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CUPRINS

Cyberbiosecurity. A short review ..... **-9-**
Caterina TOMULESCU

Sustainable solutions for corporate governance ..... **-27-**
Diana Georgiana MOSNEANU

Digitalizarea administrației publice din România – între nevoile şi aspirațiile unei societăți moderne a secolului XXI ..... **-41-**
Cezar Corneliu MANDA

About security culture ..... **-63-**
Sebastian SARBU

Academic perspectives on the specific challenges of urban resilience management ..... **-71-**
Dorel BADEA, Diana RANF, Marian COMAN

Accelerating history and the birth of a new science chaos theory ..... **-79-**
Valentin Stelian BĂDESCU, Ruxandra Ioana BĂDESCU

Smart citizens, smart administration – between rights and responsibilities ..... **-113-**
Mihaela STĂNCIULESCU

Cetățeni inteligenți și administrație inteligentă între drepturi şi responsabilități ..... **-125-**
Mihaela STĂNCIULESCU

Critical aspects of health security of the Republic of Moldova compared to eastern European countries, in the context of the COVID-19 pandemic ..... **-137-**
Marica DUMITRAȘCO

Social networked cities: the portals ..... **-151-**
Monica FRANGULEA

Gestionarea durabilă a pădurilor urbane în orașele inteligente ..... **-165-**
Laurențiu CIORNEI, Paula MUNTEANU

GIS solutions for smart city development ..... **-179-**
Ana-Cornelia BADEA, Gheorghe BADEA

Pandemic drive for synchronized smart political atmospheres ..... **-191-**
Iulia-Maria COȚOVANU TOADER

Sincronizarea atmosferelor smart ..... **-203-**
Iulia-Maria COȚOVANU TOADER

The role of the religious authorities and leaders in making or expanding new civilizations in the cyberspace ..... **-215-**
Sayed Muhammad HASAN SHAFIEE

Coridor de mobilitate urbană integrată în municipiul Alexandria şi proiecte complementare aflate în implementare ..... **-237-**
Anne Marie GACICHEVICI

Nonformal learning – a key concept for smart education ..... **-249-**
Roxana Andreea ANDREI

Factori cheie şi provocări privind guvernanţa inteligentă şi rolul autorităţilor publice în dezvoltarea ecosistemelor de inovare urbană în cadrul modelului Cvadruplu Helix ..... **-259-**
Ani MATEI, Elena Alexandra DOBRE

Intelligent cities dealing with technology for sustainability ..... **-277-**
Mauro ROMANELLI, Antonella ROMANELLI

Smart city - a solution for dealing with climate change in European cities ..... **-285-**
Oana-Georgiana SECUIAN, Anamaria-Gabriela VLAD, Mihaela VLAD

Smart toilet cleanliness detection system using IoT ..... **-297-**
Eduard-Nicolae HANGANU, Oana ORZA, Sabina BOSOC, Cristina BALACEANU, George SUCIU

Study on state of the art in reusing recyclable waste materials in orange, circular and green economy ..... **-305-**
Elena NEGRUȘA, George SUCIU, Andrei-Cristian BÎRDICI, Ana Garcia-LOPEZ, Giacomo Di BENEDETTO, Giuseppe Falvo D'URSO LABATE

Digitalizarea educației din România, planul pentru 2021-2027 ..... **-321-**
Georgiana Mădălina MIHĂILĂ

Monitoring water parameters using IoT technology ..... **-333-**
Ioana-Alexandra ESANU, Sabina BOSOC, Oana ORZA, Cristina BALACEANU, George SUCIU

The use of smart sensors in viticulture ..... **-341-**
Elena-Camelia MORARU, Oana ORZA, Sabina BOSOC, Roxana ROSCANEANU, Cristina BALACEANU, George SUCIU

Arhitectura contemporană, între tabula rasa şi adaptarea existentului ..... **-351-**
Iris GANEA-CHRISTU

Smart cities development based on S4ALLCities project ..... **-361-**
George SUCIU, Daniel-Marian DUTU, George IORDACHE, Mari-Anais SACHIAN, Ana-Maria TUDOR, Cornelia ALEXANDRU, Victor SUCIU

Reducing city household water consumption with internet of things devices ..... **-367-**
Ioan Florin VOICU, Daniel Constantin DIACONU

Smart consumption behavior? An approach related to fast fashion industry ..... **-379-**
Miruna PATRICHE

Space as integrator: from horizontal to vertical urban planning ..... **-393-**
Ulpia-Elena BOTEZATU, Olga BUCOVEȚCHI

Ageing in COVID era – Social isolation risk factors, outcomes and smart solutions ..... **-409-**
Ileana CIOBANU, Mihaela ZAMFIR, Andreea Georgiana MARIN, Mihai-Viorel ZAMFIR, Rozeta DRAGHICI, Alina ILIESCU, Laszlo IRSAY, Mihai BERTEANU

Rolul IoT în dezvoltarea administrației publice. Administrația 2.0 ..... **-425-**
Larisa-Florentina BUTNARIU (BADEA)

Vatra Luminoasă, age-friendly-study of intergenerational architecture in a Bucharest neighborhood ..... **-437-**
Mihaela ZAMFIR, Ileana CIOBANU, Mihai-Viorel ZAMFIR

Digital democracy in Peril. Safeguarding e-democracy by boosting cybersecurity ..... **-461-**
Claudiu Mihai CODREANU

Artefacts conservation using an IoT system ..... **-475-**
Cristina BALACEANU, Roxana ROȘCĂNEANU, Robert-Alexandru STRECHE, Filip-Emanuel OSIAC, George SUCIU

Private initiative and public management - factors in the development of smart cities in Romania ..... **-485-**
Aurelian Virgil BALUȚA, Alexandru Cristian RADA

Can we speak of smart education during the COVID-19 pandemic? ..... **-497-**
Irina-Ana DROBOT

Registrul secțiilor de votare din țară ..... **-505-**
Alexandra IANCU

The implementation of smart government of Iraq and its impact on the transportation ..... **-519-**
Ghanim Ahmed KAMIL, Cristian-Silviu BANACU, Mamoun Walid ARIDAH

Risk management in Palestine in the small insurance industry ..... **-527-**
Hasan MAKKAWI, Duha SAADEDIN

The impact of using electronic audit programs on auditing during the Corona crisis ..... **-533-**
Mamoun Walid ARIDAH, Akad Yassar AL-KHASAWNIH, Nuha ELAYAN, Ghanim Ahmed KAMIL

Managementul deșeurilor medicale și gestionarea acestora în timpul pandemiei Covid -19 ..... **-551-**
Narcis Dumitru BADEA

Cyberbiosecurity. A short review

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Abstract

In the new digital age, life sciences tend to converge with information technology and cybersecurity. With the new developments in biomedical research and the scientific progress of modern biotechnology, there is an exponential multiplication of related information sets, which require cloud storage and advanced methods of management and analysis, as well as ensuring an adequate protection of their content.

The bioeconomy global landscape involves common, multiple and diverse actions (i.e specific policies and framework regulations, international cooperation, national collaboration among interdisciplinary sectors and different actors of the public-private system). At the same time, biosecurity issues highlight a complex and rapidly emerging ecosystem, which involves high-risk vulnerabilities. Moreover, the current pandemic context, generated by the global spread of the new virus, SARS-CoV-2, has pointed out some issues (i.e the importance of strategic autonomy in supply chains - food, medical and pharmaceutical products, the development of critical functional infrastructures, the appropriate prevention and protection measures, including the management of rapid and effective responses to pandemics or other potential malicious actions with regard to the use of infectious biological agents, natural or artificial).

As science evolves, relying on the application of new technologies in areas such as artificial intelligence, process automation, bioinformatics and synthetic biology, vulnerabilities such as data confidentiality (i.e clinical, genetic information), cloud storage, intellectual property, may represent opportunities which could be exploited. Cybersecurity needs to be as robust as possible, anticipating and incorporating possible biological threats into its strategies.

This paper presents a synthetic overview of cyberbiosecurity available data, with the view to emphasize some of its strategic approaches currently used in the world/at the international level.

***Keywords**: modern biotechnology, synthetic biology, big data, cybersbioecurity, biosecurity.*

1. Introduction

Latest industrial biotechnologies have gained great interest, due to their wide applications in the economy, human health and environmental protection, areas which are facing global challenges and have generated and still generate deep concerns regarding climate change, environmental pollution, human and animal health, natural resources and biodiversity loss, food shortages and water scarcity. (35)

In a world which is racing in the fourth industrial revolution and also, in the new era of digitalization, there is an increased demand for alternative technologies and sustainable products based on the principles of bioeconomy, such as alternative energy sources, biomass conversion processes, bio-based bulk chemicals, biofuels, renewable feedstocks and medicines etc. Biotechnology has an enormous economic potential and, at the same time, it is promoting innovative applications for our common benefits; it could be considered as a sustainable tool for our future development, in which –omics sciences (genomics, proteomics, metabolomics, transcriptomics) and synthetic biology are used to cope with the most challenging global problems. (35)

Furthermore, in a context which estimates an increase of the global population to 9 billion by 2050 (United Nations: approximately 66% will be urban populations; World Health Organization: 1.5 billion people will be over 65 years), concepts such as smart and climate-neutral cities are gaining the attention of governments and regional/local authorities. World's largest cities have already adopted smart sustainable development goals, decision which has set the path for an estimated global market of $ 1.565 trillion by 2020. This means that smart cities decision-makers have already adopted the paradigm shift, that which we have noticed is being talked about more and more in the current pandemic context of COVID-19, and which means digitalization and implementation of modern and scientifically advanced technologies (i.e to develop smart infrastructures, including to store and manage big data, to automatize technological processes - robotics, systems of communications – WiFi and 5G Internet of things (IoT) technologies). At the same time, this shift creates new risks (often identified as vulnerabilities and threats), especially in terms of security (including cybernetic security, given that all these technologies, sensors, networks and infrastructures are based on internet access). In a report of the European Cyber Security Organisation (ECSO, 2018), the smart city was defined as a complex task, “the integration of data and digital technologies by the human being into a strategic approach to economic, environment, social, technological sustainability for citizen wellbeing”. (2, 4, 8, 12, 37)

As regards the global level, ECSO estimated that approximately 50 billion devices will be connected to the Internet, by 2020, including an increase of 23.97 trillion USD for the Internet of Everything (IoE) market. This represents a real motivation leading to new strategies development, which are necessary to implement (IoT) architectures, and which are not limited to the smart city concept, but also include areas such as human health, agriculture, environment, transport, research & development and education, in which applications of modern biotechnology are successfully replacing devices, chemicals, fuels and energy, foods,

therapeutics etc. From this perspective, special attention should be given to cloud computing (storing big data on cloud platforms) and to the potential of artificial intelligence and special algorithms assessing and analyzing big data. In fact, biological sciences interact with information and computer sciences, being convergent, and such a phenomenon provides opportunities for new emerging fields of multidisciplinary study, like cyberbiosecurity.

Limitation of the study: Although the scientific information regarding the emergent discipline of cyberbiosecurity, especially related to its potential risks (i.e. for people, environment, economy, national security etc.) is not abundant, the present study had briefly reviewed a number of 30 specific articles only to give an overview about the meaning of cybersecurity and biotechnology interactions; also, it is worth noting that scientific papers related to the biosecurity and biosafety field, have not been assessed, due to the huge amount of available data, and mostly due to their impact on both of the strategic/governmental area (including measures and implementation actions at national level) and the technical applications in the multidisciplinary fields involved.

2. Methodology

The methodology utilized in this paper has involved a review method (similar with the scoping review), in which knowledge related to the cyberbiosecurity has been synthesized with the view of a preliminary assessment of a planned theoretical study aiming to encompass larger information about international biosecurity strategies.

3. Cyberbiosecurity

As previously mentioned, biotechnology touches a wide range of economic sectors and generates large percentages of GDP from different industries. One of the major challenges of the 21st century is to develop new bio-based products (including therapeutics and medical devices) or to enhance the quality of the existing ones, in order to obtain novel materials with new properties, and to optimize sustainable technologies for a competitive growing bioeconomy. As regards modern biotechnology, emerging technologies and products (food and feed, pharmaceuticals, chemicals etc.), based on genetic engineering and molecular biology, find applications on the global market, and some of them are completely revolutionary as they prove multiple benefits for the environment and the human wellbeing. In a nutshell, biotechnology is classified on the basis of a “Rainbow code” (since 2012), in which each color is characteristic for a specific area of study/interest, such as: agriculture and environment are represented by green, industrial biotechnology and environmental engineering by white, human health and medicine by red, nutrition and insect biotechnology by yellow, aquatic resources by blue, bioinformatics by gold, arid lands by brown, ethics and law by violet, and bioterrorism and biological weapons by dark/black. Genetically modified (micro)organisms, transgenic organisms, biopolymers, cosmetics, biofuels,

additives, pigments, pharmaceuticals (antioxidants, antimicrobials, antitumorals) represent some of the most important biotechnological applications. (35)

3.1. The need for cyberbiosecurity

3.1.1. Context

Important definitions:

Article 2 of the Convention on the Biological Diversity (CBD) provides a general definition of "Biotechnology", namely that it is "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use". (15)

European Commission defines "Bioeconomy" as a bio-based sector, relying on "biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles" and excluding "health biotechnology and biological medicines". (16)

"Biosecurity", according to Food and Agriculture Organization of the United Nations (FAO), means "a strategic and integrated approach to analyse and manage risks in food safety, animal and plant life and health, and biosafety". (17)

Nowadays, the society faces new challenges, generated by the beggining of a digital era, but also of the 4th industrial revolution. (24) The bioeconomy is a fast-growing sector (27), (in the US it is considered to be the main driver of national GDP, accounting over USD 4 trillion, approx. 25% of US GDP, in 2015) (11, 30), and research and innovation are recognized as priorities for funding and investments, due to their development potential and for their societal benefits. (22) Modern biotechnology has generated multiple industrial advantages, with concrete benefits, but at the same time, (bio)innovation coupled with the implementation of advanced information technologies has identified some new exploitable gaps, and also new risks (although many hypothetical). (7) There is an interest to include elements of economic analysis in the impact assessment undertaken for strategies promoting bioeconomy development and protection, but also to highlight the need for innovative cybersecurity solutions and robust measures to ensure the security of biological infrastructures and biodata. (23) The absence or insufficient control over biological information and materials may involve serious problems, for the economic and national security, but also for human health or the environment. New biosecurity risks have emerged along with the scientific and technological progress due to the convergence of life sciences with computer information sciences, leading to the need for development of a legislative framework to address biological cyber threats. (23, 25)

The field of biotechnology has substantially changed in the last 10-20 years and as regards the emerging new cyber-physical characteristics, only a limited expertise to identify, classify and assess these rising issues is available. The interactions between modern biotechnology and advanced IT technologies (artificial intelligence, automation, robotics) have led to successful applications, especially in fields such as health (i.e. precision personalized medicine, biomegatronics, smart biosensors), biopharmaceuticals (e.g. development of new drugs, gene therapies),

agriculture (i.e. precision agriculture) and, last but not the least, to a revolution in the field of genomics, through the discovery of genome editing technology (CRISPR/Cas9). (5, 26) Thus, a new paradigm has emerged, as a hybridized, interdisciplinary field, known as the cyberbiosecurity, which describes an intersection of disciplines that can not be found in another sector. (25)

3.1.2 Issues and needs

Digitalization, the rapidly growing bioeconomy, and the dependence on biotechnology, as well as the scientific progress of synthetic biology, coupled with dual-use research has led to a new vision and strategic planning on the need to respond to emerging new threats (such as cyberbiological), to develop and to implement measures for the protection, prevention and mitigation of these risks or other potential issues related to ethics, national security, resilience, etc. (36) In other words, digitalization of biological information entails a number of vulnerabilities, threats and risks. Cyber attacks could generate significant impacts on the national bioeconomies, like orienting production towards malicious purposes (i.e. low quality products, loss of technological process integrity, changes in manufacturing infrastructures), threats to patients health (i.e. inefficient medicines, loss of bioproduction, hazardous lots of therapeutic drugs unauthorized access to biomedical data, stealing of trade secrets, loss of intellectual property and of commercial advantage, algorithms or software that may influence the R&D processes, ransomware attacks, data coding, malware coding in DNA etc. (23, 24, 29) Computational biology generates additional security issues and risks that emerge at the border between biotechnology and cyberspace. (29, 34)

At the present date, policies that manage the risks posed by the biological sciences, in which potential threats are traditionally addressed, are divided into two categories, namely biosafety and biosecurity; some examples of biological threats are: exposure to pathogens or toxins or their release into the environment (through accidental or unintentional actions), and their deliberate spread, endangering human, animal and plant health, food supply, etc. (acts of bioterrorism). Existing policies manage a limited number of threats, and the emergence of new risks due to the multidisciplinary nature and the convergence of biological sciences with IT, triggers the need for a cyberbiological legislation, but only after conducting specific research in the field of biological materials and their associated data protection. (10, 29, 39) Specifically, it could be identified needs, such as: an enhanced awareness regarding new threats as a consequence of rapid technological advancement and numerous innovations in life sciences and IT, as well as due to their potential impact on the bioeconomy, society and even national security; a specific regulatory framework development and dedicated measures implementation; a new culture of cyberbiosecurity responsibility, for which is necessary a sustained effort of cybersecurity experts and from those of the life sciences; building a common language that promotes cyberbiosecurity, as an emerging discipline that requires extra attention from governments, academia and R&D, and particularly from industry; identifing vulnerabilities and creating an effective risk management to protect data security, human health and environment, while providing an enabling framework and adequate funding for cyberbiological innovations.

3.2. Synthetic biology

According to the Royal Academy of Engineering, the synthetic biology "aims to design and engineer biologically based parts, novel devices and systems as well as redesigning existing, natural biological systems". (33)

3.2.1. A short history

Nucleobases (nitrogenous bases: purines, adenine - A and guanine – G, and pyrimidines, cytosine - C, thymine - T and uracil – U), as a base for life on Earth, and which are found in the composition of nucleic acids (DNA and RNA), are arranged in an "alphabet" code through which genetic information is transmitted. During the evolution of the species, they have not changed, but in recent years, with scientific advances, researchers have developed some new pairs of bases; and this could lead in the future to a potential new genetic "alphabet". These artificial pair bases have demonstrated the ability to replicate and function alongside natural nucleobases. Alexander Rich designed a third pair of artificial bases as early as 1962, and pioneering studies related to the study of this newly identified pair started in the late 1980s. (14)

Genetic engineering has its origins in the 1970s, when recombinant DNA technology was discovered, allowing the development of new functions in host organisms. In recent years, the biological sciences, along with bioinformatics have rapidly evolved and made possible genome sequencing and de novo synthesis. Moreover, technologies have become more accessible and cheaper. First genetic circuits were created in the 2000s, and a revolutionary method was discovered in the area of genomics in 2013, namely CRISPR-Cas (Clustered Regularly Interspaced Short Palindrome Repeats Cas system) and for which scientists behind it were awarded with the Nobel Prize in Chemistry in 2020. The first genome – of the poliovirus, was synthesized in 2002; a prokaryotic genome, specific to the Mycoplasma genitalium JCVI-1.0 strain, was synthesized in 2008; the first artificial cell – Synthia, was created in 2010. All of these discoveries have been triggered more ambitious objectives among scientists, and this led to the Human Genome Project-Write (HGP) launching in 2016, with the major goal to synthesize a complete human genome by 2026, with an estimated funding of USD 100 million. (40)

The field of synthetic biology involves multidisciplinary research, combining biology with chemistry, mathematics, computer science, physics and engineering, and its available funding (public and private) demonstrates the enormous potential for future development and applications.

3.2.2 Applications

Bioinformatics has generated exploitable new targets for cyber attacks, along with synthetic biology evolution (which includes the use of synthetic metabolic engineering techniques to design and develop new genetic circuits). One of the sectors in which synthetic biology and transgenic technologies have a large applicability is that of agricultural and food system R&D. Genetically modified organisms have been included in international and national regulatory policies, but nowadays there is a global trend to promote an industrial transition to obtain food

from genetically modified crops, of course using precautionary approaches; however, the need for an update of the existing legislation through some new policies dedicated to monitor products resulting from the application of synthetic biology technologies, as well as setting ethical standards and principles, is a serious reality. Changes in traditional industries, which occurred as a result of the modern biotechnology uses, have led to emerging bioeconomies, but also to solutions for many associated issues related to human health and environment. Transgenic technologies, through which an exogenous genetic material (and more recently, artificial genes) is introduced into the genome of an organism, and which causes approximately predictable changes, or genetic editing, in which the genome is edited accurately but with possible off-target mutations, are increasingly assimilated in agricultural research. In 2018, 191.7 million ha of genetically modified crops were reported worldwide (obtained through the application of transgenic technology), while in 44 countries and regions, products thus obtained were imported (e.g. corn, soybeans, rapeseed, beets, cotton), as processing raw materials. The largest producing countries were: USA, Brazil, Argentina, India, Canada, all of them occupying 91% of the total GMO cultivation area worldwide, but also China, recognized mainly for the production of genetically modified cotton and papaya. By means of synthetic biology, metabolic pathways of plants are modified to improve resistance to diseases or other stressors, or to increase the efficiency of photosynthesis, and CRISPR/Cas9 technology has been widely utilized to improve stress tolerance and increase yields, in crops of rice, wheat, sorghum, rape, potatoes, soybeans, corn, mushrooms, apples, bananas, citrus fruits, and grapes. Moreover, the European Union has decided to regulate "artificial meat" in 2018, as a new food product (it can be obtained by using yeast cells, which have also the ability to synthesize fatty acids from milk or other proteins). All of these technologies could lead to undesirable effects that pose health and environmental risks. For example, exogenous genes inserted into microorganisms could lead to changes in the intestinal flora; gene transfer (e.g. resistant to pesticides, antibiotics) can occur in natural environment, and this could lead to risks for biodiversity and changes in the balance of species populations in certain ecosystems, affecting soil microbiota, invertebrates or insects, and implicitly it could contribute to changes in the soil ecology or it could lead to the development of new pathogens and to pest resistance. There are also some risks involving food safety, due to unintentional mutations following gene editing (e.g. one edited gene may affect the expression of another one), which could determine changes in the populations structure of species, and even to migration of edited genes to other species. Therefore, a strict regulation and effective measures established for the food management (obtained by genetic modification, and from modern biotechnology uses), as well as clearly definitions of risks associated with synthetic biology, represent an international necessity (USA, EU, New Zealand, France, UK, Australia already have strict control regulations). (13)

Production of (bio)pharmaceuticals and therapeutics, such as artemisinic acid in yeast (anti-malarial drug), and the most cited example of application, attenuated pathogenic agents for synthetic vaccines, antitumoral invasin (obtained by developing a synthetic circuit using a Yersinia pseudotuberculosis strain),

bacteriophages designed to produce specific enzymes to lyse biofilms, or utilization of synthetic genes (i.e specific to viruses) to rapidly diagnose diseases like Ebola or Zika (as biosensors on paper), or even the development of sustainable chemicals (biomaterials, biofuels) are amongst the most known applications of synthetic biology. (33, 40)

Some authors consider synthetic biology as of critical importance, due to its industrial potential applications, especially in the field of energy, health, agriculture and environment, and predict it „to produce a new era of wealth generation". They compare its potential economic impact with that of synthetic chemistry, from a century ago, which led to the pharmaceutical development, and assuming even more benefits for economy and society. Among both, the existing and envisaged applications (including those planned to be developed in the next 10-25 years), some are mentioned as follows: in the health and pharmaceuticals sectors – biosensors to detect different anomalies (e.g. arterial disease), urinary tract infections – UTIs (through fluorescent signals when entering in contact with pathogenic agents, including MRSA – methicillin-resistant Staphylococcus aureus) and with targeted drug delivery or to enhance human immune system, some of them associated with biologically based logic gates (i.e. AND, OR, NAND); biologically based memory; artificial monosaccharides; biodegradable nanoparticles; development of new medicines or enhancing the therapeutic properties of the existing ones (including adaptable antibiotics), with reduced side effects; tissue engineering, coupled with 3D bioprinting; in energy field – development of efficient biofuels (especially for aviation); agriculture – gene delivering technologies to produce seeds with enhanced and multiple genetic traits and to maximize the crops' production yields; environment – biosensors for bioremediation, to detect heavy metals and toxins, coupled with genetically modified bacteria, which are able to degrade or to neutralize them, or other chemical compounds (e.g. arsenium); lowering the CO2 emissions, through artificial photosintesis (artificial leaves); development of new ecological pesticides; artificial enzymes for detergent industry etc. (33)

3.2.3 Legal and ethical aspects

A definition related to a biosafety risks classification system, as promoted during a Conference of the Biological and Toxin Weapons Convention (BWC) stated that it is "the inherent capability of microorganisms to cause disease, of greater or lesser severity, in humans, animals and plants", and American Biological Safety Association mentioned the "containment principles, facility design, practices and procedures" as important biosafety issues "to prevent occupational infections in the biomedical environment or release of the organisms to the environment". (40)

In a review paper, the authors identified 44 risks associated with synthetic biology, and related to human health and the environmental protection; the most common were allergies, carcinogens, antibiotic resistance, toxicity, different changes in the environment, horizontal transfer of genes, competition with native species, and pathogenicity. Also, European Union has funded research studies on biosafety risks in relation to the deliberate release of genetic engineered organisms into the

environment, especially those used for plant growth or bioremediation. The conclusion was that these organisms had an environmental impact, but it was approximately similar to that of native microorganisms; however there is a possibility to temporarily gain a competitive advantage over native populations, but their survival depends on the ecological conditions of ecosystems. Horizontal gene transfer is a more serious risk which could cause changes in the genetic structure of the ecosystems, and especially considering that this phenomenon has a growing rate in synthetic/modified organisms than in natural microorganisms (i.e the bacterial cell has a transformation rate of 107). However, a new emerging branch of synthetic biology, xenobiology, involves the synthesis of xenonucleic acids using xenonucleotides (e.g. the non-natural base pair dNaM-d5SICS - utilized in DNA belonging to a strain of Escherichia coli), or proteins using non-canonical amino acids (e.g. L-4,40-biophenylalanine), as components that do not exist in nature, could provide synthetic organisms without any risk of horizontal gene transfer. The development of strains that have genes with increased antibiotic resistance is another potential risk that should be considered. (40)

In accordance with an accepted definition, biosecurity means “security against the inadvertent, inappropriate, or intentional malicious or malevolent use of potentially dangerous biological agents or biotechnology, including the development, production, stockpiling, or use of biological weapons, as well as outbreaks of newly emergent and epidemic disease”, with the major risks mainly in the bioterrorism activities. (40)

The dual use of synthetic biology could generate biosecurity risks, taking into account that information about genome synthesis exist publicly (i.e. horsepox virus, a close relative of variola virus was synthesized using mail-ordered DNA fragments, in 2017); in addition to the extraordinary benefits of genome editing technology, CRISPR/Cas9 (i.e. its applications in human organ transplantation, development of cancer/viruses resistant cells, treatment of genetic diseases), it can also be utilized to increase pathogenicity, virulence or to produce toxins. (40)

After the creation of Synthia, international discussions approached the ethics of this subject; moreover, the former president of the USA, Barack Obama, requested a report to clearly identify the ethical limits of synthetic biology. To date, no biosecurity incidents related to synthetic biology have been reported, but risks must be considered to prevent future crises. Awareness is very important among scientific communities, which is why codes of conduct are recommended, and in some countries they are already implemented (e.g. Australia - "Code for the Responsible Conduct of Research", Japan - "Code of Conduct for scientists”, China – “Self-discipline of the moral behavior of scientific and technical workers”) or are proposed (China and Pakistan - “Model code of conduct for biological scientists”). The dual use of synthetic biological research could have economic consequences and threaten national and/or international security. In this regard, the landscape of potential threats related to defense field tends to widen, including cyber attacks targeting biotech applications (threats that can endanger a national bioeconomy, and exposing it even to possible unforeseen events, such as Black Swan). (20, 40)

In 2012, synthetic biology techniques were considered by an European scientific group of representatives from France, the Netherlands and Germany to still fall within the scope of Directive 2009/41/EC on the contained use of genetically modified microorganisms (GMMs) and Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms (GMOs). However, the European Union considered that organisms and/or products resulting from the xenobiology applications should be subject to a new regulatory system, due to the fact that artificial organisms may lead to different and new vulnerabilities. (40) Under Directive 2001/18/EC, GMOs are defined as "organisms, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination, while organism means "any biological entity capable of replication or of transferring genetic material'. Under Directive 2009/41/EC, GMM is defined as a "microorganism in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination", while microorganism means "any microbiological entity, cellular or non-cellular, capable of replication or of transferring genetic material, including viruses, viroids, and animal and plant cells in culture". (1)

Currently, considering that about 30 nations have introduced elements in their legislations that directly or indirectly envisage the clinical uses of germline editing, scientists worldwide are calling for a temporary international moratorium on heritable genome editing (especially in embryons), but excluding it from research uses, until the new technolgies are better understood regarding the risks, ethics and social implications, and in addition, they propose extensive studies, including on human population genetics. (19)

Along with the cyberbiosecurity implications of synthetic biology, many ethical and societal issues could arise with its innovative developments. In addition to a regulation framework, these issues must be carefully addressed by scientists, ethicists, philosophers and, as well, a public dialogue must be built, both to promote the benefits for society which synthetic biology generates, but also to answer to some questions about its major objective, namely the DNA synthesis and the creation of new life forms. According to a public statement recently appeared, DNA will no longer evolve in nature, but in laboratories and clinics ("not in nature but in the laboratory and clinic"). In the US there is a concern about biosecurity risks that can be generated by synthetic biology (especially, creation of harmful organisms and their deliberate or accidental release), which are also associated with social risks. However, experts in the field of biotechnology sustain that there are no imminent problems, as survival of synthetic organisms in nature would be rather difficult than in artificial environments, and in addition, genetic mechanisms/functions could be designed to make them dependent of artificial nutrients, etc. (33)

Therefore, ethical concerns were raised publically in 2010 (when the artificial cell Synthia was created), which led to a global debate and to the formulation of five ethical principles, namely: "public beneficience; responsible administration; intellectual freedom and responsibility; democratic deliberation; and justice and fairness". Nevertheless, a code of conduct is required for scientists in the field of synthetic biology, especially for those who conduct research with double use

potential, as an important tool for responsibility, awareness, prevention and/or defense in relation to ethical and/or biosecurity. (40)

3.3 Cyberbiosecurity – a new discipline

The concept of cyberbiosecurity emerged in the US, following a study conducted in 2014 and coordinated by the FBI, the American Association for the Advancement of Science and the United Nations Interregional Crime and Justice, but also following the project led by the US National Strategic Research Institute and several workshops organized by the US National Academies of Sciences, Engineering and Medicine (NASEM). (36) Therefore it was acknowledged an emergence of a new field, addressing potential and real malicious threats with a significant impact on the bioeconomy, human health and environment, with risks of exploitation and misuse of data, materials and processes, which are generated at the interface between life sciences and digital space. (32) The new discipline started to be promoted, having its main aim to understand and manage its unique risks, associated with the interactions of life sciences and IT field, in particular those generated by the digitization and /or automation of biology and biotechnology, and which triggered a new way of thinking, due to its new vulnerabilities (e.g. a virtual environment allows access to biological materials and physical infrastructure), and which are created by digitalizing biological data and big data and cloud management, by the use of bioinformatics tools, or control systems of industrial bioproduction processes, which are connected to network and automated etc. (26, 34)

Cyberbiosecurity was introduced initially in the meaning of "understanding the vulnerabilities to unwanted surveillance, intrusions, and malicious and harmful activities which can occur within or at the interfaces of comingled life and medical sciences, cyber, cyber-physical, supply chain and infrastructure systems, and developing and instituting measures to prevent, protect against, mitigate, investigate, and attribute such threats as it pertains to security, competitiveness and resilience". (27)

As regards the convergence of cybersecurity with biosecurity and modern biotechnology, some general elements of strategies, policies and standards which apply to the virtual space activities (e.g. network security, minimizing threats, diplomacy and international cooperation, incidents response, stability infrastructure etc.) interfere with strategic approaches to human, animal and plant life or environment risks, extending the traditional biosafety landscape, which is more focused on genetically modified organisms, and includes new biological threats which target new biotechnologies and infectious agents (dangerous pathogens), which can cause damage, while an increased attention to the scientific developments of synthetic biology, genomics, proteomics, bioinformatics (in terms of de novo synthesis of organisms, namely the manipulation of digital genetic sequences for the purpose of and biological weapons, or designing new functions in existing organisms, including the improvement of virulence, pathogenicity) is given. The FBI has expressed concerns about the use of genomic and medical data, which may be vulnerable to cyber attacks. (29, 34, 36)

Some approaches focusing on cybersecurity relation with biological sciences, exist at international level; for example, some are relevant in agriculture and food systems and they were initiated in the UK, some contribute to train professionals in this field and were initiated in the US, through NICE (Cybersecurity Workforce Framework), or some are concentrating on the applications in precision medicine, using genetics and artificial intelligence, at China initiative. Moreover, in literature it is mentioned the competitive planning of the USA against China, but also a trade agreement between these two, to improve agriculture in North America. (22)

Reed et al. (2019) propose a distinction between cyberbiosecurity and cyberbiosafety, implicitly a new terminology, cyberbiorisk management, and which refers to "identification, elimination and/or control of cyberbiosecurity vulnerabilities in the life science enterprise". Cyberbiosafety vulnerabilities include some of the followings: network-connected biological infrastructure systems (an unauthorized change may present risks of environmental contamination or could endanger human, animal or plant health) or the manipulation of digital genetic sequences (exposure to hazardous pathogens, environmental contamination). (30)

Examples of risks and/or vulnerabilities associated with cyberbiosecurity:

Nowadays we discuss about modern biotechnology (and possibilities to design living organisms with new or enhanced functions, modifying the DNA or even synthesizing new organisms), but also about laboratories of the future - LotF (led by virtual assistants, with automated techniques, artificial intelligence, complex neural networks, virtual reality, cloud computing and blockchain). Even so, with all these new scientific advancements, it is necessary to remember some important names that brought a significant contribution to the early developments of biotechnology: the agronomist Karl Ereky, considered the father of biotechnology, Edward Jenner, the English doctor who helped to the recognition of the vaccination importance (due to smallpox vaccine testing experiments), Alexander Fleming, the Scottish bacteriologist who discovered penicillin, Louis Pasteur, the French microbiologist who is linked to the discovery of brewer's yeast fermentation and many others. (7, 18, 30) We are the witnesses of a rapid growing evolution of biotechnological research, which has enormously evolved since then, and some common examples are: insulin production by recombinant DNA technique, human genome sequencing, genetic editing through the tool of synthetic biology, CRISPR/Cas9 (with benefits in the treatment of genetic diseases, HIV/AIDS, anti-cancer treatments), genomic synthesis (nowadays, it can be performed in just a few weeks, comparative with some years ago, when the poliovirus genome was synthesized in 3 years) etc. (18). With all these scientific developments and an increasing venture capital investments in biotechnology and artificial intelligence R&D (e.g. in 2016, the synthetic biology industry received USD 1 billion, and the AI, USD 5 billion), new issues arise, those of double uses of research and, the risk of cyber attacks (i.e. in the medical and pharmaceutical field), and given that digital dependence of research laboratories in which biological (-omics) data is managed, is increasing. (5, 7, 21) Typically, biological risks have been managed by implementing standard biosecurity practices, identifying vulnerabilities and then mitigating the risks through policies, standards, trainings, and physical security. For example, dangerous pathogens and toxins have

been regulated by their inclusion in the Biological Select Agents and Toxins (BSAT) list, and by the Biological Weapons Convention (BWC), which has the major objective to ban the development, production and storage of weapons derived from biological agents. The US and Russia are supposed to have smallpox strains in their BSL-4 laboratories, but given that a lot of genomes/genetic sequences are available online, and due to advances in genetic engineering (CRISP /Cas9 technology), new risks arise, mainly related to viral or bacterial genome editing (e.g. avian influenza virus - H7N9, with a mortality rate more than 40%, and which presently requires only 3 mutations to become more contagious and to rapidly spread to humans) or to new pathogens synthesis, which are not classified and regulated as potential threats. (7, 34)

Malicious actions on data flows (e.g. in biopharmaceutical production processes), unauthorized access to sensitive information (e.g. private biomedical data, technological information), data theft (intellectual property information, trade secrets, patients' private data, data belonging to forensic laboratories) and payments requests (ransomware attacks) are some of the most well-known risks in cyberspace. With the evolution of genomics, new plausible scenarios have emerged regarding cyber threats, including the insertion of a malicious code written into DNA (a malware encoded into a genetic molecule), which is intended to affect bioinformatics tools. (27) The production of genetic data has doubled every 7 months since 2010, and their digital availability increased exponentially, and this has led to an awareness of a potential threat of cyber attacks in various sectors of the life sciences. (3, 9) Genetic sequences manipulation is typically performed using CAD software, while cyber vulnerabilities are introduced into a genetic code using GenoCad (in a combination of PHP and JavaScript, and using an Apache server, usually). Common tools used for online genomic data screening and to download data sets, are the Galaxy application, and the PostgreSQL database. (27, 28)

With the evolutions of new genetic techniques, actions such as file encryption with the intention of payments receiving (ransomware attacks), industrial hacking, corporate espionage, commercial sabotage, are joining the other new challenges that expand the landscape of cyber risks, such as dual use of research and designing new potentially dangerous infectious agents. (10, 26) In 2014-2015, FBI reported a 53% increase involving industrial espionage incidents in the US, and a 10% increase for cybersecurity incidents involving the medical field, from the beginning of 2010. In 2017, 18% of cyber incidents targeted hospital IT systems (especially those of the private healthcare systems) and they were classified as ransomware attacks for critical data retrieval. (38) In 2014, a hacking attack, known as Anthem Blue Cross, affected 4.5 million patient records. (21) In the UK, another ransomware attack, known as WannaCry, targeted the same sector. In 2017, the chemical and pharmaceutical Merck company's network, suffered from the cyberattack known as NotPeya (the most expensive in history, with a global damage estimated at over USD 10 billion), which targeted the production control system and affected both, the company's international business operations (lost sales of USD 135 millions and other additional costs of USD 175 millions, and a total of USD 1 billion in one year) and the production of the Garadasil vaccine (IUU), Human Papillomavirus Vaccine.

Another malware has targeted the biopharmaceutical field, and which is believed to be used also for sabotage, known as Dragonfly. After these events, the pharmaceutical industry could be considered as an attractive target for cyberattacks. To support the medical system, cybersecurity experts and scientists were invited to a joint online dialogue, through the Biohacking Village initiative (https://www.villageb.io/). Also, in 2019, the US Department of Health and Human Services (HHS) announced the opening of the Health Sector Cybersecurity Coordination Center (HC3). (11, 25, 31)

Therefore, cyber vulnerabilities associated with networked biological data systems and, consequently, the associated infrastructure and equipments, R&D laboratories become subject to malicious exploitation, with cybersecurity risks and potential impact on both, bioeconomy and health. (25) Scientific progress and new genomic approaches in the life sciences also lead to new vulnerabilities and security risks in the management of genetic data. This information is particularly relevant not only for R&D and industry, but also for the public health, food and agriculture, and environment. However, even if cybersecurity focuses mainly on ensuring the confidentiality, availability and integrity of digital data, there are no systemic studies to include the emergence of biological cyber threats, especially in terms of security breaches involving genetic databases. To date, as far as is known, no cyberattacks have been reported on these databases, probably because the motivation for biohacking is weaker than that for attacks which target personal data, and in addition, the number of users of genomic data is much smaller. (31) However, with the expansion of the genomic databases, which have become an integral part of biological and biomedical research, and with an increased funding for the field of experimental genomics, as well as the free accessibility of digital genetic information to anonymous users, a new concern arises for cybersecurity, in particular for the identification and monitoring of genetic sequencing operations involving pathogens that may present risks of malicious use, and which requires dedicated research and systematic studies on the protection of biological data against cyber attacks. (38)

In 2018, 1737 databases with information on molecular biology were reported, and publicly accessible, of which 30 were dedicated to genomic information for viruses, 71 for prokaryotes and 35 for fungi, with applicability mostly in pathogens research. The most well-known genomic databases are hosted by NCBI (National Center for Biotechnology Information) and EMBL (European Molecular Biology Laboratory). NCBI stores 180914 bacterial associated genetic data, 4055 fungal specific data and 23816 viral specific data (e.g. genes, genomes, nucleotides, proteins), and also hosts many other smaller genetic databases, such as SRA (with “raw” genetic sequences resulting mainly from projects research), RefSeq (for genetic annotations), GEO (genomic data on gene expression regulation), BLAST (nucleotide sequences, proteins). EMBL, similar to the GenBank database (which contained approximately 20% of bacterial genomic sequences in August 2017), holds mainly genetic data corresponding to pathogens from several databases, such as EnsemblGenomes, EnsemblBacteria (with 44048 bacterial genomes), EnsemblFungi (811 fungal genomes), Array Express (transcriptomic data, RNA-seq, DNA-seq, CHIP-seq). Biomart is commonly used as an interface for accessing EMBL

data, but alternatively REST, MySQL, APL PERL, API R can also be used, the molecular sequences being stored in FASTA or FASTQ formats, and some are binary data (those recorded in SRA). Other genomic databases are: JGI (hosted by the Joint Genome Institute), which stores integrated comparative data (for genomics and metagenomics research), MycoCosm (fungal associated genomic data), GOLD (genomic metadata resulting from research projects), PATRIC (it holds 202602 bacterial genomes and other several thousand for different species of Archaea and bacteriophages), EuPathDB (genomes associated with eukaryotic pathogens, but also of non-pathogenic related species or host organisms), ViPR (viral specific genomic data required in phylogenetic and comparative analyzes, or for genomic annotations), PHIbase (for the study of host-pathogen interactions), PAMDB and PhytoPath (genomic data associated with phytopathogens), GenomeTrakr (FDA-managed network for monitoring food pathogens; it holds associated data for more than 2000 microorganisms with potential risks, but also common clinical pathogens). (38)

4. Conclusions

In this paper, the author has aimed to highlight the new concept of cyberbiosecurity and to synthesize some of the main aspects related to the life sciences and cyber space convergence, which have led to a new emergent multidisciplinary field. Cyber and biological contributions to bioeconomy, health, and environment reshape the security landscape. We are witnessing times of new industrial trends due to the present biorevolution, which is based not only on biotechnological scientific progress, but also on network connections, digital DNA and enhanced competitiveness. Business interest moved forward to modern biotechnology field. Smart laboratories include networked systems and devices, international interconnections, and artificial intelligence. All of the above generate opportunities, but also vulnerabilities and risks. Experts in cybersecurity issues recognize the biological implications, and they are starting to work with biotechnologists or other scientific experts, in order to promote a common language, definitions and knowledge, to better understand the new field, to identify security gaps, to foster awareness about cyberbiological threats and to develop strategies and countermeasures. Furthermore, a call for action is launched among policy makers, academia, industry and various stakeholders to design principles, standards and policies, to mitigate the cyber attacks and other related biosecurity issues (e.g. dual use research, combinational weapons), having in mind to strengthen the safeguarding capacities to protect human, animal and plant health, and business interests. (10, 24)

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Sustainable solutions for corporate governance

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Abstract

This article is concerated on the cost of the candidate recruited durring the recruitment and selection process coordinated by the Central Public Authority.
Objectives: the main objective is to demonstrate that the recruitment and selection process carried out by an IT system is more advantageous than a process assisted or not by an independent human resources expert. The demonstration will be based on the comparative analysis of costs and the transparency of the recruitment IT process which will highlight the decentralization of the decisions from the Short List of candidates, eliminating the human factor from the recruitment and selection process.
Approach By comparing the costs generated by hiring an independent expert by the Central Public Authority or implementing a IT system to replace this independent expert, will diseminate the main objective of the research.
Results The idea of sustainable governance by digitizing the recruitment and selection process is achievable by doing a simulation for the public tutelary authorities in Romania. The classic processes assisted by the human factor compared to the innovative ones, bring to light a new approach to corporate governance that becomes sustainable by digitizing its processes, being assisted by a software.
Implications Due to the fact that I study the subject in my doctoral thesis, I have not had the honor of involving other people with expertise, so far.
and Value In the Romanian public administration, the recent progress has contributed to the improvement of Corporate Governance, which is why I proposed to bring to the fore the importance of studying this area by adopting new tools for the public sector in Romania, support mechanisms, simple, uncompromising, completing the need of transparency.

***Keywords**: IT systems, costs, analysis.*

1. Sustainable national corporate governance

Sustainability from the point of view of Corporate Governance implies the digitization of the current recruitment and selection process, carried out above, often outsourced process, hiring an independent expert, who carries out the activity following the corporate governance's issues regarding the implementation in the public sector, as a consequence of wasting time and costs, not completing the process and thus the process remains partially decentralized, its finality being non-transparent and undemocratic, the Short List currently depends on a single decision maker.

In her paper, „e-government information systems or e-government: between the present and the future", D. Litan says that "the advantage of an e-government solution is, in addition to reducing costs, it is possible to promote two concepts simultaneously: e-government and e-democracy ", D. Litan proposes" the integration of the two types of applications, developing a single computer system, thus making the effort smaller. "

What are the risks of digitizing the recruitment and selection process?

Deloitte experts identify the potential risks of intensifying the digitization of certain processes following the Covid 19 pandemic, arguing that "The crisis has accelerated digitization, but uncertainty and lack of transparency will continue to affect the business environment; followed by the computerization of the tax administration and the intensification of controls in risk areas ". Conclusion: "The crisis caused by the COVID-19 pandemic worldwide, including in Romania, has accelerated long-standing processes that progressed slowly before the crisis, such as automation, digitization or implementation of remote work, but fiscal uncertainty and the lack of transparency persists and will continue to affect the business environment, say tax and legal experts at Deloitte Romania. At the same time, given the declining budget revenues and the authorities' intention not to increase taxes in the next period, they expect an increase in the digitalisation of the tax administration, but also, most likely, an intensification of controls in high-risk areas."

Source: www.deloitte.com/ro

What are the Specialized works in the field of Information Systems applied in the field of Human Resources in the private sector?

Here are some trends in the adoption of information systems in the private sector, from which we can extract some directions for the evolution of recruitment and selection processes today.

In the article of the online newspaper https://economie.hotnews.ro, it describes the situation of the telework phenomenon generated by the SARS Covid 19 pandemic:

"Do we walk the papers like in the last century, dreaming of efficiency or do we go full digital? There has been a lot of talk about digitization, about how some internal procedures have been hit by a deadlock due to the lack of an internal digital infrastructure in some companies. Human resource management is one of the most important processes of a company and, at the same time, one of the most resource consuming (time, staff, archiving space), the solution may be to digitize these processes. It is necessary to replace cumbersome, lengthy and inefficient processes

based on printed documents (ink-on-paper) with an electronic process that facilitates the quick signing of employment documents. Source: https://economie.hotnews.ro/ Narcis Anton, Smile Media, Thursday, January 28, 2021.

2. Digitized corporate governance in the Romanian public sector

Corporate Governance in the public tutelary authority is in the form of corporate governance structures that aim to function the start of the process of recruitment and selection of candidates for vacant positions of directors of the Boards of Directors of Public Enterprises in which the state is a majority or partial shareholder; monitoring the activity of the Public Enterprise; to monitor the activity carried out during the 4 years of the directors' term; centralization of the information transmitted by the Enterprise and its transmission to the Authority for Monitoring the Performance of Enterprises and Boards of Directors from the point of view of the legislation governing Romanian Corporate Governance.

These management positions represent the top management of a company and the model of the positions of administrators in the private sector is taken over, the candidates being recruited from various backgrounds and not holding the quality of civil servant, being subject to the Collective Labor Agreement and the Civil Code. Romanian law regulates the situation in which a civil servant wishes to apply for a position of director in the Board of Directors, the Administrative Code allows him to hold a maximum of three positions for a concurrent term of four years, without the existence of conflicts of interests according to the Romanian legislation in force. The rest of the seats in the Board are left for the candidates who are recruited from various backgrounds and not holding the quality of civil servant, being subject to the Collective Labor Agreement and the Civil Code. This is avaible for Public Enterprises, aswell for the private sector.

The inefficiency of the top management of a company has a direct impact on the indicator of profitability, the cash-flow, wich reflects the capability of a company to have the stability and the productive potential by creating the real value on the market.

The inefficient governance of listed companies adversely affects the economic and financial results and their possibilities for future development in terms of the following levers:

- the priority pursuit of the short-term interests of employees and managers, ie the increase of salaries and other allowances, the stability and protection of jobs;
- diminishing the rhythm of restructuring and reorganization or postponing the bankruptcy of some companies in financial difficulty;
- abusive sale of assets of companies managed or owned;
- non-realization of investments for modernization, maintenance or development of the productive potential of the enterprises;
- abusive takeover of increasing shares of capital by the majority shareholders;
- satisfying the interests of the majority shareholders through destructive methods of diminishing and transferring the wealth of the minority shareholders;

- the impossibility of using managers' remuneration programs depending on the real value created;
- excessive mobility of staff as a result of internal conflicts and lack of promotion and stimulation programs according to value criteria;
- late distribution or non-distribution of dividends to other shareholders in order to provide incentives to employees and managers at the end of the year;
- restricting the trading of securities on the capital market, which determines the increase of the volatility and the risk of the investment in the respective securities;
- maintaining a tense atmosphere as a result of the conflict between management and / or employees and minority shareholders, or the conflict between majority shareholders and minority shareholders;
- the impossibility of the active involvement of other social partners, for example of the banks, in the process of running the companies;
- reduced access to bank loans due to the faulty provision of information and their quality and the lack of sufficient guarantees;
- the impossibility of making acquisitions or takeovers by other companies in the field in order to streamline the activity of the respective companies;
- the decrease of the prestige on the market of the listed companies.

3. Implementing corporate governance in public enterprises in terms of digital recruitment and selection

An ambitious project entitled "Optimizing the interaction with the business environment and implementing advanced mechanisms for analysis and data exchange by implementing an e-government and Big Data analysis system within the Competition Council" was launched in public consultation in April 2018, a project initiated by the Romanian Government, part of Priority Axis 2 "Information and Communication Technology (ICT) for a competitive digital economy", with the main objective of "improving the effectiveness and operational efficiency of the institution using IT tools and technologies by:

- "improving internal and external transparency;
- strengthening and increasing operational efficiency through simplified and, over time, automated organizational procedures and processes;
- aligning the roles of employees and entities / units / subunits with institutional goals and objectives;
- separation of operational functions, providing clear rules for accountability. ”

The project comprises five main directions of action that will ensure the successful implementation of the desired IT solution:

- „Implementation of the BigData type platform and information analysis capabilities;
- Implemented a secure access component in mobility conditions, extension of the Big Data platform;

Consolidation of internal databases by:

- completing the computerization of workflows corresponding to the main activities of the Competition Council;
- extension of data exchange with other state institutions;
- extending the data / information management system and implementing a system for migrating data from physical format (paper) to digital format;
- Developed the architecture of the Integrated Information System of the Competition Council for an easy combination of multiple data sources, internal and external;
- Improving the training of the Competition Council staff in the use and administration of the implemented ICT tools. ”

Source: "Optimizing the interaction with the business environment and implementing advanced mechanisms for analysis and data exchange by implementing a computer system of e-government and Big Data analysis within the Competition Council" was given in public consultation in April 2018, a project initiated by the Romanian Government.

4. Study case: The digitized recruitment and selection process for future members of the boards of directors of public enterprises subordinated to the guardianship public authority by disseminating the costs generated during the selection process

During the selection process it is estimated to organize a number of 3-6 candidates / day, in a limited interval of maximum 10 days according to the Selection Plan adopted.

The competition tests are carried out, both respecting the procedures mentioned in GEO 109/2011 and GD 722/2016, as well as taking into account the relevant obligations in the field of environment, social and labor relations, in accordance with the provisions of art. 51 of Law 98/2016. Considering these, they are presented with the following stages:

1. Selection of application files
2. Psychometric testing
3. Competence-based behavioral interview
4. Behavioral assessments related to assessment centers

In order to meet the technical requirements required by the supervisory public authority, including:

- a team of experts and a set of specialized staff appraisal solutions
- elaboration of the competency matrix
- selection and management of application files
- psychometric assessment solutions
- conducting competency assessments through behavioral interviews
- implementation of assessment centers including various simulations (role play, presentation, case studies, etc.)
- reporting (activity report, individual psychometric testing report, evaluation center report)

The offer of an independent expert includes:

- Psychometric assessments
- Evaluation and / or Development Centers
- Top Management recruitment

An independent expert shall be contracted by public tender and then contracted according to the scheme below:

Estimated value of the purchase: 78,582 lei; for each enterprise (x 22 units under the ministry = 172,8804 lei)

The first stage is the adoption of an integrated platform, where there is a field specialized in carrying out the program for taking applications, a platform similar to the platform for submitting unemployment files https://aici.gov.ro/, where the data entry is done by applicant, completing the required fields and uploading on the platform the certificates and documents attesting to the acquired skills, including scan after the diplomas held, accompanied by a statement on their own responsibility of their authenticity.

It then moistens the selection and management of the application files by the personnel specialized in human resources from the level of the tutelary public authority.

Presentation of how a recruitment and selection software works:

elaboration of the matrix of competencies in order to establish the algorithms of the customized program;

- competency assessments by running the customized selection program;
- selection and management of application files, depending on the existence of a statement on one's own responsibility.

In order to meet the technical requirements required by the supervisory public authority, including:

implementation of an Assessment Center where psychometric assessment and proficiency testing takes place, similar to the EPSO assessment and testing center, where there is a room exclusively for secure testing, on EPSO's customized platforms, where workstations are no longer maintained for testing of this kind.

During the selection process it is estimated to organize a number of 3-6 candidates / day, in a limited interval of maximum 10 days according to the Selection Plan adopted.

The selection criteria will be established, both respecting the procedures mentioned in GEO 109/2011 and GD 722/2016, and taking into account the relevant obligations in the field of environment, social and labor relations, in accordance with the provisions of art. 51 of Law 98/2016. Considering these, they are presented with the following stages:

1. Selection of application files, following online submission;
2. Psychometric testing in the assessment center;
3. Testing specific knowledge in the assessment center;
4. Running the program with algorithms;
5. Completion of the selection following the dissemination of the results.

Cloud computing, Big Data and Big Data Analytics and C ++

Cloud computing and C ++ are closely linked. Big Data and C ++ techniques give users the ability to use common equipment to process requests and queries across multiple datasets, and provide timely result sets. Cloud computing provides the engine behind Big Data and C ++ processing using Hadoop, a class of distributed data processing platforms.

An architecture for C ++ in the Cloud, shown in Figure 4, where volumes of data from the Cloud and Web are stored in a fault-tolerant distributed database and processed using a programming model for large data sets with algorithms parallel, distributed in a cluster. The main purpose of data visualization is to present the analytical results in a visual form, through different graphs, for decision making.

The main role of the C ++ platform is to provide the Public Guardian Authority with the possibility to initiate and further carry out the process of recruitment and selection of future members of the Boards of Directors of subordinate public enterprises.

This platform is a tool to assist the investigative process, using specialized tools for retrieval, visualization, analysis, collaboration, warning and reporting through the capabilities described above.

Determining the Indicators for assessing the economic efficiency of investment projects through the BIRD or World Bank methodology according to the paper "Aspects of the Economic Efficiency of Information Systems", Lect.univ.dr. Laurenţiu Cătălin Frăţilă

"In order to assess the economic efficiency of investment projects through the IBRD methodology, a complex system of efficiency indicators is used, which can ensure the evaluation of the economic efficiency both at the level of economic unit and at the level of the national economy. Gross income - represents the total volume of receipts from a certain period (these are mainly the main activity of the company, but may also come from other ancillary activities, such as: receivables from the execution of receivables, sale of commercial effects In the case of financial analysis, the income also includes the credits received, because they are attracted sources and complete the funds of the economic agent.Total expenses include both investment and operating expenses. The volume of investments includes the actual expenses for the achievement of the economic objective, as well as a series of other expenses, such as: the expenses for the acquisition of some circulating means necessary for the first endowment, expenses for the preparation of the labor force, include all costs incurred in carrying out the activity, less keep the expenses with the amortization of the fixed capital.

Financial analysis of the computer system: Computer system operating costs

"The system is based on an original method of calculating costs called COST OF OPERATING HOURS PRODUCTION CENTER, which replaces the distribution of indirect costs per product by directing the section applied to direct labor.

The current method of calculating the cost of a product used by most companies in our country, based on the calculation of all indirect costs by directing the section applied to direct labor, is perpetuated since the times when internal accounting was kept manually, which did not allow a large volume of data or the use of complicated computational algorithms.

Remarks:

- Calculation of indirect expenses through utilities applied to direct labor in the cost of the product. Types of indirect costs: energy agents consumed by equipment, repair costs, etc. and direct labor.
- the possibility of collecting expenses on cost centers, employees, fixed assets and their subsequent transfer to production centers to determine the inductor COST OF OPERATING HOURS PRODUCTION CENTER. "

Source: http://www.saturn-alba.ro/, workstation cost section.

"The economic efficiency of an information system is expressed by the ratio between the useful result (the effect of the information system in the management and execution process determined by reporting to a set of established indicators) and the advanced costs to achieve the desired effect. implementation and operation of the information system.

Efficiency study

- setting an economic goal and a set of implicit, clearly expressed results. This involves quantifying the effects, requiring the association of financial indicators or values of the benefits of these effects whenever possible;
- identifying a group of stakeholders and beneficiaries of the investment;
- analysis of how the proposed IT spending will support the company's strategy;
- evaluating the applicability of the technology and the operational plan;
- assessment of the risks associated with the investment; In the process of evaluating the economic efficiency, different aspects of the feasibility of an investment proposal are studied "Source: Aspects of the Economic Efficiency of the Information Systems, Lect.univ.dr. Laurenţiu Cătălin Frăţilă.

$$C_{th} = \sum_{h=1}^{d+D} \left(\frac{I_h + C_h}{(1+a)} \right)$$

where:

Ih - are the investment expenditures from year h;

Ch - represents the operating expenses from year h;

a - is the discount coefficient of the sums of money;

d - is the duration of the achievement of the objective;

D - is the duration of operation of the objective.

The ratio between revenues and expenditures allows a comparison between the amount of revenues made over the entire duration of the economic objective (D) and the total expenditures made both with the implementation of the new economic system and with its operation:

$$R = \frac{\sum_{h=1}^{d+D} \left(\frac{V_h}{(1+a)} \right)}{\sum_{h=1}^{d+D} \left(\frac{I_h + C_h}{(1+a)} \right)}$$

in which:

Vh - revenues realized in year h;

Ih - annual investment;

Ch - annual operating expenses;

a - the discount coefficient;

d - the duration of the achievement of the objective;

D - duration of operation of the objective.

In terms of economic efficiency, the investment project can be accepted only if R> 1, expressing a fundamental law of economic activity, which presupposes that in any activity the expenses incurred must be fully recovered and a certain profit must be made for the investor. and society. If R≤ 1 the project is rejected.

Cash-flow is an indicator that expresses the gain or loss for each year taken into account:

$$Fh = Vh - (Ch + Ih)$$

Discounted net income (NPV) is an indicator that allows the comparison between the total volume of receipts obtained over the entire period of operation of the objective and the total costs:

$$VNA = \sum_{h=1}^{d+D} \left(\frac{V_h - (I_h + C_h)}{(1+a)^h} \right)$$

Depending on this indicator, only variants in which the discounted net income is higher than zero can be accepted in terms of efficiency, ie the company obtains a profit (V-C> 0) which can be (l). This indicator is significant in the situation of comparison between several competing projects, regarding the size of the estimated profit, remaining in the company after the investment has been made. However, being a volume indicator, which only quantifies the net effects, it cannot be considered extremely relevant to economic efficiency. Because it does not provide a comparison with the efforts made to achieve this net effect.

The internal rate of return on investment (IRR) is the discount rate that equals the discounted value of income with the cost over the entire period of operation of the objective.

For its calculation, it is necessary to choose a positive updated net income (V1) that corresponds to a minimum accepted rate (amin) and an income (V2) that corresponds to a maximum rate (amax).

$$RIR = a + (a_{max} - a_{min}) \cdot \frac{V_1}{V_1 + |V_2|}$$

Where: amin and amax are chosen in such a way that for amin to obtain a positive updated net income, and for amax a negative one.

The amine and amax values are determined by repeated tests. In order to limit as much as possible the number of attempts, first an approximate determination of the internal rate of economic return is made by relating the size of the average annual profit to the size of the investments, after which it is corrected as follows:

- if the service life is less than 5 years, it decreases by 0.20, between 5 and 10 years it decreases by 0.10, between 10 and 15 years it decreases by 0.05;
- for durations longer than 15 years, the discount coefficient corresponding to the ratio between the average annual profit and the total investment is considered.

The internal rate of return is one of the most significant indicators of the efficiency of investment projects, because it expresses the ability of the investment to provide profit throughout the operation of the objective, establishing its economic power, respectively the net profit obtained at a total effort.. Synthetic indicators quantify the economic efficiency obtained by exploiting the information system, as an investment of the beneficiary economic unit.

The main synthetic indicators are:

The economic efficiency coefficient for each computer subsystem (k (i)) is calculated by the relation:

$$\text{k(i)} = \frac{E_D(i)}{C_R(i)}$$

where: ED (i) - represents the direct economic effects obtained by introducing and operating the information subsystem "i";

CR (i) - represents the expenses incurred for the design and implementation of the information subsystem "i"; The coefficient of economic efficiency at the level of the designed system "k" is determined by the relation:

$$k = \frac{E_D}{C_R} = \frac{\sum_{i=1} E_D(i)}{\sum_{i=1} C_R(i)}$$

The term of recovery of the total expenses for the realization of an informational subsystem "t (i)", expressed in years, is determined with the relation:

$$t(i) = \frac{1}{k(i)} = \frac{C_R}{E_D}$$

The term for recovering the total expenses related to the entire information system designed "t", is determined by the relation:

$$t = \frac{1}{k} = \frac{C_R}{E_D}$$

The comparative efficiency coefficient "k *" is determined by comparing the designed system with another standard computer system, with the relation:

$$k* = \frac{E_D - E_D*}{C_R - C_R*}$$

where: ED * - represents the direct effects with the realization of the standard information system;

CR * - represents the expenses incurred with the realization of the standard information system.

The term of recovery of the additional investment "t *" expressed in years, is determined as the difference between the investment of the designed information system and the standard one, with the relation:

$$t* = \frac{1}{k} = \frac{C_R - C_R*}{E_D - E_D*}$$

Sensitivity analysis in evaluating economic efficiency

In the conditions of the market economy, the analysis of the efficiency of the investment projects is completed with a sensitivity analysis. This makes it possible to specify how sensitive the future investment objective will be to some changes of some factors considered risky, during its future operation. Examples of elements that can vary unpredictably over 5-10 years are:

- technical progress involving the exponential development of the information society;
- increasing competition in the field, which determines the emergence of new services and products that involve upgrading the IT system;
- depletion of initial financial and technical resources;
- moral wear and tear of equipment;
- changes in trends in product / supplier markets;
- increasing the salaries of specialized personnel.

It is important to highlight the extent to which the future system works in a stable way, even with the appearance of disturbances of the initial conditions. Sensitivity analysis involves addressing issues related to the risk and economic uncertainty specific to investment issues.

During the implementation of the investment project, phenomena can occur that can influence the economic results, such as:

- extension of the duration of the achievement of the objective or achievement of the projected parameters;
- exceeding the volume of investments initially foreseen;
- increase in prices for equipment, consumables, but also materials, utilities (energy, rents);
- salary increases. "

The economic calculation formulas were selected from the paper specified above in order to determine the costs of an IT system, viewed from the perspective of implementation at the level of the public guardianship authority to digitize the process of recruitment and selection of candidates for vacancies on boards of public enterprises subordinate.

Source: Aspects of the Economic Efficiency of Information Systems, Lecturer Ph.D. Laurenţiu Cătălin Frăţilă

The calculation formulas presented above are reference formulas in calculating the costs generated by the implementation of an IT system in an organization and were taken over in order to simulate the costs generated in the case study of the implementation of the IT system at the level of Central Public Authority. the recruitment and selection process of this scientific research.

According to the author, the economic efficiency of an information system that is to be implemented at the level of a tutelary public authority aims at a certain linear path of determining the costs of this information system.

Strengths of the computer system

- saving time, money;
- certification with international recognition and legal value of the entire digital process;

- flexibility, from the applicability of the software for each company, to the maintenance of the software for 16 years, ie 4 consecutive terms for each company;
- fully complies with the GDPR Regulation;
- it is very easy to implement, only by hiring an IT team, codding specialists;
- electronic archiving, can be integrated with the help of the Cloud platform, to be adopted by the government;
- both the management and the staff can view in real time, the data regarding the recruitment and selection process within the same system, eliminating data entry errors;
- generating instant reports of the situation of the recruitment and selection process, of the reserve candidates and of the data security;
- the technical solution is provided by a support team, ensuring the maintenance of the entire IT system. The support team can be hired or provided by the ministry staff.

Weaknesses of the computer system

- the permanent threat of the cyber security of the information system - represents a risk with high potential;
- the risk of fraud of the support team for the maintenance of the entire IT system - represents a risk with high potential;
- requires ensuring the continuous security of the hardware room of the computer system - represents a residual risk;
- requires ensuring the security of the assessment center, where the workstations are located is a residual risk.

5. Conclusion

Following the dissemination of the case study, the financial analysis of the two selection and recruitment processes shows that the recruitment and selection process in the IT system is more advantageous than a process assisted or not by an independent human resources expert, the difference being no only in the fact that the discontinuity of the mandates of the top management from the Public Enterprises is eliminated, but also the costs of the public authority are substantially diminished, considering the fact that the time of a process in digital system is much faster than the one in classical conditions.

The direct costs used to simulate the case study for the IT system consist of fixed costs with employees, the necessary and effective IT space, and indirect costs are unpredictable costs such as travel or debt costs.

Once the budget allocated for the implementation of the IT system is established, a budget versus benefits analysis is generated, consisting of: efficiency that is reflected in productivity and financial efficiency that is reflected in profit and last but not least efficiency that is reflected in productivity.

The investment in this project proposed to implement an IT system that will transform the recruitment and selection process, brings long-term benefits, becoming sustainable.

This innovation in the field adds value through its objectives, the financial benefits exemplified in the case study and takes into account the fact that in the near future we will face an older population, which leads to a decrease in the workforce of recruitment experts. of human resources in general and thus, software can create long-term opportunity.

Comparing the costs generated by the hiring of an independent expert by the Central Public Authority and the implementation of a computer system to replace this independent expert, we arrive at very good results, in the sense that a single simulation of the costs generated by the independent expert. A single simulation means a single contract for a public enterprise according to the tariff practiced on average by independent experts on the Human Resources market.

Consequences of the digitization of the recruitment and selection process at the Board of Directors:

> The paper analyzes the issue of management, governance and data analysis of the administrative system in terms of its relevance for the solutions it offers to increase competitiveness in smart specialization sectors at the national level.

> Results: The idea of sustainable governance by digitizing the recruitment and selection process is achievable by doing a simulation at the Romanian tutelary public authorities.

> Given these objectives, it practically substantiates the conclusions that can be drawn from the realization of a comparative situation of the classical processes assisted by the human factor and the innovative ones, which become sustainable through their digitization, being assisted by a software.

> Given the two cases of recruitment and selection analyzed, I conclude that an IT system to ensure the recruitment and selection process is more advantageous from the three essential points of view of an acquisition:

- it is more efficient, through the transparency and decentralization of the process;
- it is faster in terms of applicability and process;
- it is cheaper compared to the constant acquisition of an independent human resources expert.

The three Case Studies presented in the paper come to strengthen the idea of implementing a customized information system according to the specific requirements of the public guardianship authority.

The customized software must include specific software that is either developed in-house within an organization.

In most cases, the customized software is paid for in full by the organization (Tutelar Public Authority), which becomes the default owner of the software, and owns all rights to its subsequent use. Source: Romania's National Interoperability Framework.

Thus, we conclude that a software belongs entirely to the guardianship authority, being necessary whenever a recruitment and selection process is initiated.

The result of this scientific research answers the research questions and fulfills the proposed research objectives in full.

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Digitalizarea administraţiei publice din România – între nevoile şi aspiraţiile unei societăţi moderne a secolului XXI.

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Abstract

Demersul îşi propune să evalueze, în lumina radiografiei obiective efectuate la nivel european, pe baza Indicelui economiei şi societăţii digitale (DESI)), stadiul informatizării societăţii româneşti, cu predilecţie, actualitatea incidenţei tehnologiei informaţiei (IT) asupra spaţiului administrativ naţional.

Într-o manieră descriptivă, având ca repere inclusiv, bunele practici ale unora dintre statele UE etalon în materie, articolul îşi propune să identifice, deopotrivă obstacolele intervenite în procesul digitalizării administraţiei publice din România, îndeosebi a cauzelor care împiedică consolidarea unui autentic sistem informatic adecvat nevoilor unei societăţi moderne a secolului XXI, cu impact direct asupra calităţii furnizării serviciilor publice oferite cetăţenilor, dar şi a posibilelor soluţii care să genereze beneficii reale activităţii administraţiei publice, prin implementarea reală a conceptului de e-administrare.

Fără a avea pretenţia unui studiu exhaustiv, nefiind unul de strictă specialitate, ci un demers ce reflectă doar punctul de vedere al autorului, articolul se rezumă, la a prezenta, cu accente critice, în ciuda unor progrese vizibile, " distanţa încă mult prea mare" dintre aşteptările cetăţenilor români, ca beneficiari ai serviciilor publice şi realitatea, evident încă " insuficientă" şi "nesatisfăcătoare" a prestaţiilor administraţiei publice, pe coordonatele unei necesare şi urgente transformări ce trebuie să se producă în sânul societăţii româneşti, în mod esenţial, a filosofiei administrative, dar şi a modului efectiv de deservire a cetăţenilor, graţie instrumentelor IT, de către instituţiile administrative.

Cuvinte cheie: *digitalizare, administraţie publică, e-guvernare, servicii publice, Indice DESI.*

1. Consideraţii preliminarii

La debutul **deceniului trei al secolului XXI**, în plină expansiune a societăţii de tip informaţional, la nivel global, caracterizate prin predominanţa proceselor informaţionale, fundamentate pe *Tehnologia Informaţiei şi a Comunicaţiei (TIC)*, cu un impact uriaş asupra întregului sistem mondial de prestare de servicii şi oferirea

de produse, ce impune permanent o nevoie continuă de redesenare şi reconceptualizare în proiecţiile sale naţionale, **ne întrebăm unde se află astăzi România!?**

Dincolo de o idee, devenită de ceva vreme un *truism*, anume că **TIC-ul** continuă să fie **motorul principal** al modernizării economice şi sociale, ne apare ca legitimă întrebarea legată de stadiul implementării ***e-governement-ului*** la nivelul instituţiilor naţionale, dar mai ales nevoia de a identifica precis, **gradul de digitalizare a administraţiei publice din România**, ca pârghie necesară şi totodată, o condiţie *sine qua-non* a informatizării societăţii româneşti, cu implicaţii profunde asupra însuşi viitorului, şi implicit a destinului poporului român.

În sectorul public, digitizarea şi digitalizarea sunt în general considerate ca extinderi ale e-guvernării. Deşi e-guvernarea a fost iniţial considerată o formă particulară de comerţ electronic constând în furnizarea de documente şi servicii *online* cetăţenilor, domeniul său de aplicare este în prezent, cu mult mai amplu şi include obiective politice, precum reformele instituţionale, modernizarea guvernului şi introducerea de noi practici democratice.

Digitizarea echivalează cu integrarea tehnologiilor digitale în viaţa de zi cu zi ceea ce presupune o schimbare profundă în modul de desfăşurare a afacerii, cunoscută sub numele de "*transformare digitală*" sau "*digitalizare*". **Digitalizarea** implică, în esenţa sa, o perturbare a structurilor organizaţionale şi adoptarea de noi perspective inovatoare pentru definirea produselor comerciale şi crearea de valoare comercială.

Actualmente, investiţiile în infrastructurile TIC, asociate dezvoltării capitalului uman, şi în soluţii care să profite de avantajele legate de noile tehnologii şi de digitalizare sunt previzionate ca extrem de necesare din perspectiva realizării unor obiective, precum: *îmbunătăţirea durabilităţii şi calităţii vieţii şi muncii cetăţenilor şi întreprinderilor, optimizarea eficienţei şi accesibilităţii serviciilor, reducerea sărăciei, a ratei şomajului, a excluziunii sociale, a poluării şi a degradării mediului*.

Având atât o proiecţie individuală, la *nivel de cetăţean*, dar şi la una corespondentă, extrem de amplă şi complexă, ca efecte ale **digitalizării**, la *nivel colectiv*, incidentă asupra grupărilor umane, mai mici şi mai mari, până la cele ce acoperă populaţia unei ţări ori chiar la scară continentală, ni se înfăţişează cu stringenţă, **necesitatea dezvoltării culturii informaţiei, de altfel, un *imperativ omniprezent*** în cvasi – integralitatea documentelor oficiale ale autorităţilor publice, în *strategii* ori *planuri* de acţiune, menite a orienta calea de urmat, în spaţiul naţional sau la scară globală.

Unul dintre asemenea cele mai relevante asemenea documente, îl reprezintă la nivelul continentului European, ***Strategia de la Lisabona***[1], adoptată de statele Uniunii Europene, şi care are ca fundament conceptual faptul că *" trecerea către o economie digitală, bazată pe cunoştinţe, va fi un motor puternic pentru creşterea competitivităţii, îmbunătăţind deopotrivă calitatea mediului şi viaţa cetăţenilor*

[1] A se vedea **Strategia Lisabona** a fost adoptată de către *Consiliul European extraordinar de la Lisabona, din 23-24 martie 2000* şi revizuită de către Consiliul European de la Bruxelles din 22-23 martie 2005. Documentul accesibil la **link–ul**: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:184E:0030:0038:RO:PDF;

europeni". În afară de ***utilizarea TIC*** ca instrument de creştere a performanţelor economice şi a beneficiilor evidente oferite societăţii europene, acelaşi document strategic relevă nevoia de a deplasa punctul central al politicilor publice de la nivelul UE către serviciile prestate către cetăţean, facilitând totodată participarea cetăţenilor europeni la toate palierele de activitate socială şi economică.

I s-au descoperit aşadar, **noi valenţe TIC-ului**, a cărei contribuţie majoră se poate regăsi în contextul unei puternice susţineri sociale manifestate în **domenii cheie**, precum*: educaţia, sănătatea, munca de la distanţă*, şi în special, ***administraţia publică*** a cărei **eficientizare şi transparentizare implică un tip nou de guvernare**, o **guvernare electronică,** ce îmbunătăţeşte vizibil actul de guvernare, consolidează democraţia, creşte participarea la viaţa publică şi sporeşte evident, satisfacţia socială a oamenilor.

Pe aceste coordonate, **Strategia Europa 2020** pune accentul pe rolul *inovaţiei* în cadrul societăţii inteligente, sustenabile şi incluzive care solicită guvernelor naţionale şi cu deosebire, administraţiei publice de la nivelul statelor membre UE, oferirea unor răspunsuri la provocările complexe sociale şi societale, centrate pe cel puţin **patru tipuri de valori** ce guvernează sectorul public inovativ şi anume: ***rezultate, servicii, productivitatea*** (asimilată cu eficienţa activităţii administrative) şi ***democraţia***. Într-un asemenea cadru, **administraţia publică inovativă implică creativitate, dezvoltare şi implementarea unor idei practice** care să realizeze un beneficiu public concret şi cuantificabil, idei ce trebuie să fie cel puţin să se materializeze sub aspectul tehnologizării şi digitalizării, şi în niciun caz să nu reprezinte doar simple îmbunătăţiri sau cosmetizări ale serviciilor prestate.

Dacă ar fi să enunţăm câteva dintre **beneficiile aduse de introducerea soluţiilor inteligente în administraţia publică**, în această nouă viziune europeană, atunci acestea ar putea fi neîndoielnic: ***creşterea performanţei funcţionarilor şi a eficacităţii activităţii administraţiei publice***, prin îmbunătăţirea condiţiilor de muncă şi satisfacţia funcţionarilor, precum şi prin reducerea costurilor rezultate din adoptarea unui mod de lucru digitizat; ***îmbunătăţirea accesului cetăţenilor la informaţie*** datorită serviciilor prestate, a sporirii satisfacţiei utilizatorilor; ***oferirea unei game diverse şi numeric mai mari de servicii orientate*** pe nevoile concrete ale cetăţenilor şi nu pe cele ale administraţiei însăşi; ***o promptitudine a actului de administraţie***, printr-o *furnizare rapidă a serviciilor publice*; după cum şi ***remodelarea formalistă a birocraţiei***, prin *simplificarea procedurilor administrative* [2].

Toate aceste inovaţii mult aşteptate în administraţia publică nu pot fi însă realizate decât prin schimbarea politicilor publice şi a cadrului legislativ, prin transformări în gândire şi în modul de abordare a furnizării serviciilor publice şi mai ales, în oferirea de soluţii relevante, cu impact în cadrul administraţiei publice, ce presupun ca *sectorul public să fie deopotrivă interconectat şi deschis tuturor celor*

[2] Există astăzi **un consens** printre doctrinari în literatura de specialitate (*a căror listă lungă nu ne permite individualizarea lor în acest spaţiu*), atât la nivel intern, cât şi internaţional, cu privire la **impactul pozitiv şi avantajele de netăgăduit pe care IT-ul** le insuflă mecanismelor, dar îndeosebi, *promptitudinii, simplificării şi eficacităţii administrative*, ce îmbunătăţesc considerabil sub aspect **calitativ, furnizarea serviciilor publice**;

interesați, *să fie capabil să colecteze cele mai bune practici*, colaborând cu alte instituții din țară și din străinătate, astfel încât **să determine o reală schimbare socială, durabilă.**

2. Administrația publică din România în era digitală: între realități, așteptări și perspective imediate

Radiografia obiectivă a stadiului de *pătrundere* a **TIC,** în contextul măsurării gradului de digitalizare a României este furnizată de instituțiile europene, prin intermediul documentelor lor oficiale.

În acest sens, este de notat că **Comisia Europeană** a publicat ultimul Raport DESI [3] pe **anul 2020**, în care România figurează pe penultimul loc între statele Uniunii Europene. **Indicele DESI (***Digital Economy and Society Index***)** reprezintă ***gradul de digitalizare al economiei și al societății*** fiecăreia din cele 27 de țări ale Uniunii Europene, pe baza a **5 mari criterii** după care Comisia Europeană se ghidează: *Conectivitate, Capital Uman, Utilizare a internetului, Integrarea tehnologiilor digitale, Servicii publice digitale*. Cea mai avansată țară din acest punct de vedere este **Finlanda, urmată de Suedia, Danemarca și Olanda.**

România în anul 2020 se situează pe **locul 25** din cele 27 de state membre ale UE, depășind Grecia și Bulgaria, potrivit **Indicelui DESI pentru al Comisiei Europene**[4] cu un număr de **40,0 puncte**, în condițiile în care **media UE este de 52,6 puncte**.

În Raport se arată faptul că, în pofida înregistrării de către România a unei ușoare îmbunătățiri a performanței în aproape toate dimensiunile DESI măsurate, locul ocupat în clasament a rămas relativ stabil, având în vedere că *progresul general a fost lent* [5].

România înregistrează cele mai bune rezultate la dimensiunea **conectivitate**, datorită disponibilității pe scară largă a rețelelor fixe de bandă largă de mare și foarte mare viteză (în special în zonele urbane). Cu toate acestea, digitalizarea economiei a rămas în urmă, în condițiile în care mai mult de o cincime dintre români nu au utilizat niciodată internetul și mai puțin de o treime au competențe digitale elementare. În ceea ce privește serviciile publice digitale, România are cea mai scăzută performanță dintre statele membre, în ciuda ponderii mari a utilizatorilor de e-guvernare (pe locul 7 în UE). Pe de altă parte, **49 % dintre locuințele** din România sunt abonate la servicii de bandă largă de foarte mare viteză (cel puțin 100Mbps), România clasându-se astfel pe locul al 5 -lea în UE.

În ceea ce privește **dimensiunea capitalului uman**, România se situează pe penultimul loc în rândul țărilor UE, cu mult sub media UE. Nivelurile competențelor digitale de bază și avansate rămân cele mai scăzute în rândul statelor membre ale UE. Mai puțin de o treime dintre persoanele cu vârsta cuprinsă între 16 și 74 de ani au competențe digitale de bază (58 % la nivelul UE în ansamblu), în timp ce 35% au

[3] https://ec.europa.eu/digital-single-market/en/scoreboard/romania;

[4] **Indicele DESI** pentru România era cuantificat la **36,5 puncte în anul 2019**, raportat la **media UE de 49,4 puncte**;

[5] În **anul 2018,** România a ocupat ultimul loc, anume **locul 28** în clasamentul DESI (anterior BREXIT);

competenţe cel puţin elementare în materie de software (faţă de o medie de 61% la nivel UE) iar 10 % au competenţe digitale avansate.

În ciuda creşterii procentului de specialişti în domeniul TIC de anul trecut, aceştia reprezintă o proporţie mai mică din forţa de muncă în comparaţie cu ansamblul UE (2,2 % faţă de media UE de 3,9 %). În ceea ce priveşte absolvenţii în domeniul TIC, România are rezultate bune, aflându-se pe locul 5 între statele membre ale UE, cu 5,6 % din numărul total de absolvenţi.

Totodată, România înregistrează în continuare cel mai scăzut nivel de **utilizare a serviciilor de internet** dintre statele membre ale UE. 18 % dintre persoanele cu vârste cuprinse între 16 şi 74 de ani nu au utilizat niciodată internetul (faţă de media UE de 9 %). În România, oamenii sunt dornici să se implice în diverse activităţi online, în special reţele sociale şi apeluri video. Utilizarea reţelelor sociale este mai răspândită decât în toate celelalte ţări ale UE, România situându-se pe primul loc la acest capitol; astfel, 82 % dintre utilizatorii de internet utilizează reţelele sociale (faţă de 65 % în UE). De asemenea, cetăţenii români au utilizat apeluri video (67 %) peste media UE (60 %). Cu toate acestea, utilizarea serviciilor bancare online este sub media UE, în principal din cauza lipsei de încredere în tehnologia digitală, dar şi a faptului că mai mult de doi din cinci adulţi români (42%) nu deţin un cont bancar.

În ceea ce priveşte **integrarea tehnologiei digitale de către întreprinderi**, România se situează pe penultimul loc în rândul ţărilor UE, cu mult sub media UE. În comparaţie cu ultimii trei ani, locul ocupat de România a rămas stabil în ceea ce priveşte această dimensiune. Nu s-au constatat modificări la aproape niciunul dintre indicatori. Întreprinderile din România profită de posibilităţile oferite de analiza volumelor mari de date (big data) (11 % faţă de media UE de 12 %), 8 % dintre întreprinderile din România utilizează reţelele de socializare (comparativ cu media UE de 25 %). S-a înregistrat o ușoară îmbunătăţire a utilizării serviciilor de *cloud*, de la 6 % în 2017 la 7 % în 2018 şi în 2019, însă România rămâne cu mult sub media UE de 18 %. Doar 11 % din totalul IMM-urilor fac vânzări online (faţă de media UE de 18 %), în timp ce 6 % dintre acestea efectuează vânzări online transfrontaliere (comparativ cu media UE de 8 %).

În ceea ce priveşte **serviciile publice digitale**, **situaţia s-a înrăutăţit, România ajungând pe ultimul loc în clasamentul UE**. Cu toate acestea, ţara performează satisfăcător în ceea ce priveşte anumiţi indicatori. Există un nivel ridicat de interacţiune online între autorităţile publice şi cetăţeni, întrucât România se situează pe locul şapte în ceea ce priveşte utilizatorii de e-guvernare, care reprezintă 82 % dintre utilizatorii de internet, faţă de media UE de 67 %. Acest lucru contrastează cu punctajele scăzute obţinute în ceea ce priveşte formularele pre-completate şi serviciile realizate integral online, ceea ce ar putea indica o problemă sistemică în ceea ce priveşte calitatea şi uşurinţa cu care pot fi utilizate serviciile oferite.

În 2018, performanţa României s-a îmbunătăţit cu 5 puncte procentuale faţă de anul precedent în ceea ce priveşte *serviciile realizate integral online* (punctajul crescând de la 62 la 67), pentru ca în anul 2019 Indicele DESI să crească la 70, faţă de media UE de 90.

Nodul e-IDAS (identificare electronică) al României este în curs de construire prin intermediul unui proiect finanţat de FEDR („SITUE") şi se preconiza că va fi finalizat până la sfârşitul anului 2020, în condiţiile în care costul ridicat al unei semnături digitale calificate (cca 40EUR/an/ utilizator) reprezintă principală problemă pentru furnizarea unei identităţi digitale tuturor cetăţenilor.

România intenţionează să introducă un *sistem de identificare electronică* (e-ID) bazat pe **cărţi de identitate cu cip** (actualmente derulat în cadrul unui proiect pilot la nivelul judeţului Cluj, ce urmează a fi extins, ulterior, la nivel naţional). Guvernul intenţionează să utilizeze *identitatea electronică* drept instrument juridic pentru interacţiunea dintre cetăţeni şi întreprinderi cu administraţia publică.

Noul Centru Naţional pentru Informaţii Financiare, reorganizat în octombrie 2017, permite administraţiei să comunice pe cale electronică cu contribuabilii şi să primească declaraţii fiscale online. Acesta a fost reconceput şi simplificat în 2018 şi este acum disponibil prin intermediul Punctului de Contact Unic electronic (PCU-e). În primele trei luni, numărul declaraţiilor fiscale depuse pe cale electronică a crescut la peste 600 000 pe lună, reprezentând 96% din totalul declaraţiilor fiscale. **Spaţiul Privat Virtual (SPV)** este sistemul de gestionare a declaraţiilor şi a obligaţiilor fiscale ale cetăţenilor, în care sunt stabilite obligaţiile de plată; totuşi, acesta nu include niciun *modul de plată*.

Ghişeul.ro acţionează ca platformă de plată pentru SPV. Începând din martie 2018, adoptarea SPV de către întreprinderi a depăşit 200 000 de noi utilizatori/lună în primele trei luni.

În 2018, mai multe autorităţi de la nivel central şi local şi-au simplificat procedurile, care sunt disponibile în prezent prin intermediul PCU-e. Cu toate acestea, nu toate procedurile pot fi îndeplinite online, punându-se la dispoziţie numai documentaţia necesară. Ministerul Sănătăţii a simplificat procedurile pentru ca dosarul privind aprobarea şi corectarea preţurilor medicamentelor să poată fi transmis electronic, iar comunicarea cu operatorii să poată fi efectuată online. Ministerul are în vedere proiecte în domeniul e-sănătăţii, cum ar fi Proiectul Registrului de Boli şi Sistemul Electronic de Informatică Clinică. Oficiul Naţional al Registrului Comerţului (ONRC) a implementat procesul complet de înregistrare online pentru societăţile noi, inclusiv schimbările şi modificările din registrul întreprinderilor, vânzarea sau transferul de proprietate (transmiterea părţilor sociale), precum şi procedurile de insolvenţă. Înregistrarea simplificată online are un timp de răspuns de maximum 3 zile lucrătoare. ONRC furnizează în prezent 30 de servicii publice digitale.

Per ansamblu, se conchide că **sistemul informatic al administraţiei naţionale este fragmentat**, ceea ce reprezintă o sarcină administrativă pentru cetăţeni şi întreprinderi. În general, nivelul de interoperabilitate între serviciile administraţiei publice este *scăzut*, deoarece fiecare instituţie publică s-a concentrat asupra propriului său serviciu public digital. Prin urmare, nu este clar în ce măsură informaţiile transmise iniţial, sunt reutilizate ulterior de celelalte instituţii.

De departe, Raportul reţine o **realizare importantă pentru anul 2020,** anume **acordarea sprijinului tehnic strategic pentru proiectele centrale de digitalizare ale autorităţilor centrale din România, pe baza fondurilor UE, în**

cadrul proiectului (PO Asistenţă tehnică). Este reţinut în acest sens**,** rolul important al *Ministerului Comunicaţiilor şi Societăţii Informaţionale* de a sprijini ministerele şi celelalte autorităţi ale administraţiei centrale de a elabora şi ulterior, de a implementa proiecte-cheie de digitalizare legate de serviciile publice implicate în " evenimentele de viaţă" ale cetăţenilor şi ale întreprinderilor, e-sănătate, nodul IDAS, ID-ul digital, toate în conformitate cu Agenda Digitală pentru România (2020). Demersurile s-au materializat la nivelul unor ministere –cheie, precum Ministerul Afacerilor Interne şi Ministerului Muncii de a contracta fondurile necesare creării sistemelor informatice care să asigure furnizarea digitală a unor **servicii publice esenţiale**, precum: *registrele Stării Civile, în domeniul protecţiei copilului şi a adopţiei, al sprijinului persoanelor cu handicap* etc.

Se estimează că în următorii tei ani, **asemenea servicii** (ex*: înregistrarea naşterilor*) vor deveni accesibile, într-o manieră facilă, prin intermediul ***mijloacelor digitale***.

Acelaşi *Raport al Comisiei Europene* pentru anul 2020 consemnează că principale **bariere** în calea **realizării** *serviciilor publice digitale* în România sunt: *lipsa de coordonare* dintre instituţiile publice în ceea ce priveşte instituirea unor astfel de servicii; *migrarea specialiştilor* din IT din sectorul public înspre sectorul privat sau în alte ţări; *lipsa generală de competenţe digitale*. Se mai apreciază de către oficialii europeni că numai o soluţie de e-guvernare bine şi corect implementată ar ajuta totodată întreprinderile să interacţioneze cu autorităţile publice mai uşor, mai rapid şi cu costuri mai reduse.

De aceea, se apreciază că adoptarea legii privind *interoperabilitatea* şi punerea în aplicare a acesteia de către toate organismele publice implicate ar constitui un prin pas spre realizarea de îmbunătăţiri în administraţia publică digitală.

O dimensiune aparte a problematicii, o reprezintă rolul digitalizării în gestionarea pandemiei de COVID -19 şi în sprijinirea redresării economice. Astfel, se apreciază că actuala criză provocată de această pandemie are un impact semnificativ asupra unor indicatori societali importanţi, legaţi de utilizarea serviciilor de internet de către cetăţeni, ceea ce presupune neîndoielnic coroborarea constatărilor DESI 2020 cu presiunea exercitată asupra infrastructurii şi serviciilor digitale întreprinse de statele membre.

Într-un asemenea context, este de relevat faptul că, potrivit constatărilor Comisiei Europene, România a luat mai multe măsuri specifice în domeniul digital pentru a face faţă crizei provocate de pandemia de COVID-19. Sunt reţinute printre aceste măsuri: centralizarea datelor medicale referitoare la situaţia cauzată de virusul SARS- CoV; s-a creat un site web[6] pentru ca societăţile comerciale să transmită electronic documentaţia necesară pentru acordarea şomajului tehnic; sprijinirea persoanelor concediate din cauza pandemiei care caută în mod activ un loc de muncă prin alte iniţiative similare[7]; în paralel s-au creat mai multe site-uri web de informare pentru oferirea de informaţi clare, pentru a spori transparenţa, a reduce panica şi combate dezinformarea[8].

[6] https://aici.gov.ro;
[7] https://datafara.ro;
[8] https://stirioficiale.ro/, https://datelazi.ro, https://fiipregatit.ro, https://cetrebuiesafac.ro;

Acelaşi **document european**[9], mai menţionează crearea de site-uri web menite a oferi sprijin spitalelor[10], precum şi pentru colectarea şi distribuirea coerentă şi în siguranţă a ajutoarelor, dar şi achiziţionarea de laptopuri (în valoare de 24 milioane EUR) de către Ministerul Educaţiei pentru 250000 de copii, asigurându-se astfel, accesul la activităţi de învăţare la distanţă pentru elevii din medii defavorizate înscrişi în unităţi de învăţământ preuniversitar.

3. Bune practici ale digitalizării administraţiei în spaţiul UE

3.1. Danemarca[11]

Începutul societăţii informaţionale s-a plasat în anul 2000 în momentul constituirii Comisiei pentru Administraţia Digitală, subordonată Ministerului de Finanţe, şi al cărei rol a fost implementarea unui meta-limbaj de marcare (XML) ca şi standard comunicaţional în sectorul public şi dezvoltarea utilizării semnăturilor electronice.

În anul 2002 este publicată **prima strategie e-Guvernare** urmărind îmbunătăţirea calităţii serviciilor publice, eficienţa, introducerea unor noi metode de gândire şi transformarea organizaţiilor şi a proceselor. Anul 2003 a adus ca noutate lansarea infrastructurii necesare dezvoltării unei societăţi informaţionale, tuturor instituţiilor publice fiindu-le conferit dreptul de a transmite documentele celorlalte autorităţi în format electronic şi să solicite informaţiile în acelaşi mod.

O nouă strategie privind e-Guvernarea a fost adoptată în anul 2004 şi avea drept obiectiv principal dezvoltarea unui sector public orientat spre nevoile cetăţenilor, extrem de eficient şi capabil să furnizeze servicii de calitate.

Începând cu anul 2005 tuturor cetăţenilor danezi le este ***garantat dreptul de a comunica electronic*** cu autorităţile publice şi de a primi răspunsuri în aceeaşi manieră. În luna august a aceluiaşi an, autorităţile au întreprins o campanie de informare în masă privind serviciile oferite prin e-Guvernare, după patru luni instituindu-se obligativitatea instituţiilor publice de a face plăţile doar prin transfer electronic. Lansarea unui serviciu web destinat pensionarilor a deschis o nouă oportunitate pentru promovarea e-Guvernării, fiind un site inovator prin care furnizorii sistemelor private de pensii primeau automat informaţii în momentul în care unui cetăţean i se acorda o pensie publică anticipată.

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[9] *Raportul Comisiei Europene privind Indicele economiei și societății digitale (DESI) 2020 pentru România*, reține că " privind în perspectivă, acești indicatori DSI sunt deosebit de relevanți pentru redresarea economică după criza provocată de pandemia de COVID-19, *România fiind foarte avansată în ceea ce privește acoperirea VHCN și se situează pe locul 14 în UE în ceea ce privește gradul de pregătire pentru utilizarea rețelelor 5G*, deși pe de altă parte, ***a rămas în urmă în ceea ce privește indicatorii referitori la competențele digitale și are o performanță slabă în ceea ce privește digitalizarea întreprinderilor și serviciilor publice digitale*** ";

[10] https://www.ajutorspitale.ro; https://spitale.quickdata.ro; https://rohelp.ro; etc

[11] A se vedea ***Strategia Digitală 2016-2020***, **Agenţia pentru Digitizare a Danemarcei**, https://en.digst.dk/;

În anul 2007 a fost lansat portalul electronic naţional al Danemarcei, **borger.dk**, iar strategia e-Guvernării din perioada 2007-2010, al cărei obiectiv principal era îmbunătăţirea coeziunii şi cooperării în interiorul sectorului public, a fost rapid îmbrăţişată de Guvern, autorităţi locale şi de către cele cinci regiuni daneze.

În perioada imediat următoare s-a încheiat un acord între Guvern, administraţia locală, regiunile daneze şi un anumit furnizor privat prin care acesta trebuia să dezvolte şi să implementeze o inovaţie în domeniul semnăturii electronice.

Ministerul Ştiinţei, Tehnologiei şi Inovaţiei din Danemarca a sprijinit în anul 2008 lansarea unui software *open source*, dezvoltat de către autorităţile publice, care putea fi folosit şi dezvoltat de orice persoană interesată, iar în anul 2010 aceeaşi instituţie lansează „*NemID*", o nouă semnătură electronică care oferă danezilor un acces sigur şi uşor asupra unei game largi de soluţii self-service prin internet (eBanking, asigurări pentru imobiliare etc.).

Interesant este faptul că în anul 2011, Ministerul Ştiinţei, Tehnologiei şi Inovaţiei iniţiază un proiect ingenios prin care acordă 15 burse unor studenţi pe perioada vacanţei de vară pentru a îmbunătăţi software-ul *open source* pentru sectorul public danez, astfel **studenţii îşi îmbunătăţesc cunoştinţele de IT, iar autorităţile beneficiază de idei noi, proaspete.**

Potrivit strategiei privind digitizarea sectorului public, adoptată pentru perioada 2011-2015, obiectivul principal îl constituia, unul extrem de ambiţios, anume ***accesarea online a tuturor serviciilor de către cetăţenii*** **Danemarcei**.

De asemenea, începând cu anul 2015, este obligatoriu ca toate persoanele să comunice cu autorităţile publice numai prin intermediul internetului şi să deţină o căsuţă poştală digitală prin care vor primi înştiinţări din partea instituţiilor publice, tranzacţiile fiind mult mai flexibile. În vederea îndeplinirii obiectivului principal al strategiei, toate autorităţile trebuie să promoveze o infrastructură digitală comună, eforturile să fie coordonate în acest sens şi să fie adoptată o lege care să ia în considerare şi să cultive oportunităţile ivite în sfera societăţii informaţionale.

Pentru cele mai multe state, trecerea la servicii digitale nu mai este o alegere, ci de cele mai multe ori este singura opţiune pentru a menţine calitatea vieţii cetăţenilor pe termen lung. Un exemplu este relevat de Danemarca, ţară care ia deja măsuri îndrăzneţe spre era digitală - ceea ce face ca un număr tot mai mare de servicii guvernamentale să existe doar în ***format digital*** - ceea ce înseamnă că **utilizarea serviciilor electronice este singura opţiune posibilă pentru a interacţiona cu guvernul.** Comunicarea pe suport de hârtie nu mai este o opţiune. Desigur, astfel de măsuri drastice sunt cuplate cu principiul că agenţiile guvernamentale sunt responsabile pentru furnizarea de sprijin pentru persoanele cu nivel scăzut de calificare sau cu handicap.

Acest lucru înseamnă că, în cazul în care sunt responsabile pentru a ajuta cetăţenii care se luptă cu utilizarea noilor e-servicii, şi nu mai există nicio alternativă pe suport de hârtie, atunci ele sunt foarte motivate să se asigure că e-serviciile sunt la fel de uşor de utilizat, pentru că numai atunci agenţiile vor fi în măsură să reducă costurile pentru serviciile de asistenţă

Danemarca a înființat în 2011 Agenția pentru Digitizare, cu misiunea de a "accelera procesele de digitalizare necesare modernizării societății daneze de bunăstare"[12].

"*Strategia publică comună pentru bunăstarea digitală 2013-2020*" este un pilon important în cadrul planului pe termen mediu al guvernului danez în contextul căruia, se așteaptă ca **modernizarea sectorului public** să elibereze resurse în valoare de 12 000 milioane DKR (1.600 de milioane de euro) **în anul 2020**. Acest obiectiv înseamnă că, deși o serie de teme se ocupă de transformarea serviciului public, creșterea și dezvoltarea calităților, perspectiva și concentrarea pe realizarea câștigurilor de eficiență rămâne o condiție prealabilă fundamentală pentru proiectele strategiei.

Digitalizarea și utilizarea mai intensă a tehnologiilor digitale în furnizarea de servicii publice, inclusiv educație, se concentrează pe proiectarea serviciilor și proceselor de livrare asociate pentru a satisface mai bine utilizatorul și continuă să se bazeze pe abilitățile celor implicați în susținerea livrării serviciilor. Proiectul danez care vizează creșterea **utilizării tehnologiilor digitale în școlile publice** a însemnat implicarea unui număr de părți interesate, inclusiv a utilizatorilor finali (profesori). În mod similar,implicarea diferitelor părți interesate în Proiectul danez "*Soluții in bunăstarea tehnologică difuză*" a sprijinit selectarea celor mai bune proiecte ale Fundației Technology Welfare Foundation sa fie implementate la nivel național.

Politicile pentru asigurarea unor sisteme de sănătate care funcționează bine au devenit o problemă din ce în ce mai importantă în toate țările OCDE. Îngrijirea medicală este de interes vital pentru toți cetățenii, astfel că toate țările se confruntă cu o creștere alarmantă a costurilor deja semnificative din cauza schimbărilor demografice viitoare și a creșterii numărului și a incidenței bolilor cronice. Acești factori subliniază necesitatea de a îmbunătăți eficiența și eficacitatea sistemelor naționale de sănătate. Tehnologia, și în special tehnologiile digitale, joacă din ce în ce mai mult un rol esențial în valorificarea viitoarelor politici de sănătate. Deși au fost implementate cu ritm diferit în tarile OCDE, rețelele digitale pot contribui la reducerea erorilor și costurile de tranzacție între spitale, practicieni și farmacii, pe de o parte, și pacientul, pe de altă parte. Rețelele digitale furnizează de asemenea date pentru a îmbunătăți dozele, pentru a identifica interacțiunile periculoase ale medicamentelor și pentru a preveni abuzul și traficul. Portalul danez pentru sănătatea publică **Sundhed.dk** este un exemplu de tehnologie digitala folosita pentru a ajuta comunitățile dintre furnizorii de servicii de sănătate și pacienții și rudele acestora.[13]

În 2012, guvernul danez, la inițiativa Ministerului Educației, a fost de acord cu reprezentanți ai administrației locale din Danemarca, în privința unei strategii comune pentru creșterea utilizării TIC în școala primară.

Strategia acoperă toate cele 98 de municipalități, aproximativ 1700 de școli, aproximativ 49 000 de profesori și 580 000 de elevi. Strategia este concepută sub

[12] https://en.digst.dk/policy-and-strategy/digital-strategy/;
[13] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

umbrela strategiei naţionale electronice comune a guvernului danez. Bazându-se pe o situaţie cu puţine şcoli avansate, puţine schimburi de cunoştinţe, pieţe imature pentru materialele de învăţare online / IT şi puţine cercetări efectuate cu privire la direcţia şi impactul digitizării în educaţie, danezii au decis să-şi dezvolte strategia în jurul a **patru elemente-cheie**:

- Dezvoltarea pieţei pentru *resursele digitale de învăţare* pentru a spori furnizarea de produse de înaltă calitate;
- Asigurarea unei *infrastructuri IT* eficiente în şcoli;
- Obţinerea de mai multe *cunoştinţe despre învăţarea* bazate pe tehnologia informaţiei;
- Sprijinirea *utilizării resurselor IT şi digitale de învăţare* prin crearea de reţele şi schimbul de cunoştinţe.

Până în 2014, toate municipalităţile au stabilit infrastructura necesară, iar investiţiile în TIC permit acum predarea care a crescut semnificativ, iar cercetarea vizează şi evaluează învăţarea digitală; cu alte cuvinte, ecosistemul este în curs de dezvoltare [14].

3.2. Estonia

Considerată un ***miracol***, astăzi Estonia este considerată **cea mai digitalizată ţară din lume**, exemplul său fiind cu adevărat un autentic referenţial în ceea ce priveşte viteza, amploarea şi efectele trecerii la societatea informaţională.

Estonienii au acordat în ultimii 10 ani o atenţie deosebită dezvoltării tehnologiilor informaţionale, astfel încât astăzi Estonia este considerată o ţară de referinţă în domeniu. Cifrele vorbesc de la sine: **100% dintre şcolile şi instituţiile de stat dispun de calculatoare**, toate şcolile au cataloage electronice, **76% din populaţia ţării are calculatoare la domiciliu**, internetul în sistem Wi-Fi acoperă toată ţara.

Mai mult, ***accesul la internet*** este considerat în Estonia un **drept social**, de care cetăţenii, pur şi simplu, nu pot fi privaţi. De asemenea, **99% dintre toate plăţile bancare**, **95% din declaraţiile pe venit şi 95% din reţetele medicale** sunt **efectuate** şi, respectiv, **eliberate** în ***format electronic***.

Prin intermediul portalului electronic *www.eesti.ee* [15], la care sunt conectate peste **800 de instituţii**, estonienii pot afla o gamă foarte largă de informaţii de la orice instituţie de stat şi pot beneficia de zeci de servicii. În 2001, Guvernul a creat o pagină web: "*Astăzi iau decizii*", în cadrul căreia ministerele îşi încarcă toate proiectele de legi, permiţând oamenilor să revizuiască, să comenteze şi să facă propuneri cu privire la procesul legislativ, precum şi să propună amendamente la legislaţia existentă. Propunerile făcute prin intermediul paginii web sunt transmise ministerelor responsabile pentru răspunsul obligatoriu.

Încă din anul 2002 guvernul construise deja o **reţea Wi-Fi gratis** care acoperea majoritatea zonelor aglomerate. Din 2005, a **introdus votul online**, iar in 2012 fusese deja instalată o reţea extinsă de cabluri cu fibră optică - promisiunea

[14] http://www.uvm.dk/itifolkeskolen;
[15] A se vedea **portalul electronic estonian**: https://www.eesti.ee/en;

unei conexiuni de date ultra-rapidă - iar **94% din taxele cerute de stat erau plătite online**, cetăţenii pierzând în medie 5 minute să completeze zonele de pe formularele online care nu fuseseră completate automat de sistem în conexiune cu birourile de taxe şi cu băncile. Acum, fiecare lucru care poate fi făcut cu un serviciu digital, este pus la punct.

În 2000, Guvernul Estoniei şi-a schimbat reuniunile Cabinetului în sesiuni ***fără hârtie*** folosind un sistem de documente pe bază de web. Obiectivul noului sistem bazat pe web este de a automatiza procesul de pregătire şi procedurile de întâlniri ale Cabinetului, care include pregătirea cât mai multor materiale pe cale digitală. Miniştrii studiază proiectele de legi şi regulamente, fac comentarii şi sugestii, după cum şi votează în întregime, *online*. Sistemul a sporit viteza de luare a deciziilor în ceea ce priveşte problemele care nu produc niciun dezacord, lăsând astfel mai mult timp pentru discuţii politice de fond.

Digitalizarea Estoniei, cel mai dezvoltat stat din lume în prezent din acest punct de vedere, s-a concretizat datorită unui parteneriat dintre un guvern interesat de noutăţi, preocupat de viitor, şi un sector IT&C plin de iniţiativă.

Totul a început în 2000, prin implementarea serviciilor de *m-Parking* şi *e-Tax Board*, adică un sistem de plată a locului de parcare printr-o aplicaţie şi un serviciu de achitare a taxelor şi impozitelor.

Actualmente, **E-guvernarea** şi dezvoltarea *e-democraţiei* în domeniul tehnologiei informaţiilor şi comunicaţiilor în administraţia publică se bazează în mare măsură pe proiecte. Trei dintre cele mai importante sunt infrastructura de Internet în bandă largă, X-Road şi cardul de identitate.

Infrastructura de comunicaţii de date din Estonia a fost dezvoltată, în principal, prin două proiecte mari: PeaTee (Drum principal) şi KülaTee (Village Road). Scopul programului privitor la infrastructură a fost de a furniza servicii de comunicaţii de date pentru agenţiile guvernamentale locale, şcoli şi biblioteci. Infrastructura a fost construită în zonele rurale pentru furnizarea de comunicaţii de date şi conexiuni permanente la internet. Se estimează că 99,4% din locurile de muncă guvernamentale au acum conexiune la internet.

X-road este un program de modernizare a bazelor de date naţionale cu scopul de a le transforma într-o resursă comună, publică, de redare a serviciilor. Aceasta ar permite agenţiilor, entităţilor juridice şi publicului să caute date din bazele de date naţionale prin Internet, cu condiţia ca acestea să aibă dreptul să facă acest lucru. Utilizarea serviciilor presupune autentificarea care se poate face fie cu cartea de identitate estoniană, fie prin utilizarea codurilor de autentificare ale băncii de Internet.

E-Citizen este un proiect la nivel naţional pentru dezvoltarea cooperării dintre cetăţenii estonieni şi sectorul public prin intermediul internetului. A început cu scopul de a crea un portal cetăţean pe Internet, dar se dezvoltă acum într-o soluţie unică care să permită cetăţenilor să participe la societatea informaţională. Fiecare cetăţean va avea propriul sistem informatic (birou virtual), pe care îl poate accesa cu cartea de identitate. Cetăţeanul comunică cu toate celelalte sisteme informatice din stat prin intermediul acestui sistem informatic personal, în timp ce aceste sisteme au obligaţia de a comunica cu biroul cetăţeanului şi de a reflecta

stadiul procesării afacerilor sale la acest birou. Cetățeanul nu mai are nevoie să caute servicii, dar are posibilitatea să comande servicii şi să urmeze procesarea acestora fără a-şi părăsi '*biroul*".

Au fost create, pe rând, sisteme cu interfețe simple, din cele mai diverse, de la plata impozitelor şi taxelor, la înregistrarea deducerilor de care un cetățean beneficiază, la formularistica necesară înregistrării unei firme sau plata unei amenzi rutiere. Bazele de date ale instituțiilor au fost conectate între ele, astfel încât dacă o autoritate are nevoie de informaţiile pe care le deține o altă autoritate să le poate prelua automat. A dispărut, astfel, noțiunea de adeverinţă emisă de o instituție. Mai mult, statul estonian a aplicat un **principiu numit *„o singură dată*",** ceea ce înseamnă că informaţiile care au fost cerute o dată, cetățenilor, de o autoritate publică, nu vor mai fi cerute altădată, aceloraşi cetățeni, de alte instituții, fiindcă ele sunt obligate se le acceseze din locul de unde au fost *" înmagazinate*" **prima dată**.

Aplicarea principiului *„o singură dată*", a determinat **debirocratizarea completă**, fapt care l-a făcut extrem de atrăgător, completat apoi cu un altul, anume principiul „*Big Brother în sens invers*". Acesta este un mecanism prin care fiecare estonian poate verifica în timp real care instituţii şi când i-au verificat datele. Practic, odată conectat în sistem, el poate deschide o fereastră web în care i se afişează când i-a folosit ultima dată datele *Serviciul de Evidenţă a Persoanei* sau *Autoritatea Electorală* sau orice altă instituție. Dacă are nedumeriri sau dubii, se poate adresa autorităţii pentru a cere lămuriri cu privire la datele verificate.

Din 2002, Consiliul pentru cetăţenie şi migraţie emite un nou document de identificare internă primară, ***cartea de identitate***, care este o cartelă tipărită care poartă **semnătura digitală**. În Estonia un document semnat digital este echivalent din punct de vedere juridic cu un document de hârtie semnat olograf. Prin urmare, nu sunt necesare servicii speciale cu care să poată fi utilizată semnătura digitală. De exemplu, instanţele acceptă deja documentele semnate digital şi au instruit oficialii să facă acest lucru.

Pentru a se putea conecta în sistem, fiecare estonian primeşte la vârsta de 15 ani un ***card de identitate digital***, cu cip încorporat, care se introduce într-un cititor cuplat la calculator.

Pentru a împiedica furtul de identitate, a fost implementat un sistem cu două PIN-uri, care se folosesc după citirea cardului.

Totodată, toţi estonienii au *semnătură digitală*, creată pe baza cardului de identitate digital, cu ajutorul căreia autentifică documentele electronice. Mai mult, de câţiva ani este disponibilă şi *identitatea mobilă*, încorporată în *cipul* telefonului mobil, furnizat de operatorul de telefonie mobilă.

Utilizarea semnăturilor electronice aduce ţării economii de 2% din PIB anual. Mai mult, cu ajutorul acestui card, posesorul poate face o mulțime de lucruri fără a ieşi din casă – *să achite serviciile bancare* şi *comunale*, *să înregistreze copilul la şcoală sau la grădiniță*, *să înregistreze în termen de maxim 18 minute o firmă*, *să controleze reuşita şcolară a copilului său*, *să consulte medicul sau să comande medicamente din farmacii.*

Sistemul de ***plată a taxelor online*** este de asemenea unul revoluționar. Astfel, pe baza aceluiaşi sistem de identificare, în acelaşi **portal eesti.ee,** contribuabilul se

loghează în sistem, verifică o serie de date şi informaţii pre-completate, face toate schimbările necesare – dacă e cazul – şi confirmă declaraţia cu ajutorul semnăturii digitale. Procesul durează între trei şi cinci minute. Chiar şi rambursarea unor deduceri de taxe este posibilă cu un singur click, din 2015. Astfel, dat fiind că informaţiile privind taxele şi impozitele fiecărui contribuabil şi deducerile de care beneficiază sunt deja disponibile în sistem, colectate de diverse instituţii, ele sunt afişate fiecărui contribuabil, odată cu suma rezultată. Contribuabilului nu îi rămâne decât să dea un click pe butonul de confirmare. Durează mai puţin de un minut totul.

Platforma creată de statul estonian este folosită şi de companii private sau ONG-uri. Practic, la ora actuală, folosind portalul de stat, dar şi soluţiile private, „*orice tranzacţie, de la plata parcării la **alegerile naţionale** poate fi făcută de pe un smartphone*", constata un **studiu din 2016 al Băncii Mondiale**.

Şi încă un exemplu de societate digitală funcţională: poliţia estoniană nu mai are voie să oprească maşinile pentru verificări tehnice, deoarece toate datele referitoare la un vehicul pot fi accesate de pe calculatorul aflat în maşina de patrulare. Calculele oficiale arată că ***poliţia rutieră a devenit astfel, cu 50% mai eficientă***.

Cu ajutorul identităţii digitale peste 90% dintre acţiunile legale care erau condiţionate de deplasarea cetăţeanului la anumite societăţi sau instituţii pot fi realizate acum cu ajutorul unui *telefon inteligent*, unui *laptop s*au unei *tablete* - Estonia fiind astfel una dintre cele mai avansate ţări la nivel global.

O facilitate online a adus-o pe alta. Astfel, existenţa identităţii digitale a creat posibilitatea votului online, care a fost introdus în 2005, pentru prima dată în lume. „Sistemul de vot online înseamnă că orice cetăţean estonian cu drept de vot poate vota de oriunde din lume unde are conexiune la internet, în trei minute". Sistemul de vot online este simplu şi elimină practic manipularea votului, fiindcă se ia în considerare doar ultimul vot înainte de încheierea alegerilor, indiferent de câte ori votează un cetăţean.

La sfârşitul anului 2014, Estonia a lansat primul şi singurul program din lume de **e-rezidenţă**. Cartea electronică de rezidenţă este o carte digitală estoniană de identitate pentru non-rezidenţii din Estonia. Astfel, în prezent, toţi estonienii şi rezidenţii estonieni pot accesa toate serviciile digitale oferite de Estonia şi pot semna electronic orice document doresc, în condiţiile în care actualmente, Estonia oferă circa **4.000 de servicii care pot fi accesate online**.

3.3. Islanda

Islanda ocupă poziţia fruntaşă în privinţa adoptării ***e-Guvernării*** la nivelul statelor europene. Începutul e-Guvernării îşi găseşte rădăcinile în anul 1996, când Guvernul a prezentat o viziune asupra societăţii informaţionale, viziune care mai târziu s-a transpus într-un proiect dezvoltat în perioada 1997-2003.

În anul 2000 a fost introdus conceptul de e-Guvernare prin diferite proiecte experimentale, prin creşterea numărului de servicii oferite de Ministere prin intermediul internetului şi, desigur, prin revizuirea legislaţiei. Mai apoi, este recunoscută forţă juridică a semnăturii electronice, este dezvoltată infrastructura şi

tehnologia necesară în vederea implementării e-Guvernării (2001), fiind adoptate normele privind soluționarea electronică a problemelor cu care se confruntă administrația publică (2003).

În anul 2004, primul-ministru ia decizia de a asigura conexiunea la internet în zonele în care acesta nu era furnizat sau era limitat, proiectul privind societatea informațională din perioada 2004-2007 focalizându-se pe dezvoltarea rapidă a politicilor privind e-Guvernarea.

Evoluția Islandei în domeniul societății informaționale prinde contur în anul 2006 când aceasta devine prima țară din Europa care a introdus *pașapoartele electronice*, folosind **datele biometrice** în detrimentul simplelor imagini printate. În anul 2007 este lansat portalul sau sistemul electronic național al statului, având ca și premise costuri mai scăzute, accesul facilitat la informații și creșterea calității serviciilor oferite cetățenilor. De asemenea, Ministerul Finanțelor încheie un acord cu o companie privată pentru crearea unei noi „piețe", a unui nou centru electronic pentru agențiile și companiile de stat, iar în anul 2008, pe site-ul sistemului electronic național a fost creată o nouă secțiune dedicată problemelor economice, astfel fiind cuprinse acțiunile și planurile care urmau a fi implementate de către Guvern datorită crizei economice, acordul cu Fondul Monetar Internațional privind Nivelul de adoptare a e-Guvernării redresarea economică etc. Prin urmare, este vizibil efortul autorităților de a atrage cetățenii spre acest sistem informațional, prin furnizarea unor informații de interes actual, fapt deloc neglijabil.

În anul 2011 gestiunea portalului național [16], ***island.is***, a fost transferată de cabinetului Primului ministru către Registrele Islandei, instituție aflată sub conducerea Ministerului de Interne și care se ocupă cu ținerea evidenței datelor personale ale indivizilor care au reședința în Islanda.

Strategia Guvernului privind societatea informațională din perioada 2008-2013 este elaborată minuțios și cuprinde două principii esențiale: dezvoltarea unui sistem de operare ușor de înțeles, cu un limbaj simplu și oferirea unor servicii eficiente. Islanda și-a propus să furnizeze cetățenilor servicii în format electronic, de o calitate ridicată, aceștia având posibilitatea de a *procura certificate*, de a *efectua programări*, de a *transmite date* autorităților publice, de *a avea acces* la datele personale și generale deținute de instituțiile publice, toate prin intermediul unui centru online.

De asemenea, se pune accentul pe eficiență, standardizare, cooperare, coordonare și securitate, se asigură accesul coordonat la documentele indexate de către instituțiile publice, se militează pentru reducerea birocrației, creșterea automatizării, eliminarea barierelor, cum ar fi cele legale, oferirea unor locuri de muncă independent de locație, posibilitatea de a efectua plăți online, oferirea unui sistem electronic de livrare a informațiilor, *eProcurement* (dobândirea sau procurarea de bunuri, forță de muncă și servicii prin intermediul internetului).

Important de menționat este faptul că se accentuează importanța progresului, a inovării și a cercetării, se susțin *eParticiparea* și *eDemocrația* prin *testarea votării online* la alegerile locale, creșterea opțiunilor pentru participarea cetățenilor în procesele de luare a deciziilor ale instituțiilor publice. În domeniul educației se

[16] A se vedea **portalul digital islandez**: https://island.is/en;

promovează aplicarea constantă a tehnologiei informației pentru predare și învățare, iar în sectorul comercial se nuanțează externalizarea (economiei) și tehnologia informației pentru îmbunătățirea condițiilor de concurență pentru întreprinderile islandeze pe scena internațională.

3.4. Olanda

Primul program privind guvernarea electronică s-a dezvoltat în anul 1998, la baza acestuia stând rațiuni precum oferirea unor servicii mai eficiente cetățenilor și raționalitatea economică. În anul 2003 a fost lansată prima versiune a portalului e-Guvernării, Olanda devenind prima țară europeană care a asigurat prezența tuturor autorităților locale pe internet; în 2004 Guvernul a publicat o politică privind guvernarea electronică, și a lansat un proiect prin care se urmărea construirea primului sistem de alertă bazat pe o tehnologie de transmisie prin intermediul telefoanelor mobile, finanțat de Guvern, și prin care autoritățile furnizau instrucțiuni cetățenilor aflați într-o zonă afectată de dezastre naturale sau alte evenimente fortuite. Guvernul olandez a întreprins diferite acțiuni meritorii printre care menționăm: inițierea unui sistem centralizat, DigiD, prin care cetățenii, pe baza autentificării cu un ID aveau acces la serviciile electronice (2005), accesarea site-urilor instituțiilor publice într-un mod cât mai simplist, inclusiv de către persoanele cu dizabilități (2006), lansarea unui website „Working on the Netherlands Together" prin care cetățenii erau încurajați să ofere un feedback în vederea îmbunătățirii performanței e-Guvernării (2007), și obligarea tuturor autorităților de a recurge la open source (2007).

Interesant de menționat este faptul că în anul 2008 Ministerul Afacerilor Interne lansează un site prin intermediul căruia cetățenii au posibilitatea de a interacționa cu politicienii, îmbunătățind astfel un element atât de dezirabil pe orice scenă socială, transparența. Portalul național olandez [17], ***data.overheid.nl*** și sistemul „*DigiD Authorise*", înființate în anul 2011, au ca obiective principale o **guvernare mai eficientă și diminuarea birocrației**, cetățenii având posibilitatea de a reclama sau formula eventualele obiecții privitoare la deciziile guvernamentale, în ipoteza în care simt că au fost dezavantajați sau au fost tratați necorespunzător. Portalul național olandez oferă cetățenilor accesul la datele guvernamentale privind *mediul, populația sau infrastructura*, reprezentând un mod facil de a interacționa cu autoritățile publice și direcționând utilizatorii spre site-urile tuturor instituțiilor guvernamentale, inclusiv asupra organizațiilor de tipul bibliotecilor, instituțiilor școlare sau celor de asistență medicală.

Strategia privind e-Guvernarea aferentă perioadei 2011-2015 se baza pe oferirea unui guvernământ mai accesibil, unul care să furnizeze cetățenilor informații mai accesibile din zona sectorul public. În anul 2011, prin Programul Național de Implementare au fost îndeplinite o serie de obiective precum oferirea posibilității cetățenilor de a aplica online pentru obținerea autorizațiilor de mediu, solicitanții locurilor de muncă se puteau înregistra online la Agenția pentru

[17] A se vedea **portalul electronic olandez**: https://data.overheid.nl/en;

ocuparea forţei de muncă, solicitând în acelaşi timp ajutorul de şomaj, iar informaţiile cu privire la pensionari, persoanele cu dizabilităţi sau cu boli cronice putând fi accesate pe un site special [18].

3.5. Suedia

Digitalizarea este recunoscută în strategia guvernului suedez privind **transformarea digitală lansată în 2017**, cu obiectivul "de a deveni lider mondial în valorificarea oportunităţilor de transformare digitală". Suedia are un record pozitiv în domeniul digitalizării în general, de exemplu, Suedia a ocupat locul al treilea în indexul de pregătire în reţea al Forumului Economic Mondial 2016, **locul al treilea** în Indexul UE privind economia şi societatea digitală în anul 2017 [19], şi respectiv **locul doi** în acelaşi **Index UE încă din anul 2018 şi până în prezent** (anul 2020).

Atât Comisia Europeană, cât şi guvernul suedez susţin că datele deschise au potenţialul de a conduce la noi inovaţii care abordează provocările societale, precum şi la o mai mare transparenţă a guvernelor[20].

Proiectul suedez *My Healthcare Flows* îşi propune să asigure o mai bună ***asistenţă medicală*** prin intermediul unor niveluri mai ridicate de participare a pacienţilor şi a familiilor acestora. Ideea este de a oferi soluţii holistice bazate pe nevoile individuale ale pacientului, inclusiv servicii electronice inovatoare şi platforme deschise de date, permiţând noi modele de afaceri. Prin desfăşurarea serviciului electronic "Călătoria pacientului" şi a infrastructurii tehnice aferente un număr de unităţi de asistenţă medicală din cel puţin şapte consilii judeţene din Suedia - şi în cel puţin o unitate de îngrijire în alte două ţări nordice - aşteptările sunt ridicate nu numai în ceea ce priveşte creşterea calităţii vieţii, securitatea, siguranţa şi comunicarea cu pacienţii, ci de asemenea, ca dezvoltatorii să poată avea acces la un set de instrumente care să creeze noi oportunităţi de inovare în sectorul asistenţei medicale[21].

Iniţiativa suedeză "*My Pages App*" a fost dezvoltată pe baza cererii clienţilor pentru servicii prietenoase utilizatorilor oferite printr-un canal mobil pentru o interacţiune uşoară cu ***administrarea şi urmărirea plăţilor***. Cererea a venit în special de la segmentul de clienţi care sunt părinţi şi care au interacţiuni frecvente cu administraţia medicală de mai mulţi ani (aproximativ 1,2 milioane de utilizatori unici utilizează My Pages pe internet, dintre care 76% îl folosesc în rolul părinţilor; şi aproximativ 700.000 de descărcări ale aplicaţiei sunt pentru telefoane inteligente). Utilizarea metodelor de proiectare a serviciilor a permis clienţilor să verifice nevoile lor "mobile". Rezultatele sunt importante nu numai din punctul de vedere al satisfacţiei utilizatorilor, ci şi din punct de vedere al transparenţei percepute de administraţia medicala, precum şi al reducerii costurilor administrative interne. Aceste rezultate au fost atinse deoarece aplicaţiile digitale sunt finalizate mai precis decât formele de hârtie şi pot fi potenţial scalate. În plus,

[18] https://www.regelhulp.nl/;
[19] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;
[20] http://www.diva-portal.org/smash/get/diva2:1179537/FULLTEXT01.pdf;
[21] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

proiectul se bazează pe conceptul de cooperare voluntară bazat pe principiul "*numitorului comun*", care oferă condiţiile pentru autorităţi de a-şi dezvolta în timp şi de a-şi adapta propriile instrumentele IT, fără a depinde de alte agenţii[22].

Participarea activă a profesioniştilor din sectorul medical implicaţi în implementarea noii practici sau procese este de asemenea esenţială pentru succes. Cazul suedez "itACiH" (suport IT pentru îngrijire avansată în cămin) utilizează tehnologii digitale pentru a îmbunătăţi sprijinul pentru îngrijirea la domiciliu, inclusiv dispozitivele de atingere pentru asistenţii medicali mobili, echipamentele on-line în casă şi prezentarea generală şi planificarea la clinică si pot conta pe participarea activă a utilizatorilor profesionişti (medici şi asistente medicale).

Proiectul suedez "*Balanta Urban - Rural*" oferă oportunităţi pentru dezvoltarea co-creatoare a serviciilor publice digitale pe baza nevoilor şi perspectivelor individuale. Angajamentul utilizatorilor este un aspect-cheie în domenii precum sănătatea şi îngrijirea socială, angajarea cu utilizatorii la dispoziţia lor şi includerea utilizatorilor în deciziile cheie privind serviciile care se referă la viaţa şi bunăstarea lor. Este fundamental la crearea unor noi niveluri de autonomie şi abilitare, sa fie atinse responsabilitatea şi încrederea susţinuta în furnizarea serviciilor. Au fost organizate ateliere de discuţie şi de co-creaţie cu cetăţenii şi IMM-urile, în special în zonele rurale, care au stabilit în mod clar necesitatea de a spori vizibilitatea şi comunicarea.

Aplicaţia *My Pages* utilizează digitalizarea pentru a îmbunătăţi furnizarea de servicii în domeniul protecţiei sociale şi a fost dezvoltată prin consultarea clienţilor (*bazată pe metode de proiectare a serviciilor pentru a înţelege clienţii, a defini călătoria clientului şi a identifica nevoile şi aşteptările clienţilor*). Aducerea punctului de vedere al clientului în acest proces este **esenţială,** în special pentru **procesele clientului** care includ mai multe părţi diferite ale bunăstării care trebuie să lucreze împreună pentru a oferi cea mai bună experienţă a clienţilor la final[23].

Primarul oraşului Stockholm declara că unul dintre obiectivele administraţiei sale este de a transforma Stockholmul în cel mai inteligent oraş din lume, un obiectiv ce presupune în primul rând a lucra cu soluţii digitale şi inteligente. Primăria a alocat bani în buget pentru a finanţa acest obiectiv, subliniind atât importanţa dezvoltării soluţiilor, dar şi a implementării acestora. Primăria se bazează pe un departament IT puternic, dar îşi propune şi lansarea de burse de inovare care să beneficieze de dezvoltarea mediilor digitale[24].

4. Concluzii

Utilizarea tehnologiei informaţiei în administraţia publică, neîndoielnic, este un subiect omniprezent, aşa după cum rezultă şi din **bunele practici ale statelor europene**, în cadrul oricărei *Strategii* sau *Program de reformă a administraţiei publice*, digitalizarea fiind asimilată, cu preponderenţă în spaţiul european, ca o soluţie extrem de necesară, ce nu poate fi ignorată Ea se mai impune, totodată, ca şi

[22] http://healthpolicy.se/wp-content/uploads/2016/11/McKinsey.pdf;
[23] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;
[24]https://www.thelocal.se/20170731/meet-karin-wanngard-the-mayor-who-wants-to-turn-stockholm-into-the-worlds-smartest-city;

o ***premisă a succesului procesului de modernizare*** la nivelul întregii administraţii naţionale, indiferent de statul european cel puţin, la care ne-am putea referi.

Alături şi de alţi factori relevanţi acestui proces, dintre care se detaşează cei *umani* asociaţi procesului ***profesionalizării funcţiei publice***, îmbunătăţirea pe mai departe a disponibilităţii şi a calităţii serviciilor publice depinde însă, **într-o mare măsură**, de sistemele informatice.

Un sistem digital de gestionare a documentelor şi alte sisteme informatice şi baze de date sunt şi trebuie a fi utilizate pentru a spori transparenţa şi eficienţa proceselor principale ale autorităţilor statale şi infra-regionale, ***cooperarea*** în genere între toate aceste niveluri administrative, **reprezentând cheia** în asigurarea succesului sub aspectul funcţionalităţii mecanismului digitalizat.

Accesibilitatea largă a diverselor oportunităţi de a beneficia de **educaţie** reprezintă de asemenea, o bază importantă pentru coeziunea cetăţenilor. Este deosebit de importantă crearea unui mediu modern de învăţare, în care accentul se pune pe dezvoltarea abilităţilor IT&C ale elevilor şi profesorilor, inclusiv prin utilizarea manualelor de lucru digitale în instituţiile de învăţământ.

În ceea ce priveşte **serviciile în domeniul sănătăţii**, potrivit bunelor practici de la nivel european, acestea, mai mereu, au la bază crearea unui sistem electronic modern şi eficient de schimb de informaţii menit a creşte calitatea serviciilor medicale oferite copiilor şi altor grupuri de populaţie şi pentru a asigura schimbul operaţional de informaţii între instituţiile medicale şi medicii de familie.

De asemenea, cât priveşte *Sistemul de management al documentelor*, experienţa statelor avansate demonstrează că îmbunătăţirea sa presupune crearea în prealabil, a semnăturii digitale a documentelor, astfel încât, atât la nivelul administraţiei centrale, cât şi la nivel local, să se *fluidizeze circulaţia documentelor*, eliminând aproape complet, forma clasică, pe hârtie a acestora, era fiind încheiată.

Raportat la problematica ***eficientizării serviciilor administrative*****,** se cuvine spus că, de-o manieră generală, *E-guvernarea* permite guvernelor să evidenţieze transparenţa în administraţia publică şi nu numai. Serviciile publice tradiţionale prestate de administraţie necesită o mulţime de resurse, în timp ce prin *digitalizarea informaţiilor* totul este legat de aceeaşi reţea. Aceasta face mai uşor executarea procesării fişierelor şi a solicitărilor. Să nu omitem faptul că utilizatorul poate avea dreptul la *servicii personalizabile* în funcţie de nevoile sale. Prin facilitarea accesului cetăţenilor la servicii, administraţiile comunităţilor locale, în genere, vor putea să se conecteze mai bine cu cetăţenii lor prin proprietatea interactivă a e-guvernării, făcând totodată serviciile administrative mai eficiente.

Într-un plan conex, nu foarte îndepărtat, este esenţial să se securizeze datele cu caracter personal în scopul optimizării serviciilor către utilizatori, coroborat cu asigurarea protecţiei legale a drepturilor cetăţenilor. Fără siguranţa şi protecţia informaţiilor, nu poate exista e-guvernare, motiv pentru care putem aprecia că, dincolo de resursele financiare şi a celor materiale aferente, cu prioritate, *înzestrarea cu specialişti de top* la nivelul serviciilor administraţiei publice este o necesitate stringentă, împreună cu utilizarea unor software-uri adecvate, avansate tehnologic, care să facă faţă unor asemenea provocări.

Agenţiile guvernamentale sunt un *tip de public* care trebuie, inevitabil, să se adapteze la noua eră digitală. În timp ce software-ul a crescut, capacităţile necesită investiţii considerabile, finanţate prin bani de impozitare, scalarea cu succes a software-ului în agenţiile guvernamentale ar putea oferi, de asemenea, mai multe avantaje. Potrivit OCDE, guvernele digitale pot conduce la "guverne mai deschise, mai transparente, inovatoare, participative şi de încredere"[25].

România a făcut, neîndoielnic, paşi importanţi pe calea digitalizării serviciilor publice asigurate de administraţia publică, şi cu toate acestea, progresul este apreciat de către instituţiile UE, ca *insuficient,* în raport de media înregistrată printre statele europene.

O atare stare de lucruri, de altfel, este complet nesatisfăcătoare şi din perspectivă naţională, inclusiv în rândul cetăţenilor români, ce resimt acut lipsa unor ***reconsiderării structurale*** de esenţă în cadrul funcţionării administraţiei publice naţionale, ale cărei mecanisme sunt doar *parţial*, impregnate cu beneficiile digitalizării angrenajelor sale. Se impun, neîndoielnic, transformări de esenţă a aparatului administrativ, una care trebuie să debuteze cu lansarea unei *viziuni ample* şi totodată ***profunde***, la scară largă a administraţiei publice, la nivel central şi local, menită a implementa, cu succes, **procesul de digitalizare**.

Dincolo de problematica *mijloacelor*, importante si ele, desigur, dar într-un plan subsecvent, accesoriu, implementării acestui proces, ***dominanta o constituie*** în opinia noastră, ***schimbarea filosofiei*** ce stă la baza furnizării de servicii publice către cetăţeni, una ce se impune a fi axată şi orientată în mod fundamental pe **optici şi mentalităţi noi ale funcţionarilor publici**, mai întâi de toate, cu impact direct asupra ***combaterii şi diminuării la minimum*** a *procedurilor birocratice*, a tuturor ***aspectelor formaliste*** ce pot să întârzie sau să afecteze promptitudinea şi calitatea serviciului prestat, un demers complex şi dificil ce va trebui să se centreze pe noi **idei directoare**, precum: *simplificarea, supleţea şi flexibilitatea mecanismelor* administrative. Într-o nouă paradigma, schimbarea sistemica a modului de organizare şi de funcţionare a administraţiei publice, ce va trebui să se producă, indubitabil, va presupune, prin excelenţă, să se confere prioritate absolută, sub *aspect tehnic*, acelor **soluţii** susceptibile de a genera nu doar **rezultate rapide**, dar mai cu seamă, a celor care, prioritar, **satisfac cerinţele de calitate** ale beneficiarului *serviciilor publice*, deopotrivă, într-o manieră **completă şi integrată**.

Prin urmare, drumul e încă lung până la momentul **informatizării cvasi-generalizate** a acestor servicii, dar obiectivul e unul pe deplin posibil de a fi atins, şi chiar într-un timp relativ scurt, în măsura în care România va manifesta cu prioritate, ***voinţa de a schimba un sistem depăşit***, prin *inovaţie* şi *inteligenţă*, ca şi prin *alocarea de resurse corespunzătoare*, **umane,** dar şi a celor **materiale** şi **financiare**, învăţând din bunele practici existente la scară continentală, unele perfect susceptibile de a fi **implementate**, de-o manieră adaptată, şi la nivelul societăţii româneşti.

[25] https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf;

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[1] A se vedea **Strategia Lisabona** a fost adoptată de către *Consiliul European extraordinar de la Lisabona, din 23-24 martie 2000* şi revizuită de către Consiliul European de la Bruxelles din 22-23 martie 2005. Documentul accesibil la **link – ul**: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:184E:0030:0038:RO:PDF;

[2] Există astăzi **un consens** printre doctrinari în literatura de specialitate (*a căror listă lungă nu ne permite individualizarea lor în acest spaţiu*), atât la nivel intern, cât şi internaţional, cu privire la **impactul pozitiv şi avantajele de netăgăduit pe care IT-ul** le insuflă mecanismelor, dar îndeosebi, *promptitudinii, simplificării şi eficacităţii administrative*, ce îmbunătăţesc considerabil sub aspect **calitativ, furnizarea serviciilor publice**;

[3] https://ec.europa.eu/digital-single-market/en/scoreboard/romania;

[4] **Indicele DESI** pentru România era cuantificat la **36,5 puncte în anul 2019**, raportat la **media UE de 49,4 puncte**;

[5] În **anul 2018,** România a ocupat ultimul loc, anume **locul 28** în clasamentul DESI (anterior BREXIT);

[6] https://aici.gov.ro;

[7] https://datafara.ro;

[8] https://stirioficiale.ro/, https://datelazi.ro, https://fiipregatit.ro, https://cetrebuiesafac.ro;

[9] *Raportul Comisiei Europene privind Indicele economiei şi societăţii digitale (DESI) 2020 pentru România*, reţine că *"* privind în perspectivă, aceşti indicatori DSI sunt deosebit de relevanţi pentru redresarea economică după criza provocată de pandemia de COVID-19, *România fiind foarte avansată în ceea ce priveşte acoperirea VHCN şi se situează pe locul 14 în UE în ceea ce priveşte gradul de pregătire pentru utilizarea reţelelor 5G*, deşi pe de altă parte, ***a rămas în urmă în ceea ce priveşte indicatorii referitori la competenţele digitale şi are o performanţă slabă în ceea ce priveşte digitalizarea întreprinderilor şi serviciilor publice digitale*** *"*;

[10] https://www.ajutorspitale.ro; https://spitale.quickdata.ro; https://rohelp.ro; etc

[11] A se vedea ***Strategia Digitală 2016-2020***, **Agenţia pentru Digitizare a Danemarcei**, https://en.digst.dk/;

[12] https://en.digst.dk/policy-and-strategy/digital-strategy/;

[13] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

[14] http://www.uvm.dk/itifolkeskolen;

[15] A se vedea **portalul electronic estonian**: https://www.eesti.ee/en;

[16] A se vedea **portalul digital islandez**: https://island.is/en;

[17] A se vedea **portalul electronic olandez**: https://data.overheid.nl/en;

[18] https://www.regelhulp.nl/;

[19] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

[20] http://www.diva-portal.org/smash/get/diva2:1179537/FULLTEXT01.pdf;

[21] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

[22] http://healthpolicy.se/wp-content/uploads/2016/11/McKinsey.pdf;

[23] http://www.oecd.org/gov/digital-government/Digital-Government-Strategies-Welfare-Service.pdf;

[24] https://www.thelocal.se/20170731/meet-karin-wanngard-the-mayor-who-wants-to-turn-stockholm-into-the-worlds-smartest-city;

[25] https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf.

About security culture

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Abstract

Security culture focuses on a broader scope: the ideas, customs and social behaviours, values of a group that influences the group and also society security at large level.
Must to know the cyber risk, geopolitical influence, terrorism preventing, security institutions, the warfare information for confronting these problems and global challenges.

Keywords: *security culture, national security, corruption, terrorism, asymmetrical threats, information globalization, cybernetic security, ENISA, Kapersky Lab, civil society*.

This concept uses a new institutional approach concerning promoting dialogue with public institutions, as well as validating their social mission in the spirit of knowledge of new types of threats, risks, and vulnerabilities, at an individual, group, societal, national, regional, and global level. Security culture - modern institutional approach promoting security issues; knowing the register of public political, military, economic, societal, and environmental urgencies; the entirety of notions, ideas, and informations available at a given time to the citizens of the state concerning the national security values, interests, and necessities; the ways in which to develop attitudes, motivations, and behaviors which are necessary for the defense and protection of persons, groups, and states, againsts vulnerabilities, risk factors, threats, states of danger, or potential agressions, as well as promoting them in the security internal and international environments. (Dictionary of modern public security)

The fight against terrorism, organized crime, cross border criminality are realities which the representatives of civil society must know in order to take part together with state institutions in knowing, preventing, and confronting these problems. And when the challenge is at the security level, it should concern us all equally.

The current geopolitical context has transformed the space of strategic interest in which Romania is found into a real source, transit area, and destination of serious criminal activities consisting in: illegal weapon, munition, and explosives trafficking; drug trafficking; illegal immigration and human trafficking; counterfeit products trafficking; money laundering; etc.

The new democracies in this region continue to be confronted with certain negative phenomena which affect the quality of government. In this context, inefficient government - an effect of democratic deficit and institutional corruption, reflecting itself in manifestations of political clientelism, public administration inefficiency, authoritarian tendecies, lack of public transparency and responsability - undermines public institutions and can become a real threat with respect to national security. In Romania, inefficient government represents a potential risk for national development and national security, on the long run.

Corruption is another threat to national security, but on the short run, with a negative impact on living standards, human rights, and fundamental freedoms, as well as sound economic development.

The new asymmetrical threats, economic and information globalization, global issues, the growth of interstate dependancy in all fields, global anomie, are sources of insecurity which concern us all.

This is why security education and culture, crisis management, combating disinformation, are necessary for a new collective defense, no longer done by the state, as a political and administrative entity, but by citizens via civil society, in such a way that resources, information, and responsability decentralization is attained, an outcome necessary for preventing and managing security crises.Nowadays security is a modern concept, which in an open, democratic society represents a systemic reality, comprising economic, social, and cybernetic security, food safety, the protection of citizens rights and liberties, etc. This is why it is necessary for citizens to have access to information, to be aware of security needs, for security culture does not belong to interest groups or closed bureaucratic institutions, as it was the case in the era of state Communism.

A modern state is looking forward to identify new security solutions, to make modern, European laws in this field, and to make available the necessary resources for developing the system of national security. The most important resources to be organized and put to proper use are the informational resource and the human resource. Without long term development and a satisfying GDP, which represents a nation's state of internal sufficiency, allowing it to compete on the international level, we are rather security consumers instead of security generators.The role of civil society is to get involved actively in actions of preventive education and management of the new security reality as an indicator of a Euro-Atlantic and European Community vocation. The pursued objective is stability, peace, and the construction of a modern, democratic society connected to Euro-Atlantic values.

Cybernetic security, terrorism, and critical information infrastructure - new challenges for the management of security culture and the European geopolitical space. The objectives of the European Union in the new global context.

On the 30th of March 2009, the European Commission issued a communiqué regarding the protection of critical information infrastructure ("Protecting Europe against large-scale cyber-attacks: improving the degree of preparation, security, and resilience") by which it established a plan ("the plan of action concerning the protection of critical information infrastructure") for consolidating the security and resilience of vital information technology and communications infrastructure. Its

aim was to stimulate and support the development of a high level of response, security, and resilience capacity on a national and European level. This approach was largely approved by the Council in 2009. The plan of action concerning the protection of critical information infrastructure is built on five pillars: preparation and prevention; spotting and reaction; risk reduction and recovery after incidents; international cooperation; and the criteria for the critical European infrastructure in the sector of information technology and communications. It establishes the measures to be taken with respect to every pillar by the Commission, member states and/or industry, with the support of the European Union Agency for Network and Information Security (ENISA).

The digital agenda for Europe, adopted in May 2010, and the associated conclusions of the Council have underlined the common vision according to which confidence and security are fundamental preliminary conditions for using on a wide scale information technology and communications and for achieving thus the objectives concerning the dimension of "intelligent growth" of the Strategy Europe 2020. The digital agenda for Europe underlines the necessity that all interested parties unite their forces in a global effort in order to guarantee the security and resilience of information technology and communications infrastructure by emphasizing prevention, degree of preparation, and sensitivity, as well as to develop efficient and coordinated mechanisms in order to react to the increasingly sophisticated forms of attacks and cyber crimes.This approach guarantees that the preventive, as well as the reaction dimensions are challenges which are taken seriously.

The Commission has adopted in September 2010 a directive proposal regarding the attacks on information systems. It concerns the consolidation of the fight against cybernetic attacks by better cooperation between the criminal law systems of member states and between judicial authorities and other competent authorities. Moreover, the proposal introduces some dispositions regarding the ways of fighting new forms of cybernetic attacks, namely botnets. At the same time the Commission forwarded a proposal for a new mandate of consolidation and modernization of the European Union Agency for Network and Information Security (ENISA) in order to increase networks' degree of reliability and security. The consolidation and modernization of ENISA will allow the European Union, member states, and interested parties from the private sector to develop capacities and training to prevent, detect, and approach challenges pertaining to information security.

Moreover, the digital agenda for Europe, the Stockholm program/its plan of action, and EU's Strategy of internal security in action underlines the Commission's commitment to construct a digital environment in which all Europeans could express their full economic and social potential. This is why security culture involves cyber security, but at the same time involves proactive solutions for using human potential and community democratic participation, which could discourage security threats. The communiqué of the European Commission reviews the results that have been achieved since the adoption of the plan of action in what concerns the protection of critical information infrastructure. It describes future expected

measures for each action both at an European and at an international level and it focuses at the same time on the global dimensions of the challenges and importance of increasing cooperation between the national administrations of member states and the private sector on national, European, and international levels, in order to handle global interdependencies.

New, more technologically sophisticated threats have emerged

The global geopolitical dimension of these threats is becoming increasingly clear. We are experiencing in the present a tendency to use information technology and communications in order to achieve political, economic, and military supremacy, including through offensive capabilities. "Cybernetic warfare" and "cybernetic terrorism" are sometimes mentioned in such contexts.

Moreover, as shown by the recent events in the Southern Mediterranean region, some regimes are ready and capable to forbid or undermine arbitrarily the access of their own citizens to informatic means of communication - especially the Internet and mobile communications - for political reasons. Such unilateral internal interventions could have severe consequences on the rest of the world.

In order to better understand such diverse threats, it can be useful to divide them into the following categories: exploits, such as "persistent advanced threats", for the purpose of economic and political espionage (for example, GhostNet), identity theft, the recent attacks against the marketing systems of emissions quotas or against government information systems; sabotage, such as DDoS attacks, or spam generated via botnets (for example, the Conficker 7 million computers network or the Spanish Mariposa 12.7 million computers network); and destruction - this is a scenario which hasn't materialized yet, but, given the increasing use of information technology and communications in critical infrastructures (for example, intelligent networks and water distribution networks), it is not excluded for the coming years. Future challenges are not specific to the European Union and cannot be solved by the EU only. The increasing degree of use of information technology and communications and the Internet allows for more efficient and profitable communication and coordination between interested parties and has for result a dynamic innovative ecosystem in all areas of life.

The experts of the Kaspersky Lab group have issued a report regarding threats for 2013 and 2014, which was published in December 2013, containing the following statistical data, accompanied by a map of information crimes:

1. Maximum risk (over 60%): four countries (Vietnam at 68,1%; Bangladesh at 64,9%; Nepal at 62,4%; and Mongolia at 60,2%).

2. High risk: 67 countries, including India (59,2%), China (46,7%), Kazakhstan (46%), Azerbaijan (44,1%), Russia (41,5%), most African countries.

3. Moderate cyber attacks rate (computer viruses) (21-40,99%): 78 countries from all over the world, including European countries such as Spain (36%), France (33,9%), Portugal (33,1%), Italy (32,9%), Germany (30,2%), the UK (28,5%), Switzerland (24,6%), Sweden (21,4%), as well as other relevant countries such as the USA (29%), Ukraine (37,3%), Brazil (40,2%), Argentina (35,2%), Chile (28,9%), South Korea (35,2%), or Singapore (22,8%).

4. Low/local degree of infection (0-20,99%): 9 countries.

As we can see, we have a moderate infection rate for the European Union in 2013. As for 2014, although there are no significant differences, and being too early for a full evaluation done at the end of each year, the same experts predict important cybernetic threats/information crimes in the financial field and in cyber espionage. The target here is individual citizens' money, as well as obtaining illegal economic information such as banking secrets. The conclusion that can be drawn here is that cyber attacks of any kind represent an asymmetrical, but real threat to economic welfare and national security.

It is the role of civil society, as well as mass media, to inform and implement security culture and the technical solutions devised by the innovative intelligence analysis centers, which promote educational excellency.

At present, threats can arise anywhere in the world and, because of global interconnection, can affect any part of the world.

We must make an advancement in the direction of global awareness of the risks incumbent in the massive use of information technology and communications by all segments of society. Moreover, we must develop strategies to manage such risks adequately and efficiently, be it for the purposes of preventing, fighting, reducing, or approaching them. The digital agenda for Europe launches an invitation to "organize the cooperation between relevant actors... on a global level so that they are able to fight against and reduce security risks" and establishes the objective of "cooperating with interested parties on a global level to consolidate global risk management in the digital and physical spheres and to adopt specific internationally coordinated measures against information crimes and security attacks".

Education, scientific research, and security culture

The intellectual, educational, and cultural dimensions of national security. Defending one's country and achieving a state of national security suppose first and foremost a creative intellectual endeavor, by prioritizing education, research, and security culture.

As such, a nation that cannot be internationally competitive and cannot use the resources, technology, and human potential at its disposal, is a security consumer, not a security provider. Development is a condition of liberty, and security is the means by which the values and norms created by society can generate the state of balance and safety needed for every citizen's exercise of freedom. The right to information becomes a commitment from society, which is aware of this right as an obligation when security, democracy, peace, and freedom are under threat.

Education is the first pillar which permits national defense and security sectors to adapt in order to respond to new challenges. We need a new quality of military, public order, and information education, which supposes achieving full compatibility with the education programs of NATO and EU countries.

The private security industry represents the future for the security industry and the public security system.

Technology is the materialization of new concepts and innovations which satisfy modern security demands.

The second pillar is scientific research, an important endeavor for understanding the nature of current threats, by studying their implications. This understanding must be transferred to state institutions which allows them to develop adequate policies. It is equally important that public opinion, civil society, various think tanks participate in this effort, by contributing their own expertise.The third pillar is security culture by which we mean norms, values, attitudes, or actions which determine the comprehension and assimilation of the concept of security and other derived concepts: national security, international security, collective security, insecurity, cooperative security, security policy, etc. The development of education in the field of social sciences - especially political science, international relations, security studies - has led to the democratization of the field of defense and national security. As a consequence of the ever growing number of students and graduates in these fields, expertise is no longer the privilege of the state, which has a positive effect on the dialogue between the state and civil society, contributing to a higher quality of government in the area of defense and national security. (National Defense Strategy, 2010). With the help of OSINT and HUMINT-type information (by evaluating, corroborating, analyzing, and interpreting data), we can draw conclusions and identify possible ways in which events can unfold; specialized structures create a security culture via the projects that they develop and implement (by acting both preventively and offensively, through initiatives meant to discourage actions against personal, group, or societal security, as well as to consolidate security); they manage to grow in real terms the value of security indices in the field of reference and to proactively build the premises for the preservation and future affirmation of the communities' interests.

In order to establish the concrete ways to prevent risk materialization and/or fighting a threat, security culture provides the necessary expertise, by offering information with the purpose of knowing tendencies, facts, as well as events' circumstances, including:

1. Relevant territory (location, region, zone, country);
2. Fields of interest (directions of action);
3. Specific problems and cases;
4. Risks to national development;
5. Defense of fundamental and social values;
6. Information security;
7. Social environment.

The objectives of civil society with respect to education and security culture involve:

1. Stimulating interest and preoccupation by institutions and private individuals towards security culture/education, via mass media and other visibility actions targeted for this purpose;

2. Integrating in learning institutions - at the primary, secondary, high school, and university levels - security education both for children and adolescents, as well as adults, by organizing classes, conferences, symposiums, trainings, seminaries, meetings, colloquims, presentations, workshops, talk groups, round tables, camps, trips, and other recreational and educational activities;

3. Editing, publishing, and disseminating informative and scientific materials, books, magazines, flyers, and other printing and audiovisual materials;

4. Establishing contacts and permanent collaboration with scientific institutions both home and abroad, with experts, as well as with other organizations, government or nongovernmental institutions which have security culture or adjacent fields as their field of interest;

5. Drawing, supporting, and couseling private or legal entities that wish to be initiated in or perfect themselves in the fields of security, personal protection, educational management of security culture, as well as anyone interested in security culture;

6. Undertaing concrete actions, within the limits of academic competence, for preventing and stopping aggression/violence, for ensuring personal, group, and societal protection;

7. Taking part in projects, conferences, and scientific communications sessions having for subject the field of security, organized/supported by higher education institutions in Romania and abroad, local and central public authorities, as well as by institutions who have responsabilities in the field of national security.

It is necessary to promote, develop, and implement projects/models and standards of community and individual security in order to create a security culture, through research, studies, information, and education via partnerships with both state and private educational institutions, as well as medical, military, police, justice, and religious institutions, with governmental and nongovernmental organizations, for the purposes of developing a community that cares about the safety of its citizens, as well as of promoting knowledge, respect, and mutual trust between the members and the institutions of the community.

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Academic perspectives on the specific challenges of urban resilience management

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Abstract

*Based on **preliminary studies** on critical infrastructure security management developed by authors, interested in the field, individually or in a team, the article brings to attention, as possible **results**, several lines of development of research, on a topical issue. The perspective is an academic one but it takes into account the **approaches** of practitioners in practical fields, trends and opportunities to achieve useful results to society as a whole but also to public and private institutions, especially considered in a dual capacity, by subject of the managerial approach but also as an object to be operationalized from the point of view of managerial action. The general **objective** proposed is to demonstrate the usefulness and how the academic environment can be involved for solving some problems of interest. The **implications** and implicitly the **value** of the paper have as a desideratum the minimization of the distance between different categories of stakeholders and especially, between the theory and the practice. The research method used is descriptive, with emphasis on the systematic observation of the object of study (resilience in the urban environment) and the cataloging of the specific data identified. The topicality of article is also given by the national and European context in which resilience plans are proposed, corroborated with the pandemic*

situation generated by Covid, especially at urban level. It is also emphasized that the functionality of some critical urban infrastructure systems (medical, transport, energy, etc.) fundamentally influences the level of resilience, their preparation in time of "peace" (lack of threat or a low level of it) based on robust project influencing decisively macro-behavior in crisis situations.

Keywords**:** *resilience, management, urban*.

1. Brief presentation of the current state of scientific research

From the analysis of existing knowledge resources (many articles especially the ones accessible online), although the last five years have seen an intensification of efforts and concerns to address specific topics or complementary to the proposed topic, there is a fragmented operationalization (example – resilience of water supply systems; resilience of medical services, etc.) or poorly integrative, which objectifies the need for integrative conceptualizations, with paradigmatic theoretical valences and practical-applicative potential. In other cases, given the topicality of the subject, it is tried through project management and related funding to solve specific issues, national or regional, related to the practical part of resilience management or an educational component, assumed by various public or private institutions. Even at the conceptual level, resilience involves many ways of defining (example (Ardebili, Padoano, 2020 [1])), more or less correlated with the standards officially recognized by socio-professional communities (ISO 22316 / organizational resilience, ISO 22301 / business continuity management, ISO 31000 / risk management).

Subsequently, a complex issue of interest, which requires a high degree of scalability and interoperability at the level of design requirement in the future, is that of achieving resilience measurement indexes, useful for benchmarking analyzes or decisions for civil emergency management, necessary in different sectors of activity, some examples of achievements so far being:

- The Resilience Index Measurement and Analysis (RIMA), developed in Jordan [5];
- City Resilience Index [6];
- disaster resilience index, developed in Australia [7];
- Coastal Resilience Index/Climate Toolkit, developed in the USA [8];
- Critical infrastructure resilience index, developed at EU level [9].

Also, in the spirit of creating a minimum public culture of resilience management (figure 1), subsequent to a recognized need to increase the proactive capacity of society in general to deal with events triggering malfunctions in the essential assets of an administrative unit, there are concerns setting up laboratories to simulate resilience levels and disseminate results through training offers, as part of recent initiatives, with relevant good practice existing even within the European space (Critical Infrastructures Preparedness and Resilience Research Network).

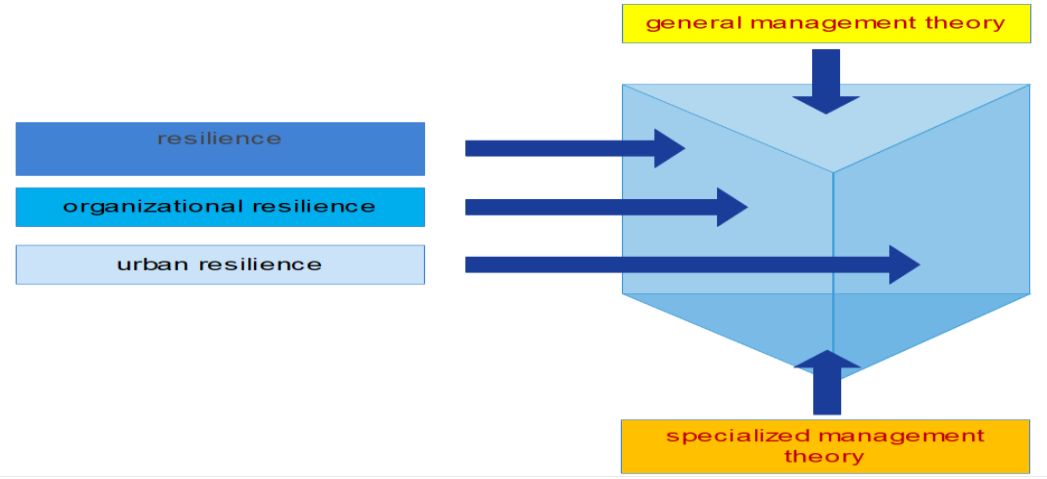

Fig. 1. Relation between resilience and management theory
Source: own elaboration

Under the impact of sustainable development goal (Agenda 2030) and implementation of the (in fact irreversible) Smart City initiative through the six verticals (citizen, mobility, life, environment, economy, government), as recognized by the European Commission, an additional pressure on the operationalization of resilience in urban areas occurs, which led, in conjunction with the dynamics of development in the field of disruptive and emerging technologies, academically nationally and internationally, to an intensification of assessments such as *what happens if*.

The interdependence of the theme is also used in some works considered of reference, published mainly in the last five years, some examples in this regard being highlighted in table 1.

Table 1. Examples of approaches in specialized papers of the proposed topic

Crt. no.	The title and author of the paper
1	Komninos, N. (2015). *The Age of Intelligent Cities. Smart Environments and Innovation-for-all Strategies.* Routledge
2	Heinrichs, H., Michelsen, P.M.G., Wiek, A. (eds.). (2016). *Sustainability Science An Introduction*. Dordrecht: Springer
3	Kolodko, G.W. (2015). *Încotro se îndreaptă lumea: economia politică a viitorului*. Iaşi: Polirom
4	Linkov, I., Palma-Oliveira, J.M. (eds.). (2017). *Resilience and Risk. Methods and Application in Environment, Cyber and Social Domains*. Dordrecht: Springer
5	Lugo Santiago, J.A. (2021). *Leadership and Strategic Foresight in Smart Cities.* Springer Nature Switzerland AG
6	Setola, R., Rosato, V., Kyriakides, E., Rome, E. (eds.). (2016). *Managing the Complexity of Critical Infrastructures. A Modelling and Simulation Approach*, Cham: Springer
7	Vrabie, C., Dumitraşcu, E. (2018). *Smart Cities - de la idee la implementare sau despre cum tehnologia poate da strălucire mediului urban*, Bucureşti: Universul Academic

Source: Made by author

2. Critical analysis of the current state and identification of research niches

Beyond definitions and terminology, resilience is a dynamic concept that drives and impacts most areas of society, in an environment characterized increasingly by volatility, uncertainty, complexity and ambiguity (VUCA). Starting from the individual level, to the organizational level, the critical infrastructures (energy, water, transport, health, financial-banking, communications, etc.) are ubiquitous assets in the urban environment, through the characteristic of the need to ensure the normal development of day-to-day activities. Most of the approaches focus more on quantitative aspects specific to the functionality of these resources in the urban environment, a more intense connection to other topical concerns of the public agenda (sustainability, public innovation, security culture, etc.) being necessary.

An identified research niche is based on the following (presumptive) framework: efficient management of resilience in the urban environment leads to the creation of favorable conditions for a high organizational capacity, which determines favorable conditions for strengthening the public security culture, the latter component being in turn, in a circular approach, an input element for resilience management. We opted for this succession and not in the opposite direction having as argumentative framework the Maslow's needs pyramid, in the sense of placing at the higher level the *soft* elements (security culture) compared to the *hard* elements (organizational ability to accomplish the assumed mission, regardless of the organization's type).

Considering imperative and inclusive from the point of view of the issue of a resources-actors-rules workbook, in order to be able to solve the scientific desideratum proposed by the title, we considered it would be necessary to bring clarifications on the following general questions which alternatively aim at a response of efficient management of situations of dysfunction specific to these special types of assets (CI) present in the urban environment:

1. What are the evolving trends of critical infrastructure systems in the urban environment and what implications are there, subsequently, in the field of risks (in general) and resilience (in particular)?

2. What is the appropriate integrative managerial framework model to be applied in the urban environment for resilience governance in a wide range of situations affecting functionality?

3. How can the current education system be improved, as the main vector of knowledge and augmentation of the security culture, so as to ensure the reduction of vulnerabilities and the continuity of processes?

An "exclusive niche" in terms of topicality and relevance for resilience management in the urban environment, to be considered in the near future, is related to the implications (political, economic, social and technological) of establishing the NATO Command at corps level, in terms of the challenges and opportunities that result in the field of urban resilience. The subject is one of both military and civil interest (university-academic environment, local public administration, business environment), a side that can be investigated in research specific to resilience in urban space and in terms of particularities (content components, ways of achievement, intensity) on strengthening the public security

culture. Aspects subsumed to this idea are part of what is recognized as military-civilian relations (CIMIC) and were preliminarily discussed in the workshop on NATO URBAN. SIBIU - The first NATO city since November 14, 2019, with the participation of representatives from the "Lucian Blaga" University of Sibiu and other local public or private organizations involved in the implementation of this project proposal.

A central objective to be operationalized considering the current state of research and approaches at a practical level is to determine the way in which an efficient management of resilience in the urban environment contributes to the consolidation of the security culture in public and private institutions in Romania. A non-exhaustive list of specific objectives should of course consider:

1. Establishing a multicriteria framework for analyzing the concept of resilience and reviewing the existing literature in the field;
2. Investigating the interdependencies between risk, resilience and continuity;
3. Identifying the defining characteristics of the current urban environment;
4. Determining the influencing factors of the resilience of urban critical infrastructures with the particularization of the conditions imposed by the implementation of the SMART concept;
5. Analysis of the way in which resilience management is currently performed in the urban environment and identification of good practices;
6. Development of a conceptual model for analysis (actors, rules, resources) of resilience in the urban environment;
7. Identifying the peculiarities of resilience management in Sibiu;
8. Investigating the opinions regarding the perception of some specific aspects of urban resilience at the level of Sibiu city;
9. Identifying factors specific to the urban resilience of influence of the public security culture;
10. Substantiation and design of *a table top exercise* application, using the expertise of US specific good practices, for creating convergence with and for public-private partnerships, for the management of resilience in the urban environment, in a cluster approach;
11. Designing a database to collect and process data specific to urban resilience, good practices and lessons learned in the field;
12. Studying the relationship between organizational culture and security culture and proposing a set of competencies specific to the security culture necessary for the manager;
13. Appreciating the extent to which studies in the field of resilience management determine a trend in management science and have an influence on the reconfiguration of an integrative management model.

3. Highlights of a feasible methodological framework for such a topic

Generically, the macro framework of research specific to such a topic is preferable to follow a staged, systematic approach, from theory to practice, but given the specificity in the actual, applied field of the proposed topic, there will

certainly be questions to verify or validate ideas from practice to theory, in case of observations or results obtained.

Specifically, the research methods considered necessary in substantiating the approach may be:

- documentary analysis to identify the main directions and study trends of resilience management or even schools of thought insofar as they have emerged;
- modeling and simulation, for the conceptualization of representations of phenomena, processes and systems specific to resilience management, for the materialization of models to simulate human behavior and decision-making mechanisms in risk scenarios;
- the method of the interview and the questionnaire for carrying out the comparative analysis in public-private and civilian-military profile regarding the perception (role, importance, ways of accomplishment, contribution to the formation of the security culture, etc.) of urban resilience;
- Analysis of Competing Hypotheses (ACH), within a scenario for the management of urban resilience in Sibiu, in which, by confronting some hypotheses with the evidence found and trying to refute them, the validity of several competing hypotheses is assessed, which represent alternative explanations for the same phenomenon / situation.
- The use of software products needed especially for the practical part of research certainly facilitates and gives robustness to studies, some landmarks in this regard being the following:
- IBM SPSS Statistics, for processing data specific to the research based on the questionnaire, identifying correlations between variables (example - age, studies, environment of the respondent versus statements), validation of working hypotheses;
- EdrawMax for the generation of schemes and the implementation of specific IDEF modeling methodologies, based on graphical representations of the analyzed systems and subsystems;
- ArcGis, for modeling and simulating some essential aspects (risk areas, magnitude of risk, affected population, etc.) specific to the manifestation of events with an impact on the resilience of some in the Sibiu area;
- VBS 3.0Virtual Battle Space, for modeling and simulation in the virtual environment, of disruptive events, to identify, using the artificial intelligence module of the product, trend elements specific to human behavior, for predefined cases.

4. Conclusions

When we characterize a city in terms of the resources involved for the proper functioning of the daily life of the community, the most sensitive aspects are related to controlled resources at private or public level, essential for the operation of the economy and government at a minimum, critical infrastructures, presented by the

European Commission as an element, a system or a component thereof, located in the territory of the Member States, which is essential for the maintenance of vital societal functions, health, safety, security, social or economic well-being of persons, and whose disruption or destruction would have a significant impact in a Member State as a result of the inability to maintain those functions. Many works so far have focused on explaining the interdependencies, the cascading effects specific to the operation of essential infrastructures. Katina [3] was concerned with describing the defensive properties of a system that increase the resilience of that infrastructure - measures of protection, detection, adaptability, deterrence, robustness, slowing down the crisis, redundancy, warning and reliability - and proposes measures to increase resilience that go beyond conventional reactive and preparatory policies and also focus on measures to deter aggression and defuse threats before they occur. An idea with effects in terms of adapting managerial models to these realities is reiterated by Johnson [2] who draws attention to the usefulness of common mental models that promote communication and collaboration between different systems and different organizations. They are crucial in managing incidents of deviation from normal functioning and return to normalcy, as well as in preventing accidents and assimilating the lessons they offer.

Beyond the general scientific benefit of such research (increasing the scientific heritage of specialized knowledge on a current topic) a practical utility for several categories of beneficiaries is aimed at and appreciated: local public administration institutions (providing relevant recommendations for facilitating a diagnostic analysis of the current state of approach to urban resilience which will support the operational efficiency of decisions in the field), the academic environment (noticing the opportunity to renew the educational offer by including resilience management programs), the private environment (awareness of the need to adopt standards and adapt activities in this regard). The connection between the three types of institutions can be made, an ideal situation, within a regional center dedicated to the management of urban resilience. Last but not least, the results of the study can contribute to the substantiation of development strategies that currently consider only to a small extent the operationalization of the main concepts, with all their connections and implications, presented and developed in the proposed research.

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Accelerating history and the birth of a new science - chaos theory

„Knowing the future, takes you back to the past.The mistakes of the politician are crimes, because as a result millions of innocent people suffer, the development of an entire country is hindered and its future is hindered for decades to come." Mihai Eminescu

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Abstract

The organizers of the International Smart Cities Conference (SCIC), 9th edition, December, 2021, proposed an exciting topic "Accelerating history", on which we reflected for a long time. And this is because I really liked the study of history, especially intellectual history or the history of ideas, as a discipline of history. Those who specialize in this field try to explain the ideas in context. For example, someone who specializes in this discipline is not concerned with finding out what freedom in itself means, but what freedom means to an eighteenth-century French peasant or a nineteenth-century American capitalist. What are the two contexts? The interesting part is that many things written about the past correspond to the future. If there is a discipline that deals with the history of political ideas, why not one that deals with the future of political ideas, based on predictions and projections. This is exactly what I am trying to do in this paper, to see what power, democracy, freedom, justice could mean in the future in the context of the acceleration of history, but also of history caused by the plandemic triggered on humanity. When I received the invitation I went to the

documentation for the elaboration of our scientific research approach, I remembered that just on my birthday, this year I received as a gift, from the family, a book with at least a strange title "Chaos. The birth of a new science "which I considered, no more, no less, as a scientific revolution. And this is because HAOS presents to a new generation of readers the theory of chaos, one of the most important innovations in scientific knowledge of our time. From the Butterfly Effect discovered by Edward Lorenz to the calculation of Mitchell Feigenbaum's universal constant and the concept of fractals developed by Benoit Mandelbrot, who created a new geometry of nature, the captivating story woven by Gleick focuses on the fundamental personalities whose genius opened a new path for science. In Chaos, Gleick makes the history of chaos theory not only fascinating, but accessible to beginners, and opens our eyes to a surprising new perspective on the universe.

***Keywords**: accelerating history, chaos theory, politics of the future, digital technology*.

1. Introduction

The organizers of the International Smart Cities Conference (SCIC), 9th edition, December, 2021, proposed an exciting topic „*Accelerating history*", on which we reflected for a long time. And this is because we really liked the study of history, especially intellectual history or the history of ideas, as a discipline of history. Those who specialize in this field try to explain the ideas in context. For example, someone who specializes in this discipline is not concerned with finding out what freedom in itself means, but what freedom means to an eighteenth-century French peasant or a nineteenth-century American capitalist. What are the two contexts? The interesting part is that many things written about the past have correspondence in the future. If there is a discipline that deals with the history of political ideas, why not one that deals with the future of political ideas, based on predictions and projections. This is exactly what we are trying to do in this work, to see what power, democracy, freedom, justice could mean in the future in the context of the acceleration of history, but also of history caused by the plandemic triggered on humanity.

Reflections on the past, which are, in many ways, reflections on the importance of context, have captivated us and made us think about the future. In history classes, it is often said that today's terms and concepts are inappropriate and inappropriate for describing past experiences. They are anachronistic. We can also say that they are anachronistic about the future. This is where a challenge arises. I am a lawyer, a former officer converted from weapons to law. When I talk to another lawyer we use a specific vocabulary because we have the same language. The same is true for scientific communities. But I'm not talking to someone who's not a lawyer. Lawyers who talk to their clients as if they were also lawyers are stupid lawyers, because those clients do not understand what they are saying. Therefore, the first question would be: What is your audience? Who are they? Therefore, we did not undertake this scientific research to impress. We know how it is, specialists in the academic field try to convince ordinary people, everyone. Only you can't convince the world if they don't understand you. To convince someone, the minimum

condition is to understand what you are saying. Then, there is no idea so complicated that you can't explain it in relatively simple terms, even if it takes longer and you have to follow some steps. Third, I think many authors deliberately use confusing language to look smarter. I don't think that's the best way. Finally, even though I am a pleading lawyer, I belong to the academic sphere as a scientific researcher of the Institute of Legal Research of the Romanian Academy and full member of the History of Science Division within the Romanian Committee for History and Philosophy of Science and Technology of the Romanian Academy. and a former university teacher, retired in the meantime. Now I write because I care about all these things. This status in the academic sphere forces me to write in an academic style of the best quality, but I think it is better to write in the simplest possible way, in a language that everyone can understand because I touch issues that matter to everyone.

After receiving the invitation, I proceeded to the documentation for the elaboration of our scientific research approach, I remembered that, just for my birthday, this year, I received as a gift, from the family, a book with at least a strange title „*Chaos. The birth of a new science*"[1] which I considered, no more, no less, as a scientific revolution. And this is because CHAOS presents to a new generation of readers the theory of chaos, one of the most important innovations in scientific knowledge of our time. From the Butterfly Effect discovered by Edward Lorenz to the calculation of Mitchell Feigenbaum's universal constant and the concept of fractals developed by Benoit Mandelbrot, who created a new geometry of nature, the captivating story woven by Gleick focuses on the fundamental personalities whose genius opened a new path for science. In Chaos, Gleick makes the history of chaos theory not only fascinating but accessible to beginners, and opens our eyes to a surprising new perspective on the universe.

Continuing the documentation, I found in the personal library another interesting book, received as a gift, also from the family, in 2019, „*Politics of the future. Digital technology and society*".[2] I discovered Jamie Susskind, its author, before reading something written by him, through an interview conducted by Cătălin Ștefănescu on his show „*100% Guaranteed*". Susskind is an exceptional narrator, who manages to explain clearly and simply scientific concepts trying to answer one of the great questions of our time: what transformations will digital technology produce from artificial intelligence to virtual reality in social and political life? Analyzing how it can be used by the state and big tech companies to gain control of people's lives and drawing on the centuries-old treasure of political thought, Susskind challenges readers to review the significance of concepts such as democracy and justice, freedom and equality, power and property. Although he has studied history, Jamie is a future specialist who says that „we are not yet ready - intellectually, philosophically or morally - for the world we create. In the coming decades, the old ways of thinking, which have been of great use to us for hundreds or even thousands of years, will be called into question. New debates, controversies and ideologies will emerge. Some of our deep beliefs will be revised or abandoned altogether. We will have to imagine together again what it means to be free or equal, what it means to have power or property and even what it means for a regime to be democratic". However, in more detail about his views on „*The politics of the future. Digital technology and society*" in a special section dedicated to this study.[3]

In the same order of ideas, in accordance with our theme, we rediscovered, in the same dowry box of the family, another gift, from 2018, a work with a suggestive title, „*21 lessons for the 21st century*".[4] Author Yuval Noah Harari, Israeli historian, writer and professor at the Department of History of the Hebrew University of Jerusalem. has caused a stir with the two books on the past and future of mankind, Sapiens: *A Brief History of Humankind* (2014) and *Homo Deus*: *A Brief History of Tomorrow* (2015). Yuval is an exceptional narrator, who manages to explain clearly and simply scientific concepts otherwise difficult to digest. In a world invaded by irrelevant information, clarity means power. 21 lessons for the 21st century shed light on some of the most pressing issues of the day. Yuval Harari treats with clarity and intelligence many of the current important topics, from work, freedom, equality, religion, immigration, terrorism, god, justice and education. What I liked about this book is that Yuval is not content to say how things are, but also gives solutions to some of the most pressing questions and dilemmas today. What made me think the most is the chapter in which he explains that in the 21st century the most precious resources have become personal data and we willingly offer these resources to giants like Facebook or Google.

In the 21st century, data will be the most valuable asset, eclipsing both land and cars, and politics will be a struggle for control over the flow of data. The race for data has already begun, and it is led by data giants such as Google, Facebook, Baidu and Tencent. So far, these giants seem to have adopted the business model of „attention traders". It catches our attention by providing us with free information, services and entertainment, after which we sell our attention to advertisers. However, the data giants are probably aiming much higher than any previous retailer. Their real business is far from selling commercials. Rather, by capturing our attention, they manage to gather a huge amount of data about us, which is worth more than any advertising earnings. We are not their customers - we are their product. Today, people are happy to offer their most valuable asset - personal data - in exchange for free e-mail services. It is somewhat similar to the African and Native American tribes who, without realizing it, sold entire countries to European imperialists on colorful beads and cheap ornaments. Also related to the progress of technology and the fact that many trades will be replaced in the future by artificial intelligence, Yuval points out what is the most important professional attribute that people of the future should have: the ability to adapt to increasingly changing times. Many pedagogical experts argue that schools should start teaching „the four C's" - critical thinking, communication, collaboration and creativity. Broadly speaking, schools should reduce the role of technical skills and focus on activities that are generally needed in life. The most important of all will be the ability to cope with change, to learn new things and to keep your mental balance in unusual situations. In order to keep up with the world of 2050, we will not only have to invent new ideas and products, we will have to reinvent ourselves endlessly because people think in stories rather than facts, figures or equations and, the simpler the story, with so much the better. We will learn to design brains, prolong life, and kill thoughts as we please. Nobody knows what the consequences will be. People have always been much better at inventing tools than using them wisely. It turned out

that all our choices, from food to partners, are not due to a mysterious free will, but rather a few billion neurons that calculate probabilities in a split second. The much-lauded „human intuition is actually pattern recognition". Homo sapiens simply is not made to be satisfied.

Man's happiness depends not so much on objective conditions as on his own expectations. But expectations tend to adapt to conditions, including the condition of other people. As the situation improves, expectations increase, and as a result, we may be as dissatisfied as before with significant improvements in conditions. If we look at things through the prism of our scientific data, all the sacred texts were written by some homo sapiens with rich imagination. They are just stories invented by our ancestors in order to legitimize various social norms and political structures. For the laity, morality and wisdom did not descend from heaven at any one time. Rather, morality and wisdom are the natural heritage of all people. Instead of praying for miracles, we should ask what we can do to help. People control the world because they can cooperate better than any animal, and they can cooperate so well because they believe in fiction. Therefore, poets, painters and playwrights are at least as important as soldiers and engineers. People go to war and build cathedrals because they believe in God, and they believe in God because they read poems about God, because they saw images of God, and because they were fascinated by plays about God. The universe doesn't make sense to me. I give meaning to the universe. This is my vocation, being free to create my own destiny, as the American sociologist and futurist Alvin Toffler did with intuition and professionalism with „The Shock of the Future" which was the cry of a society besieged by crises and frightened by the inability of its institutions to control.[5]

The term „shock of the future" describes the psychological state of individuals as well as societies, who face the impression that „too many changes have taken place in too short a time." The concept is related to the term „technological singularity", which appeared in the 21st century. Toffler suggests that society is in a phase of enormous structural change, a revolution from an industrial society to a „super-industrial society." This transformation confuses people and accelerates social and technological progress, leads to "disconnection" from the rest of the world, subject to "destructive stress and disorientation" - the shock of the future. Toffler goes on to attribute most social problems to the shock of the future, describing this type of "shock" as an "information overload." Toffler continues the analysis along the same lines, in the Third Valley and the Power in Motion. With the publication of his first work, The Shock of the Future, in 1970, he created a new discipline, futurology, by studying change and its impact on business and culture. The volume defines the forces and trends that shape our future in today's information-based economy. In addition to The Shock of the Future and The Third Wave, Alvin and Heidi Toffler wrote other books, including "War and Anti-War," "Power on the Move," and later "Creating a New Civilization." In his best-known book, The Shock of the Future, Toffler analyzed the social changes that were expected in the world. High-speed Internet will become a real norm in the field, and video conferencing, which has already become a common practice today, will allow future employees to stop going to the office and work from anywhere in the world.

China will consolidate its status as a major economic power, ally with Brazil and India to influence currency exchange rates, but also with Venezuela and several African states to meet its energy needs. The United States will depend on China to supply rare metals, which are essential for the manufacture of consumer goods, but also specific devices and products, such as radars, weapons, wind turbines and hybrid cars.

The development of alternative forms of energy will create "losers in a post-hydrocarbon world", such as Saudi Arabia, Iran, Iraq, several states in the Persian Gulf area, but also Russia. Christianity will spread to countries in the southern hemisphere, and Muslims will emigrate in large numbers to Western countries. Climate change will generate a series of conflicts, and the melting of glaciers will lead to the discovery of new mineral and oil deposits. Rising sea and ocean levels will cause a massive displacement of people from coastal areas. The phenomenon of an aging population will lead to a fourfold increase in total global spending on pensions and care for the elderly, and the US health insurance system will cease to exist in its current form. In turn, women will occupy more and more important positions, the percentage of women in management positions will reach a level unimaginable a few years ago. The speed with which the information will be transmitted will determine humanity to enter the era of the "petabyte", a unit of storage and computing power superior to the already widely used gigabyte. And with that, we will have already moved into the future of politics.

2. Politics in the future: from Judeo-globalism to national-protectionist politics

The politics of the future will hardly resemble the politics of the past. Twentieth-century politics was dominated by a key question: how much should our social life be determined by the state and how much should it be left to the market and civil society? For the generation that is currently approaching political maturity, the question will be completely different: to what extent should our lives be directed and controlled by high-performance digital systems and under what conditions? This question raises comments and controversies. Let's take them one at a time. First, it is expected that in the coming decades, computer systems will be created with astonishing efficiency, some of which will compete with man and surpass him in a wide range of activities, even without reaching an "intelligence" such as Our. Soon, these systems will no longer look like computers, but will be integrated into the material world, hidden in structures and things that we did not consider as technology in the past. More and more data about people will be collected and recorded - what we do, where we go, what we think, what we say, what we feel - which will then be sorted, stored and processed digitally. In the long run, the differences between man and machine, online and offline, virtual and real, will become increasingly insignificant. This transformation will bring some important benefits to civilization. We will be able to work differently, to travel, to shop, to learn, to create differently, to express ourselves, to keep in touch with others, to get to know each other, to coordinate, to keep fit and to discover joints in a way. brand

new. In the long run, our minds and bodies may become unrecognizable, freeing us from biological constraints. At the same time, however, some technologies will come to have great power over us. Some will force us to behave in a certain way, for example autonomous vehicles, which actually refuse to exceed the preset speed limit.

We must not overlook the fact that there is a gap between technological evolution and that of society. What will happen if this gap widens a lot and a part of the world will be left behind, because it will not be able to keep up with the evolution of technology? There will be countries, companies that will accelerate technological development. It is a truth we cannot avoid: it is a good time for any prosperous country, because it helps them to be able to develop all these new technologies at a pace that most countries cannot do. It's a sad truth. Another aspect is that technology tends to develop faster than our ability to understand it and than our ability to regulate it. This is also a problem for developed societies or especially for them. To manage the situation, we need to know where we are going, not just where we are, to observe the trends and the dominant players, to see what needs to be done. In this context, BigTech companies should have important responsibilities in the next short period of time even if these technology companies follow the logic and principles of the market. It's understandable and we shouldn't pretend we don't know or see. They always try to maximize their profit by increasing the number of customers. It's in their logic. However, we should move to a phase in which these companies act not only in the interest of themselves and their customers, but also of society, and this can only be achieved through regulations. We can't ask companies to get better, to make less profit, not to take advantage of opportunities or not to develop certain technologies just because it's not nice to do so. In a way, it's not fair and it doesn't make sense to do it. We can ask companies to behave morally, but they will behave morally only to the extent that there are commercial reasons for doing so. There are, therefore, certain limits. Therefore, I believe that we must have rules established by the state that impose on companies certain behaviors, certain standards, such as those on how they manage information, in order to be analyzed and criticized knowingly. Transparency would therefore be the first responsibility. There should then be fairness and fairness. Companies should be responsible for algorithms that allow discrimination and prejudice or are incorrect towards certain groups. I'm talking about issues that the law doesn't cover yet. Third, companies should be forced to distribute more of their resources, the data they have. I am thinking here of the results of their studies. Some companies do it, but there is room for more. This information would help the academic and journalistic worlds to be more informed and, implicitly, to better understand what is happening with technology. None of the three responsibilities will be accepted voluntarily. I think it is our role, as a society, through the competent state agencies, to impose these rules on them because, as Alvin Toffler said, „Changes in life help the future to invade our present."

Going a little further in the history of ideas, I recently reread „*The Prince,*" Niccolò Machiavelli's masterpiece, written in 1513,[6] as it was often quoted by American political scientist George Friedman in his book „*The Next Decade*", when he gave advice to the President of the United States. for the decade 2011-2021. Here

is what Machiavelli wrote about the essence of the state: the best foundations of any state are good laws and good armies. And since there can be no good laws where there are no good armies, and where there are good armies there must be good laws, I will set aside the exposure to the laws, even though I am a lawyer and I will talk about armies, I was a military man. career. I say, therefore, that the armies with which a prince defends his state are his own, or mercenaries, or allies, or mixed in these different ways. Mercenary and allied armies are useless and dangerous. Allied armies, which are also useless armies, are sent to you by a powerful head of state, when you ask them to come to your aid and defend you. Armies like this can be useful and good when fighting for themselves, but they are almost always detrimental to the one who calls them, because if you lose the battle, you are defeated, and if you win, you become their prisoner. Therefore, he who does not want to win should use such armies, because they are much more dangerous than the mercenary ones. Indeed, by their very nature, they bring with them destruction, because they are closely united to each other and accustomed to always obey one another, and not you. Thus, a wise prince always avoids this kind of army and uses only his own: he prefers to lose the battle with his soldiers, than to win it with others, judging that it is not a true victory that you win with foreign weapons. But, being too unwise, people sometimes start doing something that seems good at the moment, which makes them not realize the poison that is hidden in it.

We now live in other times, and over many decades, Western neo-liberal-globalist policy, supported and led mainly by Jews and their subjects, has consolidated and sunk into the depths of society, seizing influence, power and wealth. The scale of this process has reached such high levels that I am not wrong in saying that neo-liberals have come to rob the planet. The neo-liberal regime was not content with absolute control over the American hemisphere, which the U.S.A. he had controlled it since 1823, when President Monroe launched the theory that bears his name. Over time, neo-liberalism has encompassed the area of U.S. influence. and Great Britain in the western half of Europe, and following the verbal agreement in Malta (2-3 December 1989), between the presidents of the U.S. and the U.R.S.S., spread to a significant part of Central and Eastern Europe. In Asia, the main pawns in expanding the influence of neo-liberalism were Japan and South Korea. After the stage victory in Malta, the world's greatest neo-liberals in Washington and their supporters on various continents proclaimed globalization as an irreversible historical phenomenon. On our continent, the European Union has expanded, and European integration has also been declared an irreversible process, part of globalization. Propaganda in this direction made efforts to create hommo globalus and hommo europaeus. However, this declared "irreversibility" of the course of history is a manipulative, unscientific statement. Every historical phenomenon has both front and back. Nothing in history is irreversible. To support irreversibility in history is to deny an axiom of history, which tells us that "the wheel of history is spinning." Personally, as a teacher, I taught my students this fact and I challenged the irreversibility of the phenomenon of European integration, even if I was not "on the line". This neo-liberal-globalist political regime has been supported by all Masonic lodges, the Bilderberg Group, the Committee of 300, the Council on Foreign

Relations, the European Union and related financial bodies, respectively the IMF, WB, BRD, BE and other institutions and organizations. The system-dependent media plays a huge role, so much so that it has become part of the system. Hardworking, diligent and strongly protected, the media has ceased to be independent, with small, insignificant exceptions. One of its important tasks is to manipulate peoples and keep them under the control of the neo-liberal-globalist system.[7]

The power and control of the political regime in each country was exercised through intelligence services, connected to each other in a pyramid system, coordinated by Washington. In all states promoting the Judeo-Globalist system, without exception, important components of Justice and the Prosecutor's Office have been brought under the control and influence of the secret services. Also, who controls the Justice and the Prosecutor's Office, also controls the Police and the financial control bodies. The protection of the system is done by a very fine, covered political police, in which uncomfortable people or opponents of the political regime are neutralized and, in many cases, in extreme situations, killed by silent weapons. In order to be able to preserve their power in the face of the onslaught of members of the political class or civil society, in order not to be dependent only on political leaders, the secret services have created their own economic companies, which allow them additional financing of operations. several times, these companies evade state controls. In this way, the Judeo-Globalist system has put a suffocating cap on the whole world that it controls and maintains in an immobility that makes very difficult efforts to maintain the interests of the vital nucleus of nations, which is always aggressed and restricted, the goal being atrophy of national feelings and the ability of nations to defend their own interests in the face of Judeo-Globalists. The meaning of some terms has been distorted, so that being "nationalist" is interpreted in the Judeo-Globalist vision as something bad, something reprehensible and has received a pejorative meaning, the secret services being software for monitoring them. Without insisting on particular aspects, I mention that in Romania the repression against nationalism is practiced, in its pure and positive sense, current springing from patriotic feelings, which aims to promote the interests of the Romanian majority ethnic group, the most oppressed of the ethnic groups, after December 22, 1989. But nowhere in the world, despite the large-scale media-propaganda injections of the Judeo-Globalist system, promoted over a long period of time, has nationalism disappeared. He was diluted in some places, especially in the younger generations, but he always came back. Sociologists and psychologists have shown that in the "global era" national consciousness does not disappear. Other very important steps were the clarifying recommendations for the neo-liberal Judeo-globalist political line offered following the deliberations of most of the summit meetings of the Masonic lodges, of Bilderberg, etc. The existence of communist ideology and regimes fueled in the capitalist world the psychosis of the danger of this scourge, a danger that justified the arms race and measures of internal security and surveillance of the population, causing the population to accept them and not demand more freedom from the rulers. The disappearance of the communist enemy and his ideology and the apparent friendship of the U.S.A. with the Gorbachev and Yeltsin regimes in the Kremlin made it difficult to justify the need to continue

financing the arms race, intelligence services, maintaining the approximately one thousand military bases on the globe, etc. There was a need to create a new enemy, and it became international terrorism, treacherous, unseen, and could appear anywhere and anytime, difficult to counter. The new "adversary" had another advantage: any leader or state could be accused of supporting terrorism and targeted for being hit. The culmination I am referring to, the rise of neo-liberalism and the aggressive promotion of the policy of domination for the purpose of forced globalization, was the outbreak of the war on terror (2001). Several important events preceded the outbreak of the war on terror. I recall the creation of the Al Qaeda terrorist organization, led by former C.I.A. agent Ossama bin Laden, who had been supported and used by the U.S.A. at a time when the Taliban in Afghanistan were fighting the invasion of the country by the U.S. Army. We must not forget the terrorist attacks on U.S. embassies. from Kenya and Tanzania, which resulted in 225 dead and 4,100 injured.[8] The bombers were not caught, but the ambassadors and the most important embassy officials were not at work at the time of the attacks. Ordinary officials, street passers-by and residents of nearby buildings died. In the summer of 2001, President George W. Bush proclaimed the "Axis of Evil," representing a list of seven states that had been declared "terrorists": Syria, Iran, Iraq, Libya, Pakistan, North Korea, and Cuba. It was certain that war would be waged against one or more countries on this blacklist. The September 11, 2001 bombing followed with the four planes hitting the twin towers of the World Trade Center, the Pentagon and a field in Pennsylvania.[9] The attack is particularly controversial, as it is suspected of being organized out of the desire and support of US authorities, out of the need to justify the wars that were to be waged in the name of the fight against terrorism. In this direction of interpretation of the event, logical explanations were given and relevant information was provided. Time will lead to the officialization of some truths that are now like Polichinelle's secret, that secret that everyone knows, but no one says. So it was with the Japanese attack on Pearl Harbor, which justified the U.S. entry. in World War II. Today it is well known and acknowledged that President Roosevelt was informed that the Japanese attack was coming, and his decision was not to prevent the attack, but to allow it to take place.

The creation of the Islamic State (I.S.I.S.), conceived and organized by the Washington administration, is in the same direction. In fact, President Donald Trump has publicly accused Haillary Clinton of running the I.S.I.S. together with President Barack Obama. During the wars, the aggression against the Afghan and Iraqi peoples and the brutalities committed were colossal. These wars, as well as torture of prisoners at Guantanamo Bay, Abu Ghraib, or secret prisons in various countries, including Romania, have reached their climax and convinced most of the world outside the U.S. area of influence. that a long-running assault was launched, with the ultimate goal of subjugating the entire globe. In 2011, a court in Malaysia, after three years of investigation, convicted George W. Bush and British Prime Minister Tony Blair of genocide and crimes against peace. Under pressure from international public opinion, former U.S. National Security Adviser Condoleezza Rice acknowledged that she personally ordered torture as a means of obtaining information from prisoners. The attachment of the peoples of the World to the U.S.

and his political regime declined dramatically. However, the attachment of the peoples to the dominant power is the main factor in ensuring its security. The American administration emerged weakened from the war on terror and more subject to the Judeo-Globalist system. In 2014, the Western secret services launched the "Arab Spring", which meant the overthrow of governments, crimes, robbery and destruction, especially in Libya and a new compromise of the Judeo-Globalist regime, which trampled entire peoples, with a smile on his face. Judeo-globalist planners also aimed to destroy Iran, but Russia's firm intervention stopped the project and forced the U.S. to lift sanctions against this country that has re-entered the circuit of unrestricted international cooperation and President Donald Trump has qualified all U.S. wars. in the Middle East as "big mistakes." In fact, the U.S. military-intelligence activity. as a "gendarme of the world" he served primarily to promote Jewish economic and financial interests around the globe and less so the interests of the American people. The economic treaties concluded by the White House served all these interests of the greatest of the Jewish world. On January 20, 2017, on the occasion of the U.S. withdrawal. in the Trans-Pacific Partnership trade agreement, President Trump said: "For too long, Americans have been forced to accept trade agreements that put the interests of Washington insiders and elites above the men and women who work hard in this country."[10]

During the first decade of the millennium, powerful states of the world (Russia, China, India, Iran, Brazil, the Republic of South Africa and others) cooperated to unite in the defense effort against the assault of the neo-liberal-globalist regime. Thus, the military organization "Shanhai-5" and the economic-financial organization B.R.I.C.S. Negotiations also took place and numerous bilateral financial agreements were concluded between the states, several dozen being aimed at removing the dollar from bilateral exchanges, under the real motivation of the fact that the American currency was overprinted, namely the U.S. Treasury. it throws huge sums of dollars at the world financial market, amounts needed to cover state spending, especially military and intelligence services. Asked by reporters, "What is <Shanhai-5>?", Russian President Vladimir Putin replied: "It's a kind of N.A.T.O. and U.E. taken together. ” The second military power in the N.A.T.O., that is, Turkey, also turns its back on the West and turns to Russia and the Asian states, where it finds markets more easily and with which it can develop sovereignly. The United States has lost much of its power, and Russia and its military and economic allies are no longer willing to fly the flag. US he can no longer fly freely. It needs a reset and a restart. As a result of the above, sovereign states outside the U.S. area of influence. they began to feel more and more vulnerable. In the period between Yalta + Potsdam (1945) and Malta (1989), mankind had become accustomed to the customs of the Cold War, and the very important Final Act of the O.S.C.E. for Peace and Security in Helsinki (August 1975) had strengthened the status quo in international relations, the recognition of all existing borders in Europe and the recognition of firm principles of relations between states, such as mutual respect, non-interference in internal affairs, respect for independence and sovereignty. national states, etc. The document had been signed by 32 European states + U.S.A. and Canada and seemed to greatly strengthen world peace and the climate in international relations. But after the

Malta Agreement, Western powers began to violate the Final Act, which was the strongest Euro-Atlantic treaty, taking advantage and capitalizing in their favor that under the presidencies of Gorbachev and Yeltsin, Russia had lost power, and many states no longer felt protected by anyone. Thus, the European borders were severely violated by the dismemberment of Czechoslovakia and Yugoslavia.[11]

The international aggression against Romania, from December 1989, in which the special services of some western states also fully participated, was also a serious violation of the Final Act of the O.S.C.E. for Peace and Security in Helsinki, one of the main reasons why the foreign masters of Euro-Atlantic Romania are complicit in hiding the truth of the events of that time. Today, it is proven that the dismemberment of Romania was pursued, along with those of Yugoslavia and Czechoslovakia, just as the three countries were dismembered at the end of the interwar period. In this context, it should also be shown how EU sovereignty and national independence have been diminished, and equality between states, which persisted in the first decades of the EU, has been eradicated. In the last decade, the EU has become a pyramid system of hierarchical subordination, led by Germany, followed by France and based on the pyramid Bulgaria and Romania. The EU leadership aligned itself with the neo-liberal-globalist system, militating against the national sovereignty of states, although a united Europe was made up of sovereign and independent states. Upon accession, there was no question of any country renouncing these prerogatives, although, in the case of Romania, there are secret agreements concluded against the national interests of our country. One of the phenomena promoted in many of the states controlled by the neo-liberal-globalist regime, including in Romania, was the promotion of ethnic minorities, especially Jews, in the management of society and in its "key" points in administration and services. With the help of these leaders recruited from ethnic minorities or allogeneics, the aim was to subjugate ethnic majorities and enslave Romanian national interests to the interests of supranational bodies (European Commission, N.A.T.O., F.M.I., World Bank) and Western powers, especially the USA and Germany, Germany. Also, over a long period of time, with small steps, in waves, throughout the Euro-Atlantic area, an "anti-Semitic" legislation was promoted, undemocratic, sometimes aberrant, as was the case in Romania and marginalization took place. and repression against all who dare to criticize the Jews, for whatever reason, as if these people were infallible. Criticizing negative phenomena of Jewish citizens is assimilated to anti-Semitism, which is an abuse of interpretation and a serious violation of the freedom of opinion of citizens. In Romania, after the promotion of Ordinance 31/2002[12], amended and supplemented by Law 217/2015[13], it went so far that it was declared legal and mandatory to comply with all sentences in political trials given by the People's Court and other Jewish courts - Bolsheviks during the years 1945-1964. This washed away the heinous crimes of the terrible Judeo-Bolshevik gulag in Romania from the Soviet military occupation, proving the connection over time between Judeo-Bolsheviks and Judeo-Globalists. All these phenomena, as well as many others, on which we do not dwell in the present, have severely eroded the international system throughout the Euro-Atlantic world. In the United States, the situation has always deteriorated. The White House became more and more a prisoner of the Jewish banks to which it

owed a great deal. As U.S. public debt increased, the enslavement of American governments to Jewish supranational structures became greater. It has been decades since the interests of the old Americans, respectively of the descendants of the settlers established hundreds of years ago, were neglected in favor of global interests. The Jewish-Jewish neo-liberal leaderships of the U.S. in the last four terms, namely those of Presidents Bush and Obama, they have sold the US government's gold reserves to China, increased public debt to dizzying rates, pursued economic and financial policies that have pursued the immediate profit of large Jewish banks and allowed the big American companies, the backbone of the country, to turn into multinational companies and the economic power of the USA to dilute in the economic-financial ocean of the World, which increased the control of the great Jewish finance over the U.S. More and more Jews, African Americans, Hispanics, and other minorities of all kinds have penetrated the Washington administration and the entire Defense, Police, and intelligence services, to the detriment of the old Americans. The vital core of the U.S. administrative and military-informative power. he understood that he had to make a radical change in national political doctrine, reposition himself against the rest of the world, and try to return to the position of world superiority that he acknowledged that he had lost, even though he was still the world's leading power. We notice, in summary, that the changes in life invade our present and help to foreshadow the future.

3. About how life changes help the future invade our present

The changes we are witnessing today have been predicted by Alvin Toffler since 1980, with the advent of the „Third Wave": *„A new civilization is emerging in our lives, and everywhere blind people are trying to stop. This new civilization brings with it new types of family, other styles of work, love and life, a new economy, new political conflicts and, beyond all this, a changed consciousness. Elements of this new civilization exist from now on. Millions of people tune their lives to the rhythms of tomorrow. Others, terrified of the future, prefer to flee desperately and in vain into the past and try to restore the dying world that gave birth to them. The dawn of this new civilization is the most explosive phenomenon in our lives"*[14] At present, they have all grown in alarming proportions and it is no wonder that such formidable demographic changes and social uprooting cause tensions, neuroses, anxieties on an unprecedented scale. All these social processes and social calamities have been impelled, accelerated, and sometimes generated by the contemporary scientific-technical revolution: in only two decades, communications have become universal and instantaneous, information has exploded, air transport has surpassed sound, weapons have become planetary as a range and destructive power. And the characteristic of this revolution lies in the fact that its discoveries and technical innovations are applied the faster the higher the level of economic and technological development. In Western society, the speed of the social impact of the technical revolution has so far exceeded normal limits that people have begun to see modern technology as an unmanageable supernatural force that is unmanageable, threatening, and hostile to society.

Alvin Toffler's merit is that he has managed to capture the characteristic aspects of the new social phenomenology, operating on the whole extraordinarily diverse range of rapid modern transformations in production, communications, transportation, information and the changes they produce in the pace of life. man, in social skills and habits, in the mobility and relationships of people, in their social organizations and institutions. According to his theory, these changes are the process by which the future invades people's lives, that the accelerated pace at which they occur tests man's own adaptability, and that when this capacity is overwhelmed, the consequence is the shock of the future. Defined laconically, the shock of the future is the reaction to overstimulation. Indeed, ideally, the scientific-technical revolution should have taken place in a human society in which man controls all economic and social mechanisms, including technology. In the conceptual framework of such a social model, the shock of the future that society suffers today could be described as the tribute it pays for its historical delay. When Toffler wonders if he can live in a society that has spiraled out of control, he finds himself - as an American expression sounds - right in the bull's eye. Here he is and you can't help but agree with him when, after listing such explosive social phenomena as urbanization, ethnic conflict, migration, population, crime, he finds that the effort to capture and control them is increasingly which is more ineffective within the respective social system. And then how can we prevent the shock of the future in mass proportions by selectively adjusting the pace of change, raising or lowering the level of stimulus, when governments seem incapable even of directing change in the right direction? So far, so good. The idea that we live in a changing society, in a changing world and in general the concept of social change is almost unanimously accepted in the socio-political literature. Without risking, we anticipate that in the Standard World of 2030 the cybernetic revolution will allow governments to run society the way a pilot handles the plane and the technetronic revolution will overturn everything - morals, social structures, values and concepts that will cause cataclysmic collapses in human values and in the functioning of human society including here the economic system. Social issues will not be limited to social pathology, to the social diseases caused by overindustrialization and to the stress to which the biological organism, the human biosystem, is subjected, when it is confronted with changes so rapid that they exceed its capacity to adapt. The essential concern of policy makers will be to establish a correct diagnosis and prescribe a treatment, a therapy meant to cure or at least alleviate the pain caused by the shock of the future. Without being pessimistic, we will need a "survival strategy." The recipes offered begin with those at the personal level, and then at the group level, the reorganization of education, the submission of technique, planning and, finally, futurological education, including organized forms to get people used to living collectively in the future. Social control will disappear in a system that operates on the basis of property and private initiative and whose main incentive is maximum profit. Far be it from us to think that the answer to the problem of social control is simple or that there is a ready-made recipe, especially since it is a society as complex as that of future generations. But what we want to emphasize is that to envisage as a solution changes in personal or group behavior, reforms in education

and planning, measures of planning and collective living in the future means to stay afloat. Social control demands profound and radical transformations not only in the superstructure, but also in the base, it demands the change of the whole system affected by "cancer of history" - conflict between advanced technology and a delayed society - as the scientific-technical revolution is a global phenomenon. they feel everywhere.

It is true, however, that technology does not act directly on social and political life, but through social forces, classes, and nations, and therefore the human and social consequences of the technological revolution are not the same in all types of social organization. different degrees and intensities in relation to the level of economic development of one country or another. Daniel Bell's concept of "post-industrial society" is only a form of concealment of differences in social order and camouflage of class conflicts within capitalist society, characterized by violence, wars, conflicts, and hatred.[15] We live in a time when existing systems are in crisis, institutions once revered are dismantled and democracy itself is in crisis. In many parts of the world, the state as an institution is seen as an instrument that encourages hyper-nationalism and xenophobic impulses and abuses its power to persecute minorities and oppose nonconformist groups. There are hegemonic oligarchs who repress unbridled violence against vulnerable, smaller nations, even though organizations meant to maintain international order look helpless or ineffective. Equality ideals have been turned into malleable tools to serve the powerful, with the entire nation being devastated in the name of "promoting democracy." The "war on terror" is used as a perfect alibi to reduce individual freedoms and rights. What does this mean for freedom, justice and democracy? At the heart of the violence, hatred and anger that are destroying our world are the obvious injustices and inequalities caused by a neoliberal economic regime, with a unique focus on the market and profitability. In addition to all this, state power is usually used to protect the hegemony of elite power in all nations and to maintain the status quo. Neither the predominance of the state nor the power of the market have succeeded in creating a better world. In this violent and controversial world, it is the responsibility of scientists to research and question the dominant institutions, beliefs, ideologies and practices that seem to accentuate inequality and injustice.[16]

At the same time, the neo-Marxists know that the scientific-technical revolution, by its very objective force, produces a series of effects in any society, regardless of the economic and social system. Industrialization is accompanied everywhere by urbanization, and the acceleration of this process through the effect of the scientific-technical revolution is a social phenomenon to which Romanian sociologists have devoted several remarkable studies. It will not be difficult for the Romanian reader to identify in the pages of the present study other effects that our society feels, which has acquired, through the proportions of the plandemic that floods us wave by wave, a real shock of the present. Here a vast field of concrete investigation and creative theoretical elaboration opens before the researchers preoccupied with the future of humanity, because the great leap in science and technology, as well as the profound social transformations in the contemporary world raise new problems, which demand new solutions and demand a vision.

revolutionary not only on technology but also on society. Alvin Toffler's ideas also had surprising effects on the evolving culture of the turn of the century and the beginning of the millennium, and several world leaders, including the last Soviet President Mikhail Gorbachev and former Chinese Communist Party Secretary General Zhao Ziyang, said they were inspired. of his writings and even consulted him in the 1980s. Alvin Toffler's predictions for the next 40 years made the rounds of the Internet in 2010, when they were launched by "Toffler Associates":

- women will have an unprecedented decision-making power, they will occupy more and more important positions, the percentage of women in management positions will reach an unimaginable level;
- Muslim migration to the West will increase, and going to the office will no longer be relevant;
- many of Alvin Toffler's predictions, regarding the speed of information transmission, the acceptance of gay marriages and the acceleration of the pace of ecological catastrophes, came true in the years that followed;
- science and technology will develop at such a rapid pace that most people will not be able to "digest" this influx of information and will be tempted to "disconnect" from this much too hectic pace of life;
- for the next decades, an increasing number of people will grow their own vegetables and produce their own food, in order to depend less and less on the big producers and distributors in the food industry (s.n.);
- high-speed internet will become a real norm in the field, and videoconferencing, which has already become a common practice today, will allow future employees to stop going to the office and work from any corner of the world;
- China will consolidate its status as a major economic power, will ally with Brazil and India to influence currency exchange rates, but also with some emerging countries to ensure their energy needs;
- The United States will depend on China to supply itself with seven rare metals, indispensable for the manufacture of consumer goods, but also of specific devices and products, such as radars, weapons, wind installations and hybrid cars;
- the development of alternative forms of energy will create "losers in a post-hydrocarbon world", such as Saudi Arabia, Iran, Iraq and several states in the Persian Gulf area;
- Christianity will spread to the countries of the southern hemisphere, and Muslims will emigrate in large numbers to the countries of the West;
- Climate change will generate a series of conflicts, and the melting of glaciers will lead to the discovery of new mineral and oil deposits. Rising sea and ocean water levels will cause a massive displacement of people from coastal areas;
- the phenomenon of population aging will lead to a fourfold increase worldwide in total expenditures on pensions and care provided to the elderly;

The speed with which information will be transmitted will cause humanity to enter the era of the "petabyte", a unit of storage and computing power superior to the already widely used gigabyte. In a nutshell: we live in the future predicted by Alvin Toffler well "garnished" with a digital dementia - the disease that, along with the plandemic that produced the greatest planetary genocide, will announce the Apocalypse!

4. Digital dementia, the disease of the beginning of the end of humanity?!

„Five years ago, doctors in South Korea, an industrialized state and as modern as possible, with a very advanced information technology worldwide, recorded in young adults more and more memory, attention and concentration disorders. more common, as well as emotional flattening and general opacity. They called this pathological picture digital dementia." The combination of the two terms does not belong to me, I found it in the Word before spoken by Manfred Spitzer in his already famous book *„Digital Dementia. How we and our children go crazy."*[17] We know that dementia is a general term used to describe the decline in mental capacity and describes a group of symptoms caused by disorders that affect the brain. Dementia is not a specific disease but it affects thinking, behavior and the ability to perform daily tasks. The other word, the digital adjective, generally means "numerical" and can have the following meanings and uses: which is or can be represented by numbers or numbers.

When I think of my generation, I am satisfied that I was able to live without knowing the meaning of these terms. In fact, they did not exist, today's reality invented them and I strongly believe that all the effects of digital dementia were deliberately thought, designed and introduced in the creation of electronic devices and in the design of the architecture of the web and social networks, just to reaches these effects, such as the COVID virus, which is actually a diabolical plan to destroy humanity. They can seriously affect the younger generations and lead, over time, to the degeneration of that part of the population that will not be the subject of equally deliberate policies to reduce the world's population by at least 90%. The plans drawn up in the two Toronto protocols of 1967 and 1986 are being implemented. [18] I do not know if there are connections between these protocols and the research of Professor Manfred Spitzer, neurologist and medical director of the University Psychiatric Hospital in Ulm, Germany, but he surprises by the originality of his sharp opinions. Referring to many discoveries in the field of neurology and adding new discoveries, Manfred Spitzer brings, in his book, new arguments - in support of previous research by renowned specialists in the field - for the fact that too frequent use of the Internet can fool people. Despite malicious attacks by the media on him, he has in no way denigrated young and adult internet users. On the contrary, in order to make his position clear, he said: „I am not saying that it is a disease, but I am saying: where there are results, there are also risks and side effects."[19]

However, Spitzer not only warns, but also shows what parents, teachers and politicians can do to protect youth. It is not a new thing that watching TV from an early age and frequently, hours spent with computer games and violent video

games, phone calls and continuous phone messages, thoughtless sharing of personal feelings, thoughts and images on social networks they can have a negative influence on the feelings, thoughts, behavior and social contacts of children and adolescents. For two decades now, serious media scientists and responsible educators, juvenile judges, or hard-pressed parents of Internet-dependent teens have drawn attention to the adverse effects of excessive digital media use. In his new book, neurobiologist Manfred Spitzer has gathered easy-to-understand scientific evidence on the subject, and supplemented it with some more recent research in the field of neurophysiology. He also sounded the alarm with his warning that too frequent use of digital media is driving us and our children crazy, citing American publisher and internet specialist Nicholas Carr, who described his negative experience with the internet as follows: "What the internet seems to do is diminish my ability to concentrate and contemplate. Whether I'm online or not, my mind is now waiting to receive information the way the internet spreads it: in a rapidly moving stream of particles. When I mention to my friends the problems I have with reading, many say that they suffer from similar disorders. The more you use the internet, the more you have to fight to stay focused on larger parts of the text." Five years ago, doctors in South Korea, a highly advanced industrial country with probably the largest digital coverage in the world, discovered in their young adults not only phenomena similar to those described by adult intellectuals in the world. The United States, however, also discovered memory and attention disorders, emotional devastation and stupidity, as well as reading problems. Because these people acknowledged that they use computers and the Internet heavily, doctors established a causal relationship and called the range of symptoms "digital dementia." According to Spitzer, digital media - that is, computers, smartphones, game consoles, and televisions - not only change our lives, but literally drive us and our children crazy, promoting a process of "mental decline." He describes these neurological processes and shows how the structure of the "information processing system" called the brain adapts to changing needs, how the subcontracting of thoughts of some kind of machine harms the brain, and how this dynamic organ dies when exercise or information is lacking. At the end of 2011, more than 1,000 Internet specialists took part in an American online survey. When asked what impact this digital world will have in the long run, half of them made the following pessimistic statement about the future of the Internet and its impact on the mental abilities of the next generation: "In 2020, the brains of adolescents and young adults tasking (doing different activities simultaneously) will be "networked" differently from the brains of people over 35, and this will have unpleasant and sad consequences. They will hardly be able to remember anything; they will waste most of their energy on exchanging short social messages or on fun and deviating from a truly deep commitment to people and knowledge. They will not have the fundamental ability to think, nor to interact face to face with the people around them. Instead, they will depend on the internet and mobile devices in an extremely unhealthy way to be able to work to some extent. In essence, changes in behavior and thinking among young people will generally have negative consequences."[20]

The same Manfred Spitzer also drew attention to the fact that "digital devices - the wonderful world of computers and televisions - are harmful to learning and,

therefore, to the mental development of children." Many scientific studies show that little ones are actively embarrassed in the process of learning Baby TV and Baby Einstein DVDs. These children are affected by the normal pattern of language acquisition in the early stages of development, although there is no clear evidence of serious organic damage as the cause of the abnormalities. Most children are affected at the age of 5-6 years. But Baby TV not only impedes mental and language development, but also predisposes to obesity. Therefore, parents should no longer allow international corporations to persuade them to watch television shows and DVDs, which they say have a positive effect on their children. However, watching TV shows from an early age and doing several activities simultaneously causes attention deficit disorder, according to David Gelernter, a computer scientist and pioneer of the World Wide Web, after decades of research on the Internet. that "children's brains need rest" and *„watching TV at an early age results in an increased incidence of attention deficit disorder (ie, loss of self-control) at school age*."[21]

Manfred Spitzer considers it shameful that only now has the scientific community been able to confirm what parents and grandparents knew from the beginning: that after watching the cartoon channel for hours - for example on Sunday morning - children do not they were good for nothing because they had become „weak." According to Spitzer, „multitasking" - doing different activities at the same time or using several digital devices simultaneously and a correlated approach to several tasks simultaneously - leads to poor attention and active cultivation of superficiality and inefficiency. Moreover, the digitalization of our world has not only various harmful effects on the mind, but also on the body, says Spitzer. He presents a series of studies showing that insomnia, depression and addiction are the extremely dangerous consequences of using digital devices „whose impact on the development of the general health of today's young generation can hardly be overestimated." A physical consequence of addictive behavior - as recent data from brain research has shown - is that young people are overweight. „Social isolation and anxiety are common side effects," says Spitzer. (lack of movement, incorrect position) to dementia". Since children and adolescents in this country "spend most of their time using digital devices, we need to worry about the foreseeable long-term mental and physical harm."[22]

However, parents are convinced by the computer industry and its relentless advertisements that it spends huge sums to buy their children a laptop - "A laptop for every student" or "Laptop instead of a backpack" - because they are told that it improves students' school performance. However, the opposite is true, and this has actually been known for a long time. Modern information technology, says Spitzer, "leads to more superficial thinking, distractions, and has unwanted side effects, ranging from simple illnesses to child pornography and violence." Other serious scientists see things the same way. Among others, Spitzer mentions the former president of the American Association for Educational Research and professor of education at Stanford University, Larry Cuban. Cuban's book is suggestive: Oversold and Underused, with the subtitle Computers in the Classroom, Cuban states: "Those who advocate for the provision of digital devices in schools, funded by public money, must first provide evidence of their "positive effects". Education is the most important factor for a person's health. Moreover, the foundation for lifelong learning

is laid in childhood. Therefore, schools should ensure a good education and invest in good teachers, not in laptop classes, because education requires people with whom an interpersonal relationship can be established, which is extremely necessary for the harmonious development of the brain. What is true for schools also applies to kindergartens. Computers and the internet have nothing to look for in schools or kindergartens. "Those who want their children to become mathematicians or information technology specialists," says Spitzer, "should take care of finger games rather than laptops in kindergartens. And anyone who takes written language seriously should advocate for more pencils, instead of keyboards, and the slogan "media education" - that is, the skill of using digital devices at different levels - suggests especially to insecure parents in social media. disadvantaged, that "they would do something good if they invested their little money in aging hardware and software." They believe that if they put their child in front of a computer from an early age, children will not have to endure the hard-working fate of their parents. These parents do not know "that the new home computer will harm the child's development at school, which means so much to them." Even more, than we might imagine, digital games affect school performance, social contacts, and relationships with parents and friends. If children and young people spend their time frequently with video games on consoles or online role-playing, this will undoubtedly lead to lower school performance for the simple reason that students have much less time to do homework. or recapitulate school material in the afternoon or on the weekend. "Children who play video games spend 30% less time reading and 34% less time doing homework, compared to children who do not play computer games." Spitzer believes that their intellectual abilities are severely threatened by video and computer games, and digital games even have problematic effects in addition to those mentioned above. Experimental and long-term studies on personality development show that increased use of display devices harms the empathy and social skills of children and young people and changes the quality of relationships with family and friends: attachment to parents diminishes and the relationship with colleagues and friends is affected.

This treatment of the effects of digital devices can not miss the side effects of social networks, which parents and educators should know and think about. Spitzer's conclusion is devastating: „*The Internet is full of unsuccessful social contacts, ranging from pretending to be someone else to cheating to serious crime. There is nothing but lies, intimidation, robbery, aggressive campaigns, harassment and defamation to an unimaginable degree! Who is surprised that social networks lead primarily to loneliness and depression among young users? Lack of self-control, loneliness and depression are the main stressors of modern society. They cause nerve cell death and in the long run facilitate the development of dementia. Replacing real people-to-people contacts with online networks can be linked to a long-term reduction in our children's social brains. In the long run there is a risk that Facebook & co. they will lead to the shrinking of our entire social brain. Seen in this light, it is extremely disturbing that about 1 billion people are Facebook users today*". [23]

In order not to think that we are against the development and use of technology, we argue that because of the serious impact they have especially on the

younger generation, the use of digital devices must be kept to a minimum and, according to Manfred Spitzer, we emphasize that digital devices part of our culture, increase our productivity, simplify our lives and are a great entertainment factor. Therefore, the debate is not about fighting them or even abolishing them, but about how they can be used rationally. The same is true of the Internet, where the founders of social networks and game creators have managed to give our children the opportunity to isolate themselves from parental access and gain a distinctive feature compared to adults, a space that they shape it according to their own rules. Because this space, this world of the internet is potentially dangerous for the mental, spiritual and physical development of children, parents and educators should understand it so that they are equal with children in the debate about it. And they should - because it is difficult to forbid any teenager today and because today it is necessary for them to know how to use the computer thus preparing for the future profession - to try to introduce children to the world of the Internet constructively and more or less controlled according to their age. What transformations will digital technology produce in social and political life? We will also analyze the answer from the perspective of a necessary ethics of artificial intelligence.

5. The ethics of digital technology - a bridge too far away

5.1. Clarifying issues

Increased computing power, data availability, and advances in algorithms have transformed artificial intelligence (AI) into one of the most important technologies of the 21st century. Researchers bent on this problematic reality are trying to answer one of the great questions of our time: what transformations will digital technology produce - from artificial intelligence to virtual reality - in social and political life? Trying to answer, we notice that, practically, in the last 20-30 years, scientific discoveries, information and digitization force each of us to make great efforts to succeed in adapting. I am sure that at least some of us will be able to take this step. Philosophers would say that there is a conflict between man's desire for happiness and the demands under which he places the spirit and will of technology. The conflict is revealed more deeply and more terribly when it is pursued in the very field of cultural forms. The real battlefield is where technology alienates man from his ancestral spirit. Now not only the organic unity of existence, but also the unity of the "Idea", the unity of goal orientation and its definition are threatened by this alienation. nor does it occupy a peaceful and harmonious place among them, and as it differs from them, at the same time it separates from them and opposes them. and thus to impose it on other domains, with which a new conflict is unleashed in the circle of spiritual action and, to some extent, even within it, and what is now expected is no longer a mere distancing from "nature.", but to draw a boundary within the spirit itself, is the establishment of a universal norm, which satisfies and at the same time limits the particular norms. in the relationship between technique and theoretical knowledge of nature.

From the beginning harmony seems here given and assured; no more struggle for superordination or subordination is required, but only a permanent game of mutual giving and taking. It is this game of iels that should be somehow standardized. *„Can legislation cope with technology, innovate daily, as if with the 'speed of light'? Can it meet European Union law, the current challenges, can it keep up with the technological explosion, without becoming obsolete or becoming obsolete? Was it digital? We live in it. The old continent, still confident in its millennial role over civilization, has entered the race to possess moral supremacy, on the elaboration of ethical guidelines regarding the development of artificial intelligence, respectively ensuring an adequate ethical and legal framework. Europe? - We love her. Sublime with her enthusiasm and hesitations*".[24] These are natural questions whose answers can be found in a paper by Doina Vişan who claims that given the rapid development of artificial intelligence technology, it is necessary to develop them at European level, taking into account the fundamental role of the Charter of Fundamental Rights of the Union. European standards, ethical rules and a legal framework to ensure legal safeguards and prevent their misuse. In addition, the European Union's ambition is for Europe to become the world's leading region for the development and implementation of state-of-the-art, ethical and safe AI, promoting an OM-based approach, with full respect for fundamental rights, in order to set global ethical standards. and to become a world leader in ethical and reliable artificial intelligence. For the implementation of these principles in the development and use and legislation of AI, the European Commission presented its strategy in Communication no. 168 final of 08.04.2019 to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, aiming at building citizens' trust in an artificial intelligence focused on the human factor.

Thus, the Commission saw that, "The EU has a solid regulatory framework that will set the global standard for human-centered AI. The General Data Protection Regulation ensures a high standard of personal data protection and requires the implementation of measures to ensure data protection at the design stage and implicitly. The regulation on the free movement of personal data in the EU removes barriers to the free movement of personal data and ensures the processing of all categories of data throughout Europe. The recently adopted Cybersecurity Act will help build trust in the online world, and the proposed regulation on privacy in electronic communications aims at the same goal. However, AI brings new challenges because it allows equipment to "learn", make and implement decisions without human intervention. Soon, this type of functionality will become standard for many products and services, from smartphones to vending machines, robots and online applications. However, decisions made on the basis of algorithms could result from data that are incomplete and therefore unreliable, and could be manipulated by cyber attacks, could be subjective, or could simply be wrong. The indiscriminate application of technology as it develops would therefore lead to problematic results, as well as to the reluctance of citizens to accept or use it.[25]

However, AI technology should be developed in a way that is human-centered and trustworthy. This means that AI applications should not only comply with the

law, but also respect ethical principles and ensure that their implementation does not cause undesirable damage. Diversity in terms of gender, racial or ethnic origin, religion or belief, disability and age should be ensured at every stage of AI development. AI applications should provide citizens with the means to act and should respect their fundamental rights. Their aim should be to increase people's skills, not to replace them, and at the same time to allow access for people with disabilities. Therefore, there is a need for ethical guidelines, based on the existing regulatory framework and which should be applied by developers, suppliers and users of AI in the internal market, to establish ethical conditions for conducting business in all areas. Member States. For this reason, the Commission has set up a High Level Expert Group on AI, which represents a wide range of stakeholders, and has entrusted this group with the task of developing ethical guidelines on AI as well as prepare a set of recommendations for a broader AI policy. At the same time, the European Artificial Intelligence Alliance was set up, an open multilateral platform with over 2,700 members to provide a wider range of observations for the work of the High Level Expert Group on AI. The High Level Group of AI Experts published a first version of the Ethics Guidelines in December 2018.[26] Following a stakeholder consultation and meetings with Member States' representatives, the AI Expert Group submitted a revised document to the Commission in March 2019. To date, in their feedback, stakeholders have welcomed, on the whole, the practical nature of the guidelines and practical guidance they provide to developers, suppliers and users of AI in terms of trust assurance. The guidelines developed by the High Level Group of Experts on AI covered by this Communication make the most of the work of the European Group on Ethics in Science and New Technologies and the EU Agency for Fundamental Rights. The guidelines state that a "reliable AI" requires three components: it should comply with the law, ethical principles and be sound. Based on these three components, the guidelines identify seven key requirements that AI applications should meet in order to be considered reliable. The guidelines also include an assessment list, which can be used to verify that these requirements are met:

- human involvement and supervision;
- technical robustness and safety;
- respect for privacy and data governance;
- diversity, non-discrimination, equity and accountability.
- transparency, societal and environmental well-being;

Although these requirements are designed to apply to all AI systems in different contexts and industries, for their implementation in a concrete and proportionate manner the specific context of application should be taken into account, taking a considering the impact. For example, an AI application that suggests, as a reading recommendation, an inappropriate book is much less dangerous than erroneously diagnosing cancer and could therefore be subject to less stringent surveillance. The guidelines developed by the High Level Group of Experts on AI are not binding and therefore do not create any new legal obligations. However, many existing provisions of Union law already reflect, of course, one or more of these key requirements, for example the rules on security, protection of personal data, respect for privacy or protection of the environment as we will explain below.

5.2. Human involvement and supervision

AI systems should help people make better and better informed decisions, in line with their own goals. They should contribute to the creation of a just society, supporting human involvement and fundamental rights, without reducing or limiting human autonomy. The general well-being of the user should be at the heart of the operation of the system. Human surveillance helps to ensure that AI systems do not undermine human autonomy and cause other adverse effects. Depending on the specific AI-based system and its scope, appropriate levels of control measures should be ensured, including the adaptability, accuracy and explicitness of AI-based systems. Surveillance can be achieved through governance mechanisms, such as ensuring a human-in-the-loop approach, the human-in-the-loop, the human-on-the-loop approach, or human-in-command. It must be ensured that public authorities have the capacity to exercise their supervisory responsibilities in accordance with their mandates. If all other conditions remain unchanged, the less surveillance a human being can exercise over an AI system, the more extensive testing and stricter governance is needed.

5.3. Technical robustness and safety

A reliable AI requires sufficiently secure, reliable, and robust algorithms to resolve errors or inconsistencies at all stages of the life cycle of the AI system and to properly address erroneous results. AI systems must be reliable, secure enough to be resilient to open attacks and more subtle attempts to manipulate data or even algorithms, and must provide a backup plan in case of problems. Their decisions must be accurate or at least accurately reflect the level of accuracy, and their results should be reproducible. In addition, AI systems should integrate safety and security mechanisms from the design stage so that their safety can be verified at every stage, with an emphasis on the physical and mental safety of all involved. This includes minimizing and, as far as possible, reversing unintended consequences or errors in the operation of the system. Processes should be established to clarify and assess the potential risks associated with the use of AI systems in different areas of application.

5.4. Respect for privacy and protection of personal data

Respect for privacy and data protection must be guaranteed at all stages of the life cycle of the AI system. Digital recordings of human behavior can allow AI systems to deduce not only people's preferences, age, and gender, but also their sexual orientation, religious, or political opinions. In order for people to have confidence in the processing of data, they must be guaranteed full control over their own data and the fact that the data concerning them will not be used to harm or discriminate against them. In addition to the protection of privacy and personal data, requirements must be met to ensure a high quality of AI systems. The quality of the data sets used is fundamental to the performance of AI systems. When data is collected, it may reflect socially determined subjectivities or contain inaccuracies,

errors and mistakes. These needs must be addressed before programming an AI system based on a specific data set. In addition, data integrity must be ensured. The processes and data sets used must be tested and documented at every stage, from planning, programming, testing and implementation. Finally, access to data must be properly managed and controlled in accordance with the provisions of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on circulation of such data and repealing Directive 95/46/EC which states: „*The protection of individuals with regard to the processing of personal data is a fundamental right. Article 8 (1) of the Charter of Fundamental Rights of the European Union and Article 16 (1) of the Treaty on the Functioning of the European Union (TFEU) provide for the right of everyone to the protection of personal data concerning him or her. The principles and rules on the protection of individuals with regard to the processing of their personal data should, regardless of the nationality or place of residence of natural persons, respect their fundamental rights and freedoms, in particular the right to the protection of personal data. personal. This Regulation aims to contribute to the achievement of an area of freedom, security and justice and economic union, economic and social progress, the consolidation and convergence of economies in the internal market and the well-being of individuals.*"[27]

5.5. Diversity, non-discrimination, equity and responsibility

Diversity, non-discrimination, equity and accountability are principles that can ensure good governance for the data sets used by AI systems. Consumer diversity could lead to discrimination, and the intentional exploitation of consumer data or involvement in unfair competition can have undesirable effects even in the way AI systems are developed. Such concerns should be addressed from the outset of the development of the system. The creation of diverse design teams and mechanisms to ensure participation in the development of AI, especially of citizens, can help to address these concerns. It is recommended to consult stakeholders who may be directly or indirectly affected by the system during its life cycle. AI systems should take into account the full range of human skills, competences and requirements and ensure universal accessibility, including for people with disabilities. As for ensuring accountability and accountability for AI systems and their results, both before and after their implementation, the audit of AI systems is fundamental, as the evaluation of AI systems by internal and external auditors and the availability of such evaluation reports contributes significantly to confidence in technology. The possibility of external audit should be ensured in particular in the case of applications that affect fundamental rights, including security-critical applications. The potential negative effects of AI systems should be identified, assessed, documented and minimized. The use of impact assessments facilitates this process. Assessments should be proportionate to the extent of the risks posed by AI systems. Compromises between requirements - which are often unavoidable - should be addressed in a rational and methodological manner and should be justified. Finally, where unfair adverse effects occur, accessible mechanisms should be provided to

ensure appropriate remedial action. Thus, the European Commission's actions aim at completing the digital single market and the regulatory framework, ensuring a favorable environment for innovation, strengthening connectivity through spectrum coordination, very fast 5G and fiber optic mobile networks, next generation cloud computing, satellite technologies.[28]

5.6. Transparency, societal and environmental well-being

With regard to the traceability of AI systems, it is important to record and document both the decisions taken by the systems and the entire decision-making process. In this sense, the explicitness of the algorithmic decision-making process, adapted to the persons involved, should be ensured as much as possible. Ongoing research should be considered for the development of mechanisms to ensure explicitness. In addition, explanations should be provided on the extent to which an AI system influences and shapes the organizational decision-making process, the options for designing the system, and the rationale behind its implementation (thus ensuring not only data transparency and of the system, but also the transparency of the business model). Finally, it is important that the limitations and capabilities of the AI system are properly communicated to the various stakeholders involved, in a manner appropriate to the given situation.[29] In addition, AI systems should be identifiable as such, so that users know that they are interacting with an AI system and know who is responsible for it. For AI to be reliable, its impact on the environment and other sensitive beings should be considered. Ideally, all people, including future generations, should benefit from biodiversity and a livable environment. Therefore, the sustainability and environmental responsibility of AI systems should be encouraged. The same is true for AI solutions that address areas of global concern, such as the UN's sustainable development goals. In addition, the impact of AI systems should be considered not only from an individual perspective but also from the perspective of society as a whole. The use of AI systems should be duly taken into account, especially in situations related to the democratic process, including the formation of opinions, political decisions or in electoral contexts. In addition, the social impact of AI should be considered. Although AI systems can be used to develop social skills, they can also contribute to their deterioration. Without these minimum requirements, the paradoxical conflicting harmony of today's world will feel an acute need for security.

6. The paradoxical conflicting harmony of the world and the need for security

Ever since I write about conflict and security, I feel like I'm on a Netflix account: when it feels like a movie, it sends you to see others as well. With the same theme, from the same category, love or horror. The scenario is the same. Here it is, in our case: the development of human society, its expansion in space, time and complexity generates an ever-increasing need for security. Of course, security is an intrinsic function of systems and processes, an essential condition for sustainable development and the exercise of conflict control. But, unfortunately, the need for

security is not always identical with the security function of systems and processes, with security mechanisms, with the real capacity of systems and processes to ensure their own security, nor with its actual reality. This need is growing and pressing. The evolution of human society is not linear, but non-linear and complex, so largely unpredictable, and therefore it is characterized, among other things, by a high degree of uncertainty, insecurity. We don't know exactly what will happen tomorrow. At any moment, a misfortune can occur. Variability of systems and processes, the intervention of random or inaccurate factors that cannot be assessed and predicted, the emergence of potential crises and conflicts, the economic and social impact of natural phenomena of significant risk, even extreme risk (catastrophic earthquakes, typhoons, floods etc.), tensions in international relations, numerous unresolved issues, freezing or ongoing conflicts, dubious nuclear programs of some countries, unresolved disputes, extremist ideologies and religious and/or ethno-religious extremism are some of the factors that fracture certainty, which increase the degree of uncertainty. That's right, these are the characteristics we live in. People's lives have their certainties and uncertainties, but none of them remain constant, but always oscillates between a maximum and a minimum value, without ever reaching them.[30]

If we define security as a state of dynamic equilibrium, which ensures the functioning, within normal limits, of systems and processes, and we take into account the disturbing factors that always upset this state, we will find that, in fact, such a state is not it is based on certainties, but only on the need for certainties, on the more or less predictable effects - but desired, planned and even possible to be achieved - of sustained efforts to manage or control uncertainty. The need for security is one of those vital supports of existence, coexistence and sustainable development. It responds to a vital interest and is based on a system of common values, which give it soundness and vitality. Today, security is as important as production, creation, development, infrastructure, life. The need for security is directly proportional to the challenges, dangers and threats to systems and processes, of man and human society and inversely proportional to the degree of risk. Security provides all the necessary conditions to reduce the level of risk and increase the degree of certainty. Full security means minimal risk. Of course, full security, in a world where information aggression increases in direct proportion to the amount of information, is very difficult to achieve. But not impossible. That is why, in the future project of human society - the knowledge-based society - the place of security becomes an essential one. It is part of the resistance structure of such a society, it is one of the first conditions for such a society to exist and function. If we accept such a perspective, then the security institutions and the security functions of the systems and processes must undergo a significant revival, a substantial reform, becoming, from structures with insurance functions, structures with vital roles and functions. And this is because the world is conflicted. That's always been the case, and probably always will be. The whole universe is conflicted. Conflict is pervasive, generating movement, development. Development is done through sustainable construction and, at the same time, through denial, through destruction. Or as the UN Secretary-General recently stated. Antonio Manuel de Oliveira Guterres from the rostrum of the 76th session of the UN General Assembly, in front of world leaders: „*I*

am here to sound the alarm: the world must wake up. We are at the edge of the abyss and we are moving in the wrong direction. There is a revolting inequality between developed and underdeveloped states, as well as a lack of solidarity between them at a time when we need it like never before. Never before has our world been faced with such great threats and has it been so fragmented."[31]

Construction presupposes a structure of resistance, which, in the architecture of the world, means values, ie true bricks that assemble in its durable body, but also the effect of the action of assembly, vision in the future, openness to the future and, at the same time, denial of what it was before it, the destruction of what it was, and, according to an interest, it must be destroyed. Sad, but that's the way the world is made. That is excruciary. Everything that exists deserves to perish. Because nothing that exists is and cannot be eternal. Even the values on the basis of which the unity and duration of the world are built are perishable. After a while, it degrades because they are not active, do not produce, do not reproduce, but only attest, support and sustain. They are part of the architecture of unity and stability of the world, but they do not urge action, they are not the motive and motive of action, but interest. Interest generates policies, and policies are conflicting. We can look at the world through its values, but also through the interests that grind it, destroy it and, at the same time, always make it active, constructive. Interest urges man and his world to action, and some of the effects and products of action, hoarding themselves, become values. It is the value systems that have elevated the world to the degree of civilization today. But without action, and thus without the accumulation of new values, the world would be just a museum. The processuality of this world, although it seems predictable, knowable and manageable, is, in fact, complex, with a huge amount of unpredictable transformations, far from balance, which generates uncertainties and anxieties, insecurity and a modus vivendi on the edge.

Dynamic and very complicated balance between the values accumulated and assembled in value systems, the interests that determine actions and actions that generate products and effects that can become sustainable values or just results with ephemeral existence, as well as the existence of numerous random and unpredictable factors. they lead to what we might call chaotic, so uncontrollable evolution, far from equilibrium, they configure the coordinates in which the state of security or insecurity of the world or its components can be identified, defined and evaluated. The two states complement each other and together form a whole. But none is complete, complete, perfect. Systems and processes tend towards a state of complete security that they can never achieve. The fact that we live in a dynamic world, in constant motion, in a world where realities and wills confront each other not only to resolve the differences between them, but also to position themselves as advantageously as possible in the marathon of duration and safety and the security of today and tomorrow makes us extremely vulnerable to the pressures, dangers, and threats of becoming. We look to the future, but we live in the present. This reality urges us to explore the past, to use syllogism, statistics, fact and logic, without always taking into account that the fact that the sun has risen every day does not necessarily mean that it will rise tomorrow.

Systems and processes take care to optimize their protection and intrinsic security systems as much as they can and how they can, but security, like their insecurity, depends not only on them, but also on a host of other factors that can

influence them. significantly becoming, that is, their development, progress or, on the contrary, their deterioration and even destruction. We live in an insecure world. What kind of security are we talking about? A security of insecurity, a harmony between yes and no, between yng and yang, that is, in the space of conditioned probability, a relative balancing of a world that, at every moment, becomes unbalanced, of a world that, globalizing, refragments itself, which generates prosperity for some and poverty for others, relative security for some and insecurity, anxiety and terrorism for all others, ie for 90 percent of the planet's population. And yet, there is security.[32]

An insecure, flexible, fluid security, with predictable or unpredictable increases and decreases, real or imagined, with clear landmarks, durations on the support of great cultural systems and materialized in the pillars of great civilizations, but also with chaotic developments in the predictable and unpredictable interdependencies between states, among the entities that always change their identity and even their vocation, in the paradoxical conflicting harmony of the world in which we live. The paradoxical conflicting harmony of the world we live in. The oxymoron of this world that is about to lose its essence, the freedom of the people for whom so many generations have paid their blood tribute. My generation does not own this freedom; we are only its keepers, its guardians. We can only teach this hard-won freedom to the children of Europe in the same state in which it was given to us. We cannot reach any agreement with the shadow decision-makers of pandemic-loving governments. I love the pandemic for the same reason I love war. Because these give them the opportunity to impose control over the population, which otherwise the population would not accept, to create mechanisms and institutions with which to orchestrate and impose opinions. I'll tell you something; it is a mystery to me how all these important people like Bill Gates and Anthony Fauci have planned and thought about this pandemic for a decade claiming that it is for the good of us all, when this pandemic is about to come. Now they seem to be doing the exact opposite of what they were saying. He invents numbers, they don't even tell us the numbers of COVID deaths. And all this to inoculate fear. It's about human nature. The only thing a government needs to keep the people in slavery is fear; if you manage to frighten them, you can do with the people what you want, including to alter, until their disappearance, the fundamental rights and freedoms for which future generations will never forgive us. We cannot squander our freedoms. We just don't have the right to do that. We must do everything possible now to stop globalization so that it cannot destroy this free world that we know. Now that global thinkers make it clear that, after the COVID-19 pandemic, we will face a changed world, in which nationalism will gain territory in favor of internationalism, which, in the context of a real, global emergency, they turned out to be nothing more than sound autograph papers. Moreover, as after any economic crisis, at the exit from the COVID-19 pandemic we will find ourselves in the midst of even more fragmented societies than today in which the functioning of multinational political bodies such as NATO, UN, EU will be rethought. COVID-19 complicated things even more: the production factories closed, as a result of which the medical, pharmaceutical, food chains, etc. I'm in a dive. It is believed that we will have many state interventions in the economy, a different kind of dialogue between the state and the "private". Then, a virtual-real war is expected "with the books on its face": between people who will

claim a quasi-total return to physical life, as it showed in the early 2000s, when digital media had not colonized free time, and groups that on the contrary, they will campaign for the continuation of online professional life. Even more, coronavirus will restore to the scientist (doctor, researcher, inventor, professor, etc.) the long-lost podium and the truth, through its most emissary emissary, science, will once again be a place of honor, committing its long exile on the fringes of a society intoxicated by false news, conspiracy theories, anachronism and the literature of facts as globalization is misunderstood today.

7. Instead of conclusions: globalization is misunderstood today

Today, globalization means CHAOS, racial mixing, free movement, emigration and economic, political and social chaos. Globalization must mean unitary laws on the planet, order, respect for human values, protection of good, fair, honest people and the elimination of villains. Globalization should mean legislative harmony throughout the planet, close and effective cooperation between peoples to solve the great global problems, solve the problems of illegal emigration, eradicate poverty, reduce pollution and protect the environment. That must be globalization - the road to a better, more balanced world. Today's world is nothing more than the battlefield of World War III. But, folks, we live in the middle of World War III without knowing it. And this is what George Orwell told us in „*1984*": „War is not meant to be won. He must be continuous." For 20 years, the world has been living in a permanent state of alert, humanity is on the verge of battle and no one knows when or if this story will end. 9/11 and Covid-19 are different tools designed to achieve the same goal. It is, in short, about changing the meaning of "war" itself. War has always been vital to the preservation of the state. Wars make rulers rich and impoverish ordinary people. Wars unite nations behind their leaders and distract from domestic political issues. But as nations become stronger, weapons technology is increasingly advanced, and global power tends to be centralized in giant corporations rather than nations, war - in the traditional sense - is becoming more expensive, more and more expensive. dangerous. In the end, the war becomes meaningless. In essence, the classic (old-fashioned) motivations for war no longer apply today, but the ancillary political benefits remain. Even if the state (the political world) and its sponsors (multinationals) no longer have to engage in large-scale armed conflicts, the population still needs to believe that they are in imminent danger.

Let us remember, for those of us who lived in those times, the first stage of this evolution/change was the moment 9/11, the one that started the war against terror. This staged attack was made to create a war-like mentality. To make people believe that they are threatened and to serve as a basis for granting „new temporary emergency powers" to the government. But 9/11 went on, becoming casus belli for a war - the „War on Terror," as the Americans called it. Traditional armed conflicts have broken out in Afghanistan, Iraq, Syria, Libya and Yemen, but the main target of the war on terror has, in fact, been internal. A nationwide psy-op war, designed to keep 350 million people in a semi-permanent state of fear. It was, I might say, the next natural step in Orwellian redefining the concept of war. If the aims of a war are to maintain internal control over the population and to drain public money into

inflated contracts with the private sector, then is that the only reason to declare war on another country? This does not even require a real physical war. Isn't the idea of such a good war?! Why not make an abstract concept your enemy, especially since this is a war you can never lose. And, just as sure, you never have to win it. It is the war that can go on indefinitely. The war on terror was the scourge of 9/11.[33]Terror is an abstract noun, with no solid reality at its base and can mean anything. The war on terror can be internal or external, political or military, open or hidden from the public or even both. It cannot be won, it cannot be lost and it never ends. To keep people terrified of an abstract concept you have to constantly remind them that terror is there. Which means that acts of terrorism must be allowed to happen. A war on terror is good if you want to run a country, but if you want to run a planet? In this case, you need a new enemy, of a completely different level. An enemy that can be anywhere and everywhere and that is certainly not human. Do we remember that the Covid19 pandemic was presented from the beginning as a war? In March 2020, the UN Secretary-General urged countries to „declare war on the SARS-CoV-2 virus" and call the Covid pandemic19 „the greatest threat since World War II." And the leaders of the nations complied, throwing to the population remarks such as „the darkest hour of mankind", „we are literally living a war", „I am a president of war, but the fight is against an invisible enemy"; the metaphor of war has been ubiquitous in speeches, titles and TV commercials. The message was clear, simple and short: the coronavirus is the enemy and the whole world is already at war. But this is really a perfect war - it has all the advantages of a real war and none of the disadvantages. All the ephemeral malleability of the war on terror, but none of its potential complications. In the name of the war against Covid19 we have seen that taxation, censorship, population surveillance, public spending on the private sector and state power increase day by day. Meanwhile, every new law that passes through any parliament in this world extends the power of the state over the citizen, and at every step, new private sector contracts swell with public money. Testing and tracking people. Vaccines, fans and quarantine hotels. Public money is poured into private hands. And the best part is that everything is done in the name of "helping the citizens". How are 9/11 and Covid19 linked? The two "wars" form a continuum of narratives meant to scare people and make them accept the draconian limitations of freedom. Is this pandemic the end? No, obesity and global warming follow. The global hegemony of neo-Marxist progress will not occur through traditional warfare or imperial conquest, as it once did. It is shaped by a conglomeration of restrictions on individual freedom, all in the name of the „good of the citizens." Well, I don't think this cancerous evolution will end well. Any system of a positive reaction loop explodes and I do not see what would replace the negative religious reaction. Contagious all souls, the need/desire to achieve at any cost, of multiplicative gain, of speculative parasitism, of unscrupulous monopolization - not sour how to lead to a balance. A world in which a handful of people can replace others cannot be viable.[34]

For Romania, Eminescu's topicality has become, with some exceptions, a matter accepted once and for all, without the old demonstrations being resumed. The pains, the longings, the drama of the Romanian people are also Eminescu's, as Eliade wrote, Eminescu „took part in the tragedy of the Romanian nation, and he

becomes the voice of this people - a lucid, uncompromising, relentless, uncontrollable voice in which they could he found all the Romanians thirsty for justice and truth. Deeply acquainted with the Romanian realities, history and being, Eminescu not only observed with great acuity the pathologies suffered by society, the moral degradation and demagoguery of the ruling class, the economic and cultural decline to which the Romanian people had been brought, but also proposed viable solutions to society's problems. Romanians of his time, and many of these problems are also of our age. It was not in vain that someone said that Eminescu is „our contemporary". [35] We could say that today the need to return to Eminescu is more pressing than ever. It is sad that now we no longer have an Eminescu, and the major danger that threatens us is our exit from history! Only God can save us!

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[13] Law no. 217 of July 23, 2015 was published in the Official Gazette no. 558 of July 27, 2015.
[14] Alvin Toffler, „Al treilea val", Editura Politica, Bucureşti, 1983. American writer and futurist Alvin Toffler has authored volumes of global political, social, and economic analysis, known worldwide as „Şocul viitorului"/1970, „Al treilea val"/1980, „Puterea în mişcare"/1990, „Război şi antirăzboi"/1995, „Crearea unei noi civilizaţii"/1995, „Avuţia în mişcare".
[15] More than 50 years ago, Daniel Bell, a respected Harvard professor, published a book that became fundamental in the following decades. The volume is called "The Coming of Post-Industrial Society." The book promoted the idea that in an "evolved" society there is a transition from a production-based economy to a service-based economy, a diffusion of national and global capital and massive privatization.
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[18] According to Serge Monaste - who suffered an unexpected and suspicious heart attack as a result of which he lost his life - the Toronto Protocols were established following a meeting in 1967 in Toronto, when the heads of the Occult they set the direction and the last details of the "Fall of the Nations" plan. The actors of that top secret meeting were the members of the "6.6.6" group. Monaste was convinced, without any tangible evidence, that this forum with satanic resonances contained at that time the leaders of the first 6 banks in the world, of the first 6 multi-national energy companies and the first 6 agri-food producers on the planet. Their plans went only in three main directions without which we cannot imagine modern society. In short, control over all the political, economic and social factors of the 1970s, 1980s, 1990s will eventually lead to the takeover of all forms of world power by the establishment of the much-trumpeted „New World Order". The plan would continue unhindered today. The ideas seem to come from George Orwell's grim 1984 novel.
[19] Manfred Spitzer, op.cit., p. 8.
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[22] See, Frankfurter Allgemeine Zeitung FAZ, 19.10.2011, "Children's brains need rest".
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[29] Idem, p. 9.
[30] Gheorghe Văduva (2019), Editoriale, Univers Strategic. București, pp. 10-17.
[31] The 76th Session of the UN General Assembly to take place in New York. At this year's session, for the first time since the beginning of the COVID-19 pandemic, the work of the event took place with the physical presence of the heads of state or government of the UN member states. The theme of the 76th session of the General Assembly was "Building resilience through hope for recovery from the COVID-19 pandemic, sustainable reconstruction, responding to the needs of the planet, respecting human rights and revitalizing the United Nations."
[32] Gh. Văduva, op. cit., p. 15.
[33] See, World War III and the new weapons of mass destruction: propaganda, fear and pandemic, taken from the website: https://www.national.ro/coronavirus/world-war-iii-si-noile -arms.
[34] Idem, p. 3.
[35] Mihai Eminescu - our contemporary, taken from the website: http: //www.dacoromania.

Smart citizens, smart administration – between rights and responsibilities

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Abstract

This paper`s objective is to offer an assessment of the level of accomplishment of the country`s obligations in smart developing the public systems of the local authorities, the citizenry`s competencies and also the way in which the fundamental rights are known and respected in the elaboration and implementation process of the local digitalization strategies.

Romania`s sustainable and intelligent development needs theoretical models, but also best practices where respecting fundamental rights and liberties should be valued. The public sector, the local administration`s services have to evolve and modernize for a smart and digital functioning in the use of citizens and with their support. Digital transformation through less bureaucracy and by walking through the specific steps – the digitization (by obtaining data) and the digitalization need to take in consideration also guaranteeing the constitutional rights and liberties. Conforming with specific rights and liberties legislation during the process of obtaining the status of an intelligent city represents a right and also a responsibility, in equal measure, for both citizen and authorities. Identifying and adopting policies, methodologies and developing practices of public systems as to become intelligent cities have to harmoniously incorporate legislation, technology, predictability, feasibility and acceptance by the citizen as a final point in the curve of a realistic level of expectation.

It is the state`s obligation to educate its people and companies regarding the benefits offered by the technology of information and by the electronic public services, to elaborate national plans for developing the digital competencies of citizens, but also of public administration, to elaborate and implement regulatory, supervisory and control measures of the digitalization process respecting the fundamental rights and liberties of its citizens at the same time.

Thus, two case studies will be presented and their means of application, by two city halls, the local digitalization strategies for optimizing the interconnection between citizen and public services.

Keywords: *the state`s obligation, digital competencies, regulatory, supervisory and control measures.*

Development of public administration services by smart technologies which are interactive with citizens is essential regarding several aspects: the subjectivity of the clerks is eliminated; time for answering the petitions is shortened; it allows solving them in a flexible schedule, according to citizens' time availability; it facilitates interconnecting the 'counters', meaning that various requests can be accessed by a single application; it sets up 'zero corruption'. Last, but not least, such a system stimulates citizens' pro-active attitude to use and update their IT knowledge.

A few decades ago, smart city objective seemed a SF issue, but nowadays it becomes both a new paradigm for organizing public servicesand a necessity which determines the economic and social development of community.The entire processis placed at crossroads, between two realities.On the one hand, theauthorities' requirements diversified and citizens' expectations related to them increased. On the other hand, IT technologies progress led to their simplification, so they can be largely accessed and, consequently, new procedures of communication between state and citizen can be adopted.

The range of smart technologies applicable to administrative issues is more and more diverse, so that they are practically available for any urban locality regarding costs, as well as adequacy to the community needs. Smart development of community can become real by identifying those dysfunctional points of bureaucracy, by rational dimensions of normal administrative procedures for a city to function and by political will to consistently diminish citizen's dependency on clerks' moods.

Smart city involves a profound knowledge of the realities in that community and a will to set up a new relation between citizens and authorities by a rapid and exhaustive communication, disregarding the political 'brand'. It represents a means to ensure citizen's access and contribution to the local policies, his involvement in local authorities' decisions, his consulting regarding the local budget projection and spending for the real needs of the community.

Solutions for smart city are based mainly on ensuring citizens' rights and raising citizens' awareness of their responsibilities, as well as on understanding what participative democracy means. The most important feature of smart technologies consists of allowing citizen to be placed in the circuit of administrative decisions. The rest represents effects: beginning an open dialogue between authorities andcitizen, identifying certain commonly agreed directions and realizing certain predictable programs for local development.

1. If there is no law, there is nothing

Smart technologies have one more effect: they prevent administrative bureau cracy to make some arbitrary, subjective decisions. For example, the famous 'approvals' continuously required from all kind of authorities in order for a citizen to get an authorization for construction are a kind of surgical knife used by a monkey. However, accessing that information *incloud* would make public authoritynot feel that 'authority' means dominating the citizen instead of serving him.

This reality leads to the truism according to which nothing is going to be done by itself regarding smartification of the administrative procedures unless a legal compulsory framework, including sanctions is adopted.

Nowadays, the internal frame for regulating this domain is vague and insufficient, rather optional than compulsory and rigorous. Smart technologiesoccur more seldom in various electoral programs and political engagements, but not in the set of obligatory features for a job description at the level of local stakeholders. It is not about those authorities are not able to configure a visionary plan, but they manifest rather reluctantly regarding this type of construction which is indispensable for the future of a country risking to remain disconnected from the global network of smart technology, involving all the implications of such a self-exclusion.

The direction of civilized world towards assimilatingsmart technologies in the publicsphereis obvious. The phenomenon can be stopped. The advantages are unanimously recognized. Still, the problem is just the pace of each community integrates in this rhythm. In our country there are all types of national strategies, 'feasibility studies' or plans at local or national level, but when it comes to real actions, there are only few and sporadic examples.Regulations in this domain are insufficient and lack predictability. Few examples are presented below.

By Ordinance of Education Ministry no. 2276/2020-2276/6152 regarding the assignment of "Eugen Ionescu" scholarships for 2020-2021, published in the Official Monitor no. 18/ 01.08.2021, only three universities in Romania, i.e. "Alexandru Ioan Cuza "University, "Asachi" University in Iaşi by the Facultyof Business Administration and Faculty of Civil Engineering and Building Services, as well as the Technical University of Building Services Bucharest by the Faculty of Civil Engineering, offer scholarships in the domains: *smart society*, *smart cities*.

By adopting the Decision no. 2010/40/UE of the European Parliament and of the Council regarding the frame for implementing smart systems of transportation in the domain of rode transportation and for the interfaces with other types of transport, released in Official Journal no. 39L/16.02.2016, European Commission invited European standardization organizations (ESOs) to elaborate the necessary standardsfor implementing and operational use of STI (smart transportsystem), respecting the conditions of inter-operability, compatibility and continuity.

The Directive no. 2010/40/UE sets up the necessity ofcertain urban-interurbaninterfaceswhich allow the inter-operability andthe continuityof transport services, disregarding thenetworks and borders. The urban areas are identifiedas "priority areas", optional for applying some services of informing in real time about the traffic. The first and the last kilometers of a journey for persons who travel usually belong to urban areas, so this information is essential for providing some informing services regarding the multimodal journeys at the EU level, which may contribute to a mobility without syncope.

Among the objectives set up by this Directive, the requirements regarding the increased efficiency and safety of urban mobility were included in a set of recommendations entitled "The Package regarding urban mobility", adopted in 2013, including domains such asurban logistics, regulations regarding access in urban areas and taxes for the users of roads, coordinated implementation of smart systems of urban transport and road safety in urban areas.

As for the local authorities' interest in developing and implementing smart projects, it would be necessary to initiate a studyregarding isolated experiences in implementingsmarttechnologiesaccording to some special decisions of local councils, which have successfully integrated the concept of urban lasting mobilityand developed it for the local communities.

Mobility planning – a term which needs clear defining- represents a key-element for the durable development and one of the most important challenges for the present cities.

The opinion of the community should be found and valued before the implementation of a city-mobile net project (application for urban mobility) begins, because it is about the quality of life in community and the strategy for urban mobility. In contrast to traditional approaches of transport planning, the new concept focuses especially on involving citizens and all the parts, on coordinating the policies among sectors (transport, land using, environment, economic development, social policies, health, safety etc.), among the various levels of authority and among the adjacent authorities. Sustainable plans of urban mobility require a long-term sustainable overview for an urban area, which take into account the extended costs and benefits for society, with a view "to internalize the costs" and to highlight the importance of evaluation[26], accompanied by a diversity of local specific challenges and needs. The reaction of community after those measures are applied alters the quality of the relation between authority and citizen, as it is questioned the stakeholders' good intention and it risks to compromise the involvement and the set of ideas and solutions that could have come from the local community.

The Decision no. 81/2017 regarding the modification and completing the National Strategy for research, development and innovation 2014-2020, approved by the Government Decision no. 929/2014 published in Official Monitor no. 155/02.03.2017 regulates, among others, Romania's participation in the European process of research, development and innovation, by assuming the role of leader or important actor of different research infrastructures. The regulation aims to stimulate interdisciplinary technological cores (*clusters*) by supporting many smart specializations, subordinated to the concept of *smart city.* Such solutions for integrated infrastructures for the needs of inhabitants in crowded urban areas determines our country participation in "the conceptual development, designing and using certain European research infrastructures, while the national scientific and technologic community expresses firm positions in this respect and there is a critical mass necessary for an important position in that infrastructure". The above-quoted decision mentions the existence of such projects, some of them emergent, included in national or European strategic documents, for examplethe roadmapfor Research infrastructures ESFRI (European Strategy Forum on Research Infrastructures) or the national one elaborated under coordination of CRIC (Romanian Committeefor Research Infrastructures), or those explicitly mentioned in the Government program at that time.

[26] https://www.eltis.org/sites/default/files/BUMP_Guidelines_RO.pdf, accessedin 02.12.2021

2. Legislating is a hub of paradoxes

In the introduction to the National Strategy for Research, Development and Innovation 2014-2020, it is stated that, judging by both international standards and internal needs, Romania does not have enough researchers. The critical mass of human resources for developing certain promising domains is missing and especially for interdisciplinary research and innovation.

The number of researchers in the business domain is decreasing, while the big companies with branches in Romania seem to be rather reserved when it comes to developing some local research centers and ranging the respective activities as research and development activities. Intra and inter domains mobility is limited, having a negative impact upon the circulation of technical knowledge and innovation. The access of private sectorto the public infrastructures of research is difficult, the provided facilities are limited and, consequently, the degree of using these facilities is low.

Admitting the reduced dimensions of the research and development sector in our country, the above-mentioned Strategy considers that the main cause for this reality is the reduced funding. In absolute figures, Romania spends almost 20 times less than the European average per capita for research and development. On the other hand, "the demand for research and development is reduced, it is not sufficiently stimulated and it does not sufficiently stimulate other economic sectors". The conclusion: "The research and development domain prove to be weakly connected both to the business environment and to the society, in general. Under such circumstances, innovation does not represent a central factor of economicand social development in Romania".

The state proves to be a weak partner in the domain of research and development, lacking vision and not allotting financial resources to capitalize smart technologybenefits, leaving the responsibility for adopting it to the business environment and local communities.

However, there are sufficient normative acts adopted rather for respecting Brussels recommendationsthan for respecting certain internal needs. When it comes to legislating, we represent a hub of paradoxes. A good example is the Ordinance of the Government no. 88/2020 regarding financial support allotting for preparing a portfolio of projects considered to be priorities for 2021-2027, which are to be proposed for financing from European fundings in the Operational Program Technical Assistance 2014-2020 and in the Operational Program Large Infrastructure 2014-2020 which aim also the domain of smart technologies specialization.

The Ordinance of the Government no. 156/2020 regarding certain measures for supporting the territorial development of urban and rural localitiesinRomania stipulates that urban administrative-territorial units, i.e. cities, sections in Bucharest and the areas with rural localities in their administrative-territorial structure, can include in their extended territorialarea a seriesof smart solutions, called *smart village* and *smart city,* which are to be financed from the non-refundable European funds, allotted to our country for 2021-2027.

The state and local authorities have to offer legal instruments to facilitate the access and implementation of informationaltechnologies, stimulating – or/and

compelling - local communities to put a rush on the transition to functioning in a smart system.

3. Information is power; how is it going to be used?

All the aspects the local administration is responsible for, which ensure the normal functioning of a community– transport, health, education, communications, services – need to be known and functional, but the dysfunctionalities need also to be identified, to be able to eliminate and to prevent them. Especially urbancommunities need and should use, if it is possible, all the facilities of urbane smarttechnologies, especially in the benefit of vulnerable groups. With a view to this, it is compulsory that the legislative platform for implementing the practical means and solutionsof using thesmarttechnologyensures the fundamental rightsfor each citizen. *Smart cities*represent a frame which has to guarantee the individual freedom and rights, offeringeach member of that communitythe certainty that his/her private life is protected from any intrusion or unauthorized surveillance.

The fundament of each smart application is the respect for human dignity, for the citizen rights and liberties, disregarding the nature of publicservices based on smarttechnology. Respecting this fundamental conditiondetermines the citizens' participation in making decisionsby local authorities, as well as their trust in the usefulness of newtechnologies. In order for a functional smart city to be developed, it is necessary for the citizen to understand, feel and behave as a reliable partner, to be listened to and respected.

Participative democracy is as important as facilitating the urban mobility by smarttechnology, developed especially according to the needs at local level, having connections at national level, when it is required. The process could begin with simple stages, such as the possibility to connect an entire section to smart energy or the possibility to develop smart delivery services at local level.

In all the situations, theconstant challenge of implementing anyadministrative smart solution refers to the degree of awareness of both local authority and citizen regarding the mutual responsibilities and respect the citizen rights and liberties.

4. Smart involves a collective wisdom

Smart cities mean much more than collecting data by the services of local public administration or by the applications introduced in the election procedure. One of the most important civil rights stated in the article no. 36 of the Constitution, referring to the guaranteed right to vote ensures the sovereign power of the citizens. Holding this legitimate and fundamental power is obligatory accompanied by the civic responsibility. This means that it is essential for all to vote after having been well informedand "to makea distinction between the electoral campaign promises and political programs and platforms program, on the one hand, and the things that can be accomplished and are important for us, on the other hand"[27].The concept and

[27]https://romaniansmartcity.ro/wp-content/uploads/2020/09/Ghidul_Alega%CC%86torului_Smart_2020_Asociat%CC%A6ia-Roma%CC%82na%CC%86-pentru-Smart-City.pdfaccessed on 02.12.2021

the implementation of *smart cities* are important for each citizen who will come closer and closer to the challenge of *smart citizen*.

There are very generous "smart levels" for developing the new local policies, such as connecting to the sources of electric power or the issues related to the old persons without families.

The issue referring to the aging of population should become a priority for society, also by designing and developing some ways for the seniors to access various services and their possible interconnection by smart technology. This type of challenges belongs to a perspective of smart cities development in the near future. The smartness of the cities lies in the level of applying smarttechnologies, both in the local administration and in the citizens' life, according to their needs. The concept ofsmart city refers to the level of collective wisdom of administrative and civil community.

During the process of applying smart technologies, each city faces the difficulty of finding a fair balance between respect for human dignity and citizen rights, on the one hand, and facilitating the access to high quality services, with proficient technologies, on the other hand. This represents a sensible problem, especially because a part of the datacollected at local level are centralized and relevant at national level. In particular, it is aboutdata referring to real estates and movable properties, to those goods which are subjected to local taxes.The possibility to pay the taxesusing the private mobiles raises questions about how the private dataare managed with full safety and how these data are used related to the governmental data.

These aspects represent real challenges because the possibility to collect such a huge amount of data should correlate to the guarantee of their protection. The measures and instruments of smart technology should include proceduresas smart as them, that could guarantee the constitutional rights regarding the protection of personal data.

In this respect, an old piece of news in the American media is famous:"The piece of news about the robot from Boston Dynamic that saved the hostages is less visible than the piece of news about the voice and behavior of a person that were perfectly simulated and used in a penal trial "[28].

The fact that this represents a vulnerable issue has been proved during the pandemics, too. Romanian society is divided by the procedure of restricting the access in various public areas on condition of scanning the QR codes of green certificates. The opinion that the respective scanning is, in fact, a hidden illegal procedure to access private data becomes more and more popular.

The general assault of the instruments of smart technologyrequires rules and basic principles to guarantee they function for the social benefit and in safety conditions, respecting the right to private life and for human dignity, as they offer reliability and full transparency, they respect confidentiality, values and principles of social relations ethics.

[28]Claudiu Marin DRĂGUȘIN, *Stadiul actual al eticii în domeniul iinteligenței artificiale*, Revista Dreptul nr. 3, 2020

5. The demands of using smart technologies

On April 8, 2019, the European Union communicated its vision regarding the ethicsof using the artificial intelligence.Referring to the use of thistechnology, there are formulated several requirements, in many directions:a)human involvement and surveillance: artificial intelligence systems should facilitate the existence of certain reasonable societies by supporting the involvement of human factorand by respecting the fundamental rights, without reducing, limiting or compromising human autonomy; b) robustness and safety: anartificial intelligence which we can trust requires the algorithms to be safe, reliable and solid enough to face the errors or inconstances during the entire period of functioning for artificial intelligence systems; c) respecting private life and data governance: citizens should have full control on their own data, which should not be usedfor their discrimination or prejudice; d) transparency: trackabilityof artificial intelligence systems should be ensured; e) diversity, non-discriminationand equity: artificial intelligence systems should take into account the entire set of abilities, competences and demands from the human factor and ensure the accessibility; f) social and environmental wellness: artificial intelligence systems should be used to accelerate positive social changesand to favorthe durable developmentand ecological responsibility; responsibility: there should be set up devices to ensure the responsibility and liability of artificial intelligence services and their actions"[29].

Respecting such requirements and principles contributes to identification, developmentand implementation of the best social policies. Once they are offered to the human resources involved in this process, the real challenge becomes using them for thedevelopmentof the most opportune and efficientsmart solutions. The interface isprovidedby computersand smart deviceswhich arecontrolled by people. But what happens when these devices fail or are out of order and the data collected in their storage space are likely to be lost or irrecoverably deleted? That is why their sustainability becomes a very important issue.

The pace of progress for smart technologies permitted the emergence of quantum computers, which wil linterferein virtual currencies cryptography. The universe built in these virtual coordinates seems to be over whelming for many people: „Crypto currencies have the potential to change the finances, by eliminating the intermediates and by bringing accounts to millions of nonbank persons in the entire world. On their turn, the quantum computers could change the way pharmaceutic products and materials are designed, by their extraordinary power of processing. However, there is a problem: block chain technology that provides crypto currencies could become vulnerable to sophisticated attacks and to fake transactions, if this quantum computation grows faster than the effortsto make digital money. Crypto currencies are secured by a technology called block chain, cryptography with public key. The system is present everywhere. It protects your online purchases and it jams communication sfor anybody else but the targeted addressee. The technology functions by combining a public key, which anybody can see, with a private key. If the present progress goes on, quantum computers will be

[29]Idem3

able to hackthecryptography with public key, creating a potential threat which is extremely seriousfor the crypto world, where some currencies are evaluated byhundreds ofmilliards of US dollars. In case the encrypting is interrupted, the hackers can violate the identity of legitimate owners ofcryptocurrencies, of NFTsor other digital actives"[30].

Facing such challenges, what could be called the legal safety of various technologic applications gets really important. "The concern for guaranteeing the legal safety is real inRomania, where the quantity of legislation increased, as a consequence of an increased complexity of law domain, determined by the development of new sources of law, especially the community and international ones, as well as by the evolution of society, of the emergence of new domainsof regulations. (…) In other words, does the activity of legislating ensures the quality of law, with respect to its conformity to the principle of preeminence oflaw and to the principle of the law safety, in its largest acceptation? The jurisprudence of Constitutional Court and European Court for Human Rights, recently marked by more and more frequently reference to the demands regarding the accessibility and predictability of law, can represent an answer to this question and, in the same time, a signal regarding the necessity to take action with a view to remediate certain deficiencies affecting more and more profoundly the Romanian judicial systemand, implicitly, the existence of the state of law. (…) The importance of respecting the principle of juridical safety for theexistence of the state of lawrequires a greater attention paid to the quality of law. As a consequence, even if the huge increase in number of the normative documents and their complexitycould be justified by historical, sociological, political, economic factors, an effort to impose discipline to the regulating excess, to subordinate the decreed norms to the strictness of juridical safety is necessary. It is an effort for theprimaryor delegatedlegislatorsand it involves the diagnosis of the problems, identification of adequate remedial actions, in the sense of organizing the activity of legislating by a rigorous underlying on the principles of legislative technique and by increasing the accessibility and predictability of the juridic norms"[31].

The above-mentioned aspectsprove that there are sufficiently enough solid reasons for the concept of *smart cities* should not remain above the citizens, as a mysterious system used by the people "chosen" or "designated" by therespective political regime, but, with respect to the state, it should become a subject ofpassing towards innovative waysfor the life of the communityand the relations between citizen and authorities, where the first one holds the priority.The specialists consider that the optimal transitionconsists ofsmall segments, in domainsof activity closely related to the citizen, so that monitoring the new procedurescould be realized as easy as possible. It is rational and practical to advance by step by step, stage by stage, in restrained areas so that, when a well-functioning modelis achieved, it could be applied at regional or national level, witha risk for an error to appear as reduced as possible.

[30]Cryptocurrency faces a quantum computing problem - CNETaccessed on 02.12.2021 andhttps://www.digi24.ro/stiri/sci-tech/lumea-digitala/doua-tehnologii-sunt-aproape-sa-schimbe-lumea-dar-ar-putea-intra-in-confruntare-directa-1734609

[31]https://www.ccr.ro/wp-content/uploads/2021/01/predescu.pdf accessed on 02.12.2021

Digitalization at the level of small localities/ cities represents a feasible objective because it allows testing and adapting the smart procedures to a more reduced extent, before generalizing them at the community or regional level.

6. Case study of pandemics

Real democratic societies are able to propose solutions for development and improvement of the relations between citizens and authorities. This requires powerful cities, local authorities willing to innovate and a real local locale autonomy.

Applying the public health policies decided at central level and implementedat local level, under pandemics conditions, especially regarding the access of students and teachers to the Internet network for on line education process, developedenoughgapsin the progress of this new and innovative form of didactic activities. Theavailable instruments for accessand the devices that wereusedshowed great differences among cities, rural and urban localities. Yet, suchdifferences generate irremediable consequences for theeducation andself-developmentof each childorteenager in those localitiesthat are not prepared for this exam of IT modernity. It was the first lesson and we need to learn from it that, before the transition to a more sophisticated conceptualization of smart cities, a good starting point in the system of developmentof asmart communitywould be the urgent effort to reorganize/reconstruct thefunctionalstructureofschoolswhich the local councils are in charge with, so they become efficient in the situation when on line education is required. The state should remain responsible for providing the necessary infrastructure, including also the partnership with the privatecompanies in the domain of digitaltechnology.

How many of the private companies in Romaniaare willing to offer solutions for smart cities? Or should the solutions come from the society, while the state should ensure the hub for connecting and implementing them? Smart community is not achieved by and reduced to purchasing innovative products. There is need for much more. The three actors – the local authorities, the companies involved in corporative governanceand the citizens should find means to work together in order to identifythe best innovativesolutions, that could be useful for everybody. If the stateis not a partner for citizens and companies in the domain, the solutions reached at or/and purchasedwill not be compatible with our rights and liberties, but they will match certain special, particular interests, to the detriment of smart cities project, without serving the realinterests of people and society.

Smart Cities should serve peopleinterestsand not confer morepower to authorities, who would become more able to strictly monitor citizens. **Smart Cities are forcitizens, not against them!** We should stay together for the civil development of this concept and for guaranteeing the citizens' rights and liberties when it is realized.

This is the instrument by which the cities could and should learn one from another. Local authorities need to identify legal solutions, while the state needs to ensure the legislative competitional support.

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Cetăţeni inteligenţi şi administraţie inteligentă între drepturi şi responsabilităţi

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Abstract

Lucrarea de faţă îşi propune se prezinte o analiză a stadiului de îndeplinire a obligaţiilor statului în dezvoltarea inteligentă a sistemelor publice ale autorităţilor locale, a competenţelor cetăţenilor precum şi a modului în care sunt cunoscute şi respectate drepturile fundamentale în procesul de elaborare şi implementare a strategiilor de digitalizare locală. Dezvoltarea sustenabilă şi inteligentă a României are nevoie de modele teoretice dar şi de bune practici în care să fie valorificată respectarea drepturilor şi libertăţilor fundamentale. Sectorul public, serviciile administraţiei publice locale trebuie să se dezvolte şi să se modernizeze pentru o funcţionare inteligentă şi ***digitală în folosul cetăţenilor şi cu susţinerea lor****. Transformarea digitală prin debirocratizare şi cu parcurgerea paşilor specifici – digitizarea (cu obţinerea de date) şi digitalizarea trebuie să aibă în vedere şi garantarea drepturilor şi libertăţilor constituţionale.* ***Respectarea legislaţiei în materie de drepturi şi libertăţi*** *în procesul de obţinere a statutului de oraş inteligent reprezintă un drept şi o responsabilitate, în egală măsură, pentru cetăţeni şi decidenţi. Identificarea şi adoptarea politicilor, metodologiilor şi practicilor de dezvoltare a sistemelor publice în perspectiva oraşelor inteligente trebuie să încorporeze armonios legislaţia, tehnologia, predictibilitatea, fezabilitatea şi acceptarea de către cetăţean ca punct final în curba unui nivel de aşteptare realist. Este obligaţia statului să-şi educe cetăţenii şi companiile cu privire la beneficiile oferite de tehnologia informaţiei şi de serviciile publice electronice, să elaboreze planuri naţionale pentru dezvoltarea competenţelor digitale ale cetăţenilor dar şi în cadrul administraţiei publice, să elaboreze şi să implementeze măsurile de reglementare, supraveghere şi control ale procesului de digitalizare cu respectarea drepturilor şi libertăţilor fundamentale ale cetăţenilor săi. În acest sens vor fi prezentate două studii de caz şi mijloacele de punere în aplicare, de către două primării urbane, a strategiilor locale de digitalizare pentru optimizarea interconectării dintre cetăţean şi serviciile publice.*

Cuvinte cheie**:** *obligaţia statului, competenţe digitale, măsuri de reglementare, supraveghere, control.*

Dezvoltarea serviciilor administraţiei publice prin tehnologii smart interactive cu cetăţenii este esenţială sub mai multe aspecte: elimină subiectivismul funcţionarilor; scurtează timpul de soluţionare a petiţiilor; permite rezolvarea acestora într-un program flexibil, conform disponibilităţii de timp a cetăţeanului; facilitează interconectarea „ghişeelor", în sensul că solicitări dintre cele mai diverse pot fi accesate printr-o singură aplicaţie; instaurează „corupţia zero". Nu în ultimul rând, un asemenea sistem mobilizează cetăţenii în a fi pro-activi pentru actualizarea şi utilizarea propriilor cunoştinţe de IT.

Dintr-un subiect de SF, cum părea acum câteva decenii, obiectivul *oraşul inteligent* devine în zilelele noastre o nouă paradigmă de organizare a serviciilor publice şi o necesitate care condiţionează dezvoltarea economică şi socială a comunităţii. Întregul proces se află la intersecţia a două realităţi: pe de o parte, cerinţele autorităţilor s-au diversificat şi exigenţele cetăţenilor faţă de acestea au crescut. Pe de altă parte, perfecţionarea tenologiilor IT a dus la simplificarea lor, permiţând un acces tot mai larg şi, implicit, adoptarea unor noi proceduri de comunicare între stat şi cetăţean.

Portofoliul tehnologiilor smart cu aplicabilitate în practica operaţiunilor administrative s-a diversificat tot mai mult, fiind accesibile, practic, în orice localitate urbană, sub aspectul costurilor şi al adecvării la necesităţile comunităţii. Dezvoltarea smart a comunităţii poate prinde viaţă prin identificarea nodurilor disfuncţionale ale birocraţiei, prin dimensionarea raţională a procedurilor administrative fireşti funcţionării unui oraş şi prin voinţa politică de a diminua substanţial dependenţa cetăţeanului de capriciile ghişeelor.

Oraşul smart presupune cunoaşterea profundă a realităţilor din comunitate şi voinţa eliberată de „branduire politică" de a instaura o nouă relaţie între cetăţeni şi autorităţi printr-o comunicare promptă şi exhaustivă. Este mijlocul prin care se pot asigura accesul şi contribuţia cetăţeanului la politicile locale, implicarea acestuia în deciziile autorităţii locale, consultarea lui privind constituirea şi cheltuirea bugetului local pentru nevoile reale ale comunităţii.

Soluţiile pentru oraşul inteligent se bazează în primul rând pe garantarea drepturilor şi conştientizarea responsabilităţilor cetăţenilor şi pe înţelegerea a ceea ce înseamnă democraţia participativă. Marea virtute a tehnologiilor smart constă în aceea că permit reaşezarea cetăţeanului în axul deciziilor administrative. Restul sunt efecte: deschiderea neîngrădită a dialogului dintre autorităţi şi cetăţean, identificarea unor direcţii consensualizate şi realizarea unor programe predictibile de dezvoltare locală.

1. Dacă lege nu e, nimic nu e

Tehnologiile smart mai au un efect: răpesc birocraţiei administtrative „pixul" unor decizii arbitrare sau lăsate la voinţa bunului plac. De exemplu, faimoasele „avize" cerute fără contenire de la tot felul de autorităţi pentru a i se elibera unui cetăţean o autorizaţie de construcţie sunt un fel brici în labele maimuţei. Or, accesarea informaţiilor respective *in cloud* ar lipsi autoritatea publică de sentimentul că „autoritate" înseamnă a-l domina pe cetăţean şi nu a fi în slujba lui.

Această realitate conduce spre truismul că nimic nu se va face de la sine în materia „smartificării" operţiunilor administrative dacă nu se va realiza un cadru legislativ imperativ şi sancţionatoriu.

În prezent, cadrul intern de reglementare în domeniu este vag şi insuficient, mai degrabă opţional şi facultativ decât, rigutos şi imperativ. Tehnologiile smart figurează mai des în diverse programe electorale şi promisiuni politice, nicidecum în setul de obligaţii de serviciu ori în fişa postului a decidenţilor pe plan local. Aici nu este vorba despre o lipsă de alonjă vizionară din partea autorităţilor, ci de reţineri interesate în a aborda o astfel de construcţie indispensabilă pentru viitorul unei ţări, care riscă ~~să~~ să rămână decontectată de la reţeaua globală a tehnologiei inteligente, cu toate implicaţiile acestei autoexcluderi.

Tendinţa lumii civilizate spre asimilarea tehnologiilor smart în spaţiul public este evidentă. Fenomenul este de neoprit.Avantajele sunt recunoscute anonim. Problema este doar a vitezei fiecărei comunităţi de a se integra în acest ritm. Nici ţara noastră nu duce lipsă de tot felul de strategii naţionale, „studii de fezabilitate" ori foi de parcurs la nivel local sau naţional, dar trecerea la acţiuni concrete este sporadică şi aleatorie. Reglementările în materie sunt insuficinte şi lipsite de predictibilitate. Iată câteva exemple.

Prin Ordinul 2276/2020-2276/6152 al Ministrului Educaţiei, privind acordarea burselor "Eugen Ionescu" în anul universitar 2020-2021, publicat în Monitorul Oficial nr. 18 din 01.08.2021, doar trei universităţi din România şi anume Universitatea "Alexandru Ioan Cuza" şi Universitatea "Asachi" din Iaşi prin Facultatea de Administrare a Afacerilor, respectiv Facultatea de Construcţii şi Instalaţii şi Universitatea Tehnică de Construcţii Bucureşti prin Facultatea de Inginerie a Instalaţiilor oferă burse în domeniile: *smart society*, *smart citiies*.

Prin adoptarea Deciziei 2010/40/UE a Parlamentului European şi a Consiliului privind cadrul pentru implementarea sistemelor inteligente de transport în domeniul transportului rutier şi pentru interfeţele cu alte moduri de transport, publicată în Jurnalul Oficial 39L din 16.02.2016, Comisia Europeană a invitat organizaţiile de standardizare europene (OSE) să elaboreze standardele necesare pentru implementarea şi utilizarea operaţională a STI (sistemul de transport inteligent) în condiţii de interoperabilitate, compatibilitate şi continuitate.

Directiva 2010/40/UE stabileşte necesitatea unor interfeţe urban-interurban care să permită interoperabilitatea şi continuitatea serviciilorde transport indiferent de reţele şi de frontiere. Zonele urbane sunt identificate drept "zone prioritare" opţionale pentru punerea în aplicare unor servicii de informare în timp real cu privire la trafic. Primii şi ultimii kilometri de drum ai persoanelor care călătoresc au loc de obicei în zone urbane şi, prin urmare, aceste informaţii sunt esenţiale pentru furnizarea la nivelul UE a unor servicii de informare cu privire la călătoriile multimodale care să contribuie la o mobilitate fără sincope.

În cadrul obiectivelor stabilite de această Directivă, cerinţele de creştere a eficienţei şi siguranţei mobilităţii urbane ~~iar acestea~~ au fost incluse într-un pachet de recomandări numit „Pachetul privind mobilitatea urbană", adoptat în anul 2013 şi care include domenii precum logistica urbană, reglementările privind accesul în zonele urbane şi taxarea utilizatorilor căilor rutiere, implementarea coordonată a sistemelor inteligente de transport urbane şi siguranţa rutieră în zonele urbane.

În ceea ce priveşte interesul autorităţilor locale pentru dezvoltarea şi implementarea unor proiecte inteligente, ar fi necesar un studiu privind experienţele izolate de implementare a tehnologiilor smart conform unor hotărâri dedicate ale consiliilor locale, care să fi integrat cu succes conceptul de mobilitate urbană durabilă şi să-l fi dezvoltat pentru comunităţile locale.

Planificarea mobilităţii – un termen care trebuie bine definit - reprezintă un element cheie al dezvoltării durabile şi una dintre cele mai importante provocări ale oraşelor de astăzi.

Punctul de vedere al comunităţii trebuie aflat şi valorificat înainte de a începe implementarea unui proiect citymoble net (aplicaţie de moblitate urbană) pentru că este vorba despre calitatea vieţii în comunitate iar strategia de mobilitate urbană. Spre deosebire de abordările tradiţionale de planificare a transporturilor, noul concept pune un accent deosebit pe implicarea cetăţenilor şi a tuturor părţilor, pe coordonarea poliScilor între sectoare (transport, uSlizarea terenurilor, mediu, dezvoltare economică, poliSci sociale, sănătate, siguranţă etc.), între diferitele niveluri de autoritate şi între autorităţile învecinate. Planurile sustenabile de mobilitate urbană necesită o viziune pe termen lung şi sustenabilă pentru o zonă urbană şi care să ţină cont de costurile şi beneficiile societale mai extinse, cu scopul de a "internaliza costurile" şi a sublinia importanţa evaluării[32] este însoţită de o diversitate de provocări şi nevoi specifice locale. Reacţia comunităţii ulterior aplicării măsurilor alterează calitatea realiţiei dintre autoritate şi cetăţean, pune la îndoială buna credinţă a factorilor decidenţi şi riscă să compromită implicarea şi portofoliul de idei sau soluţii care ar fi putut veni din partea comunităţii locale.

Hotărârea nr. 81/2017 pentru modificarea şi completarea Strategiei naţionale de cercetare, dezvoltare şi inovare 2014-2020, aprobată prin Hotărârea Guvernului nr.929/2014 publicată în Monitorul Oficial nr. 155/02.03.2017 reglementează, printre altele, participarea României la procesul european de cercetare, dezvoltare şi inovare prin asumarea rolului de lider sau de actor important la diferite infrastructuri de cercetare. Reglementarea îşi propune să stimuleze concentrările tehnologice (*clustere*) interdisciplinare prin susţinerea mai multor specializări inteligente, subordonate conceptului de *oraş inteligent.* Astfel de soluţii de infrastructuri integrate pentru nevoile populaţiei în aglomerări urbane condiţionează participarea ţării noastre „la dezvoltarea conceptuală, construcţia şi operarea unor infrastructuri de cercetate europene, în condiţiile în care comunitatea ştiinţifică şi tehnologică naţională exprimă poziţii clare în acest sens şi există masa critică necesară unei poziţii importante în acea infrastructură". Hotărârea citată menţionează existenţa unor astfel de proiecte, unele emergente, cuprinse în documente strategice naţionale sau europene, cum sunt foaia de parcurs (*roadmap*) pentru infrastructuri de cercetare ESFRI (European Strategy Forum on Research Infrastructures) sau cea naţională elaborată în coordonarea CRIC (Comitetul Român pentru Infrastructuri de Cercetare), sau cele menţionate explicit în Programul de guvernare de la acea dată.

[32] https://www.eltis.org/sites/default/files/BUMP_Guidelines_RO.pdf, consultat la 02.12.2021

2. Legiferarea este un hub al paradoxurilor

În preambulul Strategiei naţionale de cercetare, dezvoltare şi inovare 2014-2020 se consideră că, „judecând după standardele internaţionale, dar şi după nevoile interne, România nu are destui cercetători. Lipseşte masa critică de resurse umane pentru dezvoltarea unor domenii promiţătoare şi, în mod special, pentru cercetarea şi inovarea interdisciplinară.

Numărul de cercetători din mediul de afaceri este în scădere, iar marile companii cu filiale în România se arată reticente în privinţa dezvoltării unor centre locale de cercetare şi a încadrării activităţilor specifice ca activităţi de cercetare-dezvoltare. Mobilitatea intra- şi intersectorială este limitată, având un impact nedorit asupra circulaţiei cunoştinţelor tehnice şi inovării. Accesul sectorului privat la infrastructurile publice de cercetare este dificil, serviciile oferite sunt limitate şi, în consecinţă, gradul de utilizare al acestor instalaţii este scăzut".

Recunoscându-se subdimensionarea sectorului de cercetare-dezvoltare din ţară, Strategia amintită consideră că principala cauză a acestei realităţi o reprezintă finanţarea redusă. În cifre absolute, în România se cheltuieşte pentru cercetare şi dezvoltare, pe cap de locuitor, de aproape 20 de ori mai puţin decât media europeană. Pe de altă parte, „cererea de cercetare şi dezvoltare este scăzută, nu este stimulată suficient şi nici nu stimulează suficient alte sectoare economice". Concluzia: „Sectorul CD se dovedeşte slab conectat, atât cu mediul de afaceri, cât şi cu publicul în general. În aceste condiţii, inovarea nu reprezintă un factor central al dezvoltării economice şi sociale în România".

Statul se dovedeşte un partener slab în domeniul cercetării şi dezvoltării, lipsit de viziuneşi fără alocări de resurse financiare care să pună în valoare beneficiile tehnologiei smart, lăsând responsabilitatea adoptării acesteia pe mediul de afaceri şi comunităţile locale.

Există, însă, destule acte normative adoptate mai mult pentru conformarea cu indicaţiile de la Bruxelles, fără să existe o „chimie" cu necesităţile interne. În materie de legiferare, suntem un hub al paradoxurilor. Un exemplu îl reprezintă Ordonanţa de urgenţă 88/2020 privind acordarea unui sprijin financiar pentru pregătirea portofoliului de proiecte considerate prioritare pentru perioada 2021-2027, care să fie propuse spre finanţare din fonduri europene prin Programul operaţional Asistenţă tehnică 2014-2020 şi Programul operaţional Infrastructură mare 2014-2020 care ţintesc, printre altele, domeniul de specializare în tehnologiile inteligente.

Ordonanţa de urgenţă nr. 156/2020 privind unele măsuri pentru susţinerea dezvoltării teritoriale a localităţilor urbane şi rurale din România prevede că unităţile administrativ-teritoriale urbane, respectiv municipiile, sectoarele municipiului Bucureşti şi oraşele care au în structura administrativ-teritorială sate aparţinătoare, pot include în aria lor teritorială astfel extinsă o serie de soluţii de tip inteligent, denumit *smart village* şi oraş intelligent, denumit *smart city,* care să fie finnţate din fondurile europene nerambursabile, alocate ţării noastre pentru perioada 2021-2027,

Statului şi autorităţilor locale le revine obligaţia să pună la dispoziţie instrumentele legale şi juridice care să faciliteze accesul şi implementarea tehnologiilor informaţionale, stimulând – sau/şi obligând - comunităţile locale să urgenteze tranziţia spre funcţionarea în sistem smart.

3. Informaţia e putere; cum va fi folosită?

Tot ceea ce ţine de responsabilitatea administraţiei locale şi bunul mers al comunităţii – transport, sănătate, educaţie, comunicaţii, servicii – are nevoie de cunoaştere şi funcţionalitate, dar şi de identificare a disfuncţiilor, pentru a interveni în eliminarea şi prevenirea lor. Îndeosebi comunităţile urbane au nevoie şi trebuie să folosească, pe cât posibil, toate facilităţile tehnologiilor smart, ~~i~~nclusiv sau mai ales în beneficiul grupurilor vulnerabile.În acest scop, este obligatoriu ca platforma juridică a implementării mijloacelor şi soluţiilorpractice de folosire a tehnologiei smart să garanteze drepturile fundamentale pentru fiecare cetăţean. *Smart cities* reprezintă un cadru care trebuie să garanteze libertatea şi drepturile individuale, oferind fiecărui membru al comunităţii respective certitudinea că viaţa lui personală este protejată de orice intruziune sau supraveghere neautorizată.

Fundamentul oricărei aplicaţii *smart* îl constituie respectarea demnităţii umane, a drepturilor şi libertăţilor cetăţeneşti, indiferent de natura serviciilor publice bazate pe tehnologia inteligentă. De respectarea acestei condiţii fundmentale depinde participarea cetăţenilor la procesul decizional al autorităţilor locale, ca şi încrederea lor în utilitatea noilor tehnologii. Ca să dezvolţi un oraş inteligent funcţional este nevoie să-l faci pe cetăţean să înţeleagă, să se simtă şi să se comporte ca un prtener de încredere, ascultat şi respectat

Democraţia participativă este la fel de importantă ca şi facilitarea mobilităţii urbane prin tehnologia inteligentă, dezvoltată mai ales în funcţie de nevoile în plan local, şi, acolo, unde se impune, cu conexiuni la nivel naţional. Totul ar putea începe cu paşi simpli, ca de pildă cum s-ar putea ~~să~~ asigura conectarea la energie inteligentă a unui cartier sau cum se pot dezvolta serviciile smart delivery în plan local.

În toate cazurile, provocarea constantă a implementării oricărei soluţii administrative de tip smart o constituie cunoaşterea de către autoritatea locală şi cetăţean a responsabilităţilor reciproce şi respectarea drepturilor şi libertăţilor cetăţeneşti.

4. Smart presupune înţelepciune colectivă

Smart cities înseamnă mult mai mult decât colectarea de date de către serviciile administraţiei publice locale ori de aplicaţiile introduse în mecanismul electoral. Unul dintre cele mai importante drepturi cetăţeneşti este prevăzut la art. 36 din Constituţie care garantează dreptul la vot şi, prin asta, consfinţeşte puterea suverană a cetăţenilor. Deţinerea acestei puteri legitime şi fundamentale este, obligatoriu, însoţită responsabilitatea civică. Acest lucru înseamnă că este esential să votăm foarte bine informaţi şi „să facem distincţia între promisiunile de campanie, platformele program şi lucrurile care pot fi realizate şi sunt impotante pentru noi”[33]. Conceptualizarea şi implementarea *smart cities* sunt importante pentru fiecare cetăţean care se va afla, tot mai aproape, de provocarea *smart citizen*.

[33]https://romaniansmartcity.ro/wp-content/uploads/2020/09/Ghidul_Alega%CC%86torului_Smart_2020_Asociat%CC%A6ia-Roma%CC%82na%CC%86-pentru-Smart-City.pdf consultat la 02.12.2021

Pentru dezvoltarea noilor politici locale există „smart paliere" foarte generoase, precum conectarea la sursele de energie electrică sau problematica persoanelor vârstnice singure.

Chestiunea îmbătrânirii populaţiei ar trebui să devină preocupantă pentru societate, inclusiv prin proiectarea şi consolidarea unor modalităţi de acces a persoanelor vârstnice la diferite servicii şi chiar posibila lor interconectare prin tehnologia inteligentă. Acest tip de provocări fac parte din perspectiva dezvoltării oraşelor inteligente în viitorul apropiat.

Inteligenţa oraşelor este dată de nivelul atins în aplicarea tehnologiilor smart, nu doar în administraţia locală, ci şi în uzul nemijlocit al cetăţenilor, conform propriilor nevoi.

Noţiunea de oraş inteligent/„smart" sau în traducere liberă "oraş isteţ" nivelul de înţelepciune colectivă a comunităţii, administrativă şi cetăţeanească.

În tentativa aplicării tehnologiilor smart, fiecare oraş se confruntă cu dificultatea de găsi un jus echilibru între respectarea demnităţii umane, a drepturilor cetăţeneşti, pe de o parte, şi facilitarea accesului la servicii de bună calitate, cu tehnologii performanţe, pe de altă parte.

Problema este sensibilă cu atât mai mult cu cât o parte dintre datele colectate la nivel local se centralizează şi au relevanţă la nivel naţional. Este vorba îndeosebi despre date relative la proprietăţile mobiliare şi imobiliare, la bunurile supuse taxelor şi impozitării locale. Posibilitatea de a se achita taxe şi impozite de pe telefoanele mobile individuale ridică întrebări despre cum se gestionează aceste date cu caracter personal în deplină siguranţă şi cum se folosesc aceste date în conexiune cu datele guvernamentale.

Aceste aspecte sunt reale provocări pentru că posibilitatea de a colecta un volum atât de mare de date trebuie corelată cu garantarea protecţiei lor. Măsurile şi instrumentele tehnologiei intelgente ar trebui să includă proceduri la fel de smart care să garanteze drepturile constituţionale în materie de protecţie a datelor personale.

Este faimoasă, din acest punct de vedere, o ştire mai veche din presa americană: "Este mai puţin vizibilă ştirea în care robotul de la Boston Dynamic a salvat ostaticii decât ştirea în care vocea şi comportamentul unei persoane au fost simulate până la perfecţiune şi folosite într-un proces penal"[34].

Sensibilitatea problemei s-a evidenţiat şi în perioada pandemiei. Societatea românească este segregată prin procedura de a condiţiona accesul în diferite arii publice de scanarea codurilor QR ale certificatelor verzi. Prinde tot mai multă notorietate opinia că respectiva scanare este, de fapt, o procedură mascată şi ilegală de acces la date cu caracter personal.

Asaltul general al instrumentelor tehnologiei smart are nevoie de reguli şi principii de bază care să garanteze că ele funcţionează în beneficiul social şi în condiţii de siguranţă cu respectarea dreptului la viaţă privată şi a demnităţii umane, că oferă fiabilitate şi deplină transparenţă, respectă confidenţialitatea, valorile şi principiile eticii relaţiilor sociale.

[34] Claudiu Marin DRĂGUŞIN, *Stadiul actual al eticii în domeniul inteligenţei artificiale*, Revista Dreptul nr. 3, 2020

5. Cerinţele utilizării tehnologiilor smart

Uniunea Europeană a comunicat la 8 aprilie 2019 o viziune proprie în materie de etică în folosirea inteligenţei artificiale. Pentru utilizarea acestei tehnologii, sunt enunţate mai multe cerinţe, pe mai multe direcţii: a)implicare şi supraveghere umană: sistemele de inteligenţă artificială ar trebui să faciliteze existenţa unor societăţi echitabile prin sprijinirea implicării factorului uman şi a respectării drepturilor fundamentale, fără să reducă, să limiteze sau să compromită autonomia umană; b) robusteţe şi siguranţă: o inteligenţă artificială în care putem avea încredere presupune ca algoritmii să fie siguri, fiabili şi suficient de solizi pentru a face faţă erorilor sau inconsecvenţelor de pe parcursul întregului ciclu de viaţă al sistemelor de inteligenţă artificială; c) respectarea vieţii private şi guvernanţa datelor: cetăţenii ar trebui să deţină controlul deplin asupra propriilor date, care să nu fie utilizate în scopuri prejudiciabile sau discriminatorii; d) transparenţă: ar trebui asigurată trasabilitatea sistemelor de inteligenţă artificială; e) diversitate, nediscriminare şi echitate: sistemele de inteligenţă artificialp ar trebui să ţină seama de întreaga gamă de abilităţi, competenţe şi cerinţe din partea factorului uman şi să asigure accesibilitatea; f) bunăstare societală şi de mediu: sistemele de inteligenţă artificială ar trebui utilizate pentru a accelera schimbările sociale pozitive şi pentru a favoriza dezvoltarea durabilă şi responsabilitatea ecologică; responsabilitate: ar trebui instituite mecanisme care să asigure responsabilitatea şi răspunderea sistemelor de inteligenţă artificială şi a acţiunilor acestora“[35].

Respectarea unor astfel de cerinţe şi principii contribuie la identificarea, dezvoltarea şi implementarea celor mai bune politici sociale. Puse la dispoziţia resurselor umane implicate în acest proces devine o adevărată provocare să fie folosite pentru dezvoltarea celor mai oportune şi eficiente soluţii smart. Interfaţa este asigurată de computere şi device-uri smart care sunt operate de oameni. Ce se întâmplă, însă, când această aparatură eşuează, se defectează iar datele colectate în memoria lor sunt expuse pierderii, ştergerii irecuperabile? Iată de ce sustenabilitatea acestora devine o chestiune de importanţă majoră.

Ritmul în care progresează tehnolgiile smart a făcut posibilă apariţia computerelor cuantice, care vor interfera în criptografia monedelor virtuale. Universul construit în aceste coordonate virtuale se anunţă copleşitor pentru multă lume: „Criptomonedele au potențialul de a schimba finanțele, eliminând intermediarii și aducând conturi către milioane de persoane nebancare din întreaga lume. La rândul lor, calculatoarele cuantice ar putea schimba modul în care produsele farmaceutice şi materialele sunt proiectate prin puterea lor extraordinară de procesare. Însă avem o problemă: tehnologia blockchain care alimentează criptomonedele ar putea deveni vulnerabilă la atacuri sofisticate şi la tranzacţii falsificate, dacă acest calcul cuantic se maturizează mai repede decât eforturile de a face bani digitali. Criptomonedele sunt securizate de o tehnologie numită blockchain, criptogtrafie cu cheie publică. Sistemul este omniprezent. Vă protejează achiziţiile online şi bruiază comunicaţiile pentru oricine altcineva decât destinatarul vizat. Tehnologia funcţionează combinând o cheie publică, una pe care oricine o poate vedea, cu o

[35] Idem[3]

cheie privată. Dacă progresul actual continuă, computerele cuantice vor putea sparge criptografia cu cheie publică, creând o potenţială ameninţare extrem de serioasă pentru lumea crypto, unde unele valutesunt evaluate la sute de miliarde de dolari. În cazul în care criptarea este întreruptă, atacatorii pot uzurpa identitatea proprietarilor legitimi ai criptomonedelor, ai NFT -urilor sau ai altor active digitale”[36].

În faţa unor asemenea provocări, o importanţă deosebită capătă ceea ce s-ar putea numi siguranţa juridică a diverselor aplicaţii tehnologice. „Preocuparea pentru asigurarea securităţii juridice este de actualitate în România, în condiţiile creşterii cantitative a legislaţiei, determinată de creşterea complexităţii dreptului, ca urmare a dezvoltării noilor surse de drept, mai ales a celor comunitare şi internaţionale, precum şi a evoluţiei societăţii, a apariţiei unor noi domenii de reglementare. (…) Altfel spus, în activitatea de legiferare este asigurată calitatea legii, în sensul de conformitate a acesteia cu principiul preeminenţei dreptului şi cu cel al securităţii juridice, în cel mai larg sens al său? Jurisprudenţa Curţii Constituţionale şi a Curţii Europene a Drepturilor Omului, marcată în ultimii ani de tot mai frecventa invocare a cerinţelor referitoare la accesibilitatea şi previzibilitatea legii, poate constitui un răspuns la această întrebare şi, totodată, un semnal cu privire la necesitatea luării de măsuri pentru remedierea unor deficienţe ce afectează din ce în ce mai profund sistemul juridic românesc şi, implicit, existenţa statului de drept. (…) Importanţa respectării principiul securităţii juridice pentru existenţa statului de drept impune o mai mare atenţie acordată calităţii legii. Ca urmare, chiar dacă creşterea exponenţială a numărului de acte normative şi a complexităţii acestora poate fi justificată prin factori de natură istorică, sociologică, politică, economică, este necesar un efort de disciplinare a excesului normativ şi de supunere a normelor edictate rigorilor securităţii juridice. Este vorba de un efort care priveşte legiuitorul - primar sau delegat, şi care presupune diagnosticarea problemelor, identificarea de remedii adecvate, în sensul organizării activităţii de legiferare prin fundamentarea riguroasă a acesteia pe principiile tehnicii legislative şi a creşterii accesibilităţii şi previzibilităţii normelor juridice”[37].

Aspectele evocate mai sus demonstrează că sunt motive suficient de solide pentru care conceptul *smart cities* nu trebuie să rămână deasupra cetăţenilor, ca un sistem misterios butonat de „aleşii” sau „numiţii” regimului politic respectiv, ci trebuie să devină, pentru stat, un subiect de trecere spre modalităţi novatoare pentru viaţa comunităţii şi în relaţiile dintre cetăţen şi autorităţi, în care prioritatea o are cel dintâi. Specialiştii consideră că trecerea optimă este aceea pe segmente mici, în domenii de activitate aflate în legătură cât mai directă cu cetăţeanul, astfel încât monitorizarea noilor proceduri să poată firealizată cât mai uşor. Este raţional şi practic să se avanseze în paşi etapizaţi şi pe arii restrânse astfel încât, o dată ajunşi la un model cât mai bine funcţional să poată deveni aplicabil la nivel regional sau naţional, cu un risc cât mai redus de apariţie a unor erori. Digitalizarea la nivelul

[36]Cryptocurrency faces a quantum computing problem - CNET consultat la 02.12.2021 şi https://www.digi24.ro/stiri/sci-tech/lumea-digitala/doua-tehnologii-sunt-aproape-sa-schimbe-lumea-dar-ar-putea-intra-in-confruntare-directa-1734609

[37] https://www.ccr.ro/wp-content/uploads/2021/01/predescu.pdfconsultat la 02.12.2021

localităţilor/oraşelor mici este un obiectiv fezabil pentru că va permite testarea şi adaptarea procedurilor smart la o scară mai redusă, înainte de generalizarea lor la nivel, comunitar sau regional.

6. Studiul de caz al pandemiei

Societăţile cu adevărat democratice sunt capabile să avanseze soluţii de dezvoltare şi optimizare a relaţiilor dintre cetăţeni şi autorităţi. Pentru asta este nevoie de municipalităţi puternice, de autorităţi locale cu voinţă de înnoire şi de o reală autonomie locală.

Aplicarea politicilor de sănătate publică decise la nivel central şi implementate la nivel local în condiţiile pandemiei, cu precădere în ceea ce priveşte accesul şcolarilor şi dascălilor la reţeaua internet pentru desfăşurarea învăţământului on line, au developat destule lacune în derularea acestei forme în premieră a procesului didactic. Instrumentele de acces disponibile şi device-urile folosite au semnalat mari diferenţe între oraşe, între comune sau între oraşe şi comune. Or, astfel de diferenţe generează consecinţe iremediabile pentru pregătirea şi dezvoltarea personală a fiecărui copil sau adolescent din acele localităţi nepregătite pentru acest examen al modernităţii informatice. A fost o primă lecţie din care e nevoie să învăţăm că înainte de a trece la o conceptualizare mai sofisticată a oraşelor smart un bun început în sistemul de dezvoltare al unei comunităţi smart ar fi efortul grabnic de a reorganiza/ reconstrui structura funcţională a şcolilor aflate sub autoritatea consiliilor locale astfel încât ele să devină eficiente în situaţii care impun învăţământul on line. Statul trebuie să rămână responsabil pentru asigurarea infrastructurii necesare,inclusiv în parteneriat cu companiile private din domeniul tehnologiei digitale.

Câte dintre companiile private din România sunt dispuse să ofere soluţii pentru oraşele inteligente? Sau soluţiile trebuie să vină din partea societăţii, iar statul să asigure hub-ul pentru conectare şi implementare? Comunitatea smart nu se realizează şi nu se reduce la achiziţionarea de produse inovatoare. Este nevoie de mult mai mult. Cei trei actori – autorităţile locale, companiile implicate în guvernanţa corporativă şi cetăţenii trebuie să găsească mijloace de a lucra împreună, pentru identificarea celor mai bune soluţii inovatoare, care pot fi deopotriv de utile tuturor. Dacă statul nu va fi partener cu cetăţenii şi companiile de profil, soluţiile obţinute şi/sau achiziţionate nu vor fi compatibile cu drepturile şi libertăţile noastre ci vor intra îl linie cu interesele unora sau altora, în detrimentul proiectului smart cities fără să servească intereselor reale ale societăţii, ale oamenilor. Smart Cities trebuie să servească intereselor oamenilor şi nicidecum să confere mai multă putere în mâna autorităţilor, care ar deveni mai capabile să montorizeze îndeaproape pe cetăţeni. **Smart Cities este pentru cetăţeni şi nu împotriva lor!** Trebuie să fim împreună pentru dezoltarea civilă a acestui concept şi pentru garantarea drepturilor şi libertăţilor cetăţeneşti la punerea lui în aplicare. Este instrumentul prin care oraşele pot şi trebuie să înveţe unele de la altele. Este nevoie ca autorităţile locale să identifice soluţii legale iar statul să asigure suportul legislativ şi competiţional.

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Critical aspects of health security of the Republic of Moldova compared to eastern European countries, in the context of the COVID-19 pandemic

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Abstract

In this paper we analyze the state's preparedness for the COVID-19 crisis, as well as argues the need for selective changes following the detection of critical aspects of health security in the Republic of Moldova. The main objective of this paper is to assess the situation in the fi eld of health security in the Republic of Moldova, as well as its comparison with neighbouring countries in the regional framework of Eastern European countries, in order to identify gaps in health security indicators in the country. The novelty of the research consists in conducting for the fi rst time the benchmarking analysis of health security in the Republic of Moldova based on the Global Health Security Index. In the benchmarking analysis, the average score calculated for Eastern European countries is considered as the reference value for each category. In the analysis performed the categories with lower than average ratings are considered critical. Research has shown that the most critical categories of health security for the Republic of Moldova are: Rapid response to and mitigation of the spread of an epidemic; Health system; Early detection and reporting for epidemics of potential international concern, and Overall risk environment. Study has found significant weaknesses in the state's ability to prevent, detect and respond to health emergencies; severe gaps in the health system; vulnerability to political, socio-economic risks that may undermine pandemic preparedness and response. The
paper also identifi es critical categories of health security in Eastern European countries, including: Poland, Hungary, Czech Republic, Bulgaria, Slovakia, Romania, Bulgaria, Ukraine, Belarus that can be used by decision makers in these countries in the process of adjusting state policies and drafting policy documents. At the end of the paper are formulated two groups of conclusions and proposals: in the regional context of Eastern European countries, as well as those directly addressed to decision makers in the Republic of Moldova.

Keywords**:** *COVID-19 crisis, gaps in health security indicators, infectious diseases, decision makers, Eastern European countries.*

1. Introduction

The etymology of the word crisis comes from the Greek noun "krisis" and the verb "krino", which have several related meanings: "to separate", "to decide" and "turning point".

In Chinese, the word crisis is composed of two characters: the character "wei", which means "danger" and the character "ji", which means "a time when things happen or change, chance".

Therefore, the crisis can be seen as a moment of truth: a turning point in which the conditions before and after the moment are much different.

The turning point is a challenge. It creates pressure to invent new methods of adaptation after the old methods prove incapable of solving the challenge. If a state creates newer and better methods of adaptation, then we can say that that crisis has been successfully overcome. Here the important moment is that countries under the pressure of a crisis must decide what exactly works and can work even in the new conditions, keeping these issues. On the other hand, the things to be changed must be identified.

With regard to COVID-19, there is a general consensus that this is a crisis that is not at the beginning, but at the moment there is still great uncertainty about the duration of the pandemic, especially given the development of new strains of the virus and its socio-economic impact

In the context of the COVID-19 crisis, a comparative analysis of health security in the Republic of Moldova with the systems of other countries will allow the detection of problems that cannot be identified by studying the situation in a single country.

As infectious diseases don't know borders, the comparison of the Republic of Moldova with the surrounding countries is relevant. With these countries, there are also intensive trade and flows of people. In addition, decision-makers should not only know where their own training gaps are, but also how their are prepared in comparetion with neighbors to assess the likelihood of an outbreak spreading. The benchmarking analysis used in the paper is based on the *Global Health Security Index*.

The main purpose of this article is to assess the situation in the Republic of Moldova, as well as to compare it with neighboring countries, in the regional framework of Eastern European countries, in terms of health security. Achieving this goal allows us to identify gaps in health security indicators in the Republic of Moldova, as well as to trace directions for remedying them.

In addition to the introductory part, the paper has five sections, including theoretical and methodological approaches to research, then the critical categories of health security in the Republic of Moldova are identified in the regional aspect of Eastern European countries, further in each critical category are scored unfavorable indicators and, finally, some conclusions and proposals are formulated.

2. Scientific and decision-making approaches to infectious diseases up to the COVID-19 crisis

Previous studies of the COVID-19 pandemic have shown that some of these coronaviruses have the potential to infect humans [1,2]

In 2017, a study of all known gene sequences of coronaviruses found that 91 percent of them live in bats, making them the world leader in the evolution of

coronaviruses [3]. From bats came SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), Ebola, Nipah, etc.

Going into recent history, it should be noted that in 1972 MacFarlane Burnet, a Nobel Prize winner who was a world expert on human infections at the time, made a prediction about infectious diseases that they would be very monotonous because they are already defeated [4]. He considered that due to the vaccination process and the application of antibiotic treatment, there are no new infectious diseases have been appeared in the last fifty years. As a result, Harvard Medical School made staff reductions at the Department of Infectious Diseases in the 1970s [5]

In the contemporary world, after the infectious diseases were no longer a leading cause of death not only in developed countries, but increasingly in developing countries, diseases related to genes, environment and lifestyles, smoking and obesity complications are the main public health problems.

In this context, Deborah McKenzie mentions that these challenges "do not require investments in new vaccines or antimicrobial medicines, surveillance of pathogens or local agents and medical staff, who can monitor and limit epidemics" [5, p.67]. As a result, these capacities have declined significantly in many countries, as well as reduced investment in public health in countries everywhere. In particular, research funding ceased after 2005, when SARS was defeated. Currently, this explains the insufficient knowledge to stop the virus, as well as hinders efforts to combat COVID-19 and mitigate the negative impact on society. In the absence of the circulating virus, it was difficult to determine whether a medicine or a vaccine was effective, as there was no demand for them and the markets for medicines and vaccines did not develop, respectively. As it is known, since the 80's the creation of pharmaceutical products is done by large private companies, for which investments can be profitable only in the case of making medicines in large enough quantities. But the trade tools needed to overcome the situation have not been developed. At the same time, the companies producing vaccines and medicines are the financiers of many researches in this field.

It is now clear that Burnet's claims were premature and did not present a guide for the next fifty years, as he almost ruled out the emergence of a new infectious disease

It should be noted that at the beginning of the pandemic, most governments that had plans to combat a pandemic established these plans taking into account the flu pandemic. Many of them, in fact, have been titled "Pandemic Influenza Plan" [6]. But measures to combat COVID-19 (testing and isolation) do not coincide with those to combat the flu pandemic. So only few governments had plans on how to act when they were affected by a pandemic

Currently, the International Health Regulations (hereinafter the Regulations) set out the regulatory framework that obliges countries to save lives and jobs threatened by the international spread of infectious diseases [7]. Countries need to coordinate their monitoring and disease response with each other, and developed countries need to help developing and transition countries to implement appropriate surveillance measures to detect any danger. According to the pandemic plan drawn up by the Obama administration in the United States, one billion dollars

has been allocated for laboratories and training plans, stocks of protective equipment, etc. for developing countries in accordance with the Regulations. At the same time, according to Christopher Kirchhoff, all this was underfunded and / or abolished under the Trump administration[8]. Finally, although in the scientific work prior to the COVID-19 pandemic, researchers issued warnings that some of these coronaviruses have the potential to infect humans, the support of this knowledge has not been validated by decision makers

Currently, the discoveries of scientists against SARS (2003) have been rethought in the fight against COVID-19, which has allowed the development of vaccines in record time.

3. Research methodology

The analysis of health security in the Republic of Moldova, as well as the comparative analysis with the countries in the region are based on the methodology of the Global Health Security Index (GHSI). GHSI is a new tool, created in 2019 by the Global Alliance for Health Security and developed together with The Economist Intelligence Unit. GHSI can be used to assess global health security in one of the 195 signatory countries to the International Health Regulations, one of which is the Republic of Moldova. To assess a country's capacity to prevent and mitigate pandemics, the Global Health Security Index includes 34 indicators and 85 sub-indicators organized into the following 6 categories:

1. Prevention of the emergence or release of pathogens
2. Early detection and reporting for epidemics of potential international concern
3. Rapid response to and mitigation of the spread of an epidemic
4. Sufficient and robust health system to treat the sick and protect health workers
5. Commitments to improving national capacity, financing plans to address gaps, and adhering to global norms
6. Overall risk environment and country vulnerability to biological threats

From a methodological point of view, it is important to mention that The Economist Intelligence Unit has developed questions that, as far as possible, are classified as a binary choice (yes or no; or 1 or 0). For example, if a country meets a certain criterion, it is awarded a point; if not, it has a zero score. A binary approach limits the risk of subjectivity and increases the likelihood that the same scores will be obtained for a given indicator as a key measure of analytical objectivity and rigor [9, p. 63].

The rating scale ranges from 0 to 100, where 100 corresponds to the best health security conditions

Aggregate scores are divided into three levels, countries with scores between 0 and 33.3 are ranked at the lower level (also called “low scores”), countries with scores between 33.4 and 66.6 are at the middle level (also called "Moderate scores") and countries that are scored between 66.7 and 100 are at the top level (also called "high scores"). [9, p. 41]

Analytical rigor is also ensured by using information from open sources to government institutions and international organizations, as well as national legislation and regulations, academic resources and scientific publications.

It is important that GHSI assess not only the existence of countries' capabilities, but also whether these capabilities are tested regularly (annually), and prove to be functional in real-world exercises or events.

GHSI serves as a tool for national governments to prioritize resources more systematically to fill in the most critical gaps for prevention, detection, and rapid response to biological events before they spread or lead to cascading and destabilizing effects [9, p. 38].

4. The place of the Republic of Moldova in the health security of some Eastern European countries

Six categories of the Global Health Security Index, selected for nine Eastern European countries, including: Moldova, Poland, Hungary, Czech Republic, Bulgaria, Slovakia, Romania, Bulgaria, Ukraine, Belarus are presented in Table 1.

All countries, according to the overall score obtained are ranked in the middle level of health security. At the same time, the comparative analysis of health security in Eastern European countries shows persistent differences between them. According to the overall score obtained the countries are ranked: Poland (55.4) and Hungary (54) at the upper end to Ukraine (38) and Belarus (35.3) at the lower end (Table 1).

Table 1. The scores of the health security categories of some Eastern European countries

Country	Prevent	Detect	Respond	Health	Norms	Risk	Over all
Poland	50.9	61.7	47.5	48.9	58.9	67.9	55.4
Hungary	56.4	55.5	52.2	36.6	58.9	68.2	54.0
Czech Republic	51.1	50.7	46.6	37.4	58.9	74.0	52.0
Slovakia	53.5	46.0	34.1	37.9	52.8	71.5	47.9
Romania	48.9	42.8	35.3	36.7	52.4	65.7	45.8
Bulgaria	37.6	53.3	21.7	41.0	61.5	66.3	45.6
Moldova	**46.5**	**42.9**	**31.1**	**36.4**	**56.7**	**47.1**	**42.9**
Ukraine	38.1	36.5	34.8	23.0	55.1	43.3	38.0
Belarus	19.4	28.9	46.6	40.6	25.8	53.0	35.3
Country with the best score	Hungary 56.4	Poland 61.7	Hungary 52.2	Poland 48.9	Bulgaria 61.5	Czech Republic 74.0	-
Average score Eastern Europe	**44.7**	**46.5**	**38.9**	**37.6**	**53.4**	**61.9**	**46.3**
Number of countries with critical categories	**3**	**5**	**5**	**5**	**3**	**3**	-

Source: Developed by the author using the Global Health Security Index

Note: Categories with below average score
Categories with above average score

The Republic of Moldova according to the overall score of health security - 42.9 is at the bottom of the list of Eastern European countries, after Romania (45.8) and Bulgaria (45.6)

The analysis also shows that Hungary gets the best score in two categories (*Prevention; Quick Response*), Poland in two categories (*Detection and Reporting; Health System*), Bulgaria in one category (*Compliance with International Norms*) and

the Czech Republic in the category (*Environmental Risk*). Romania and Slovakia, as well as tree countries from the former Soviet Union, do not have the categories with the best result.

In the following analysis, the most critical categories of health security in Moldova will be identified by comparing the scores of the categories between Eastern European countries. For this, the average score for each category is calculated. In our analysis, categories with a lower than average rating are considered critical.

Analysis shows that Ukraine is the country with the highest number of critical categories (five), followed by Belarus, Moldova and Romania with four each. It is also noted that Poland is a country without critical categories.

The analysis shows that in most Eastern European countries (five of them) the score is below average in the following categories: *Detection and Reporting; Quick Response and Mitigation of the Spread of an Epidemic; Health System*. These categories, as well as the *Environmental Risk category* are considered the most critical for the Republic of Moldova.

In the case of Belarus, the above-mentioned trends are not fully observed: the score of the categories *Quick Response and Mitigation of the Spread of an Epidemic* and *Health System* is higher than the average for Eastern Europe. Belarus also scored the lowest in the *Prevention* and *Compliance with International Norms* categories

5. Gaps in health security indicators in the Republic of Moldova

The previous analysis shows that in the regional context of Eastern European countries the most critical categories of health security for the Republic of Moldova are: *Quick Response* and *Mitigation of the Spread of an Epidemic; Health System; Detection and Reporting* and *Environmental Risk*. In each critical category, it is important to identify indicators that have contributed to the state's insufficient preparedness for the pandemic, and that can later be used as benchmarks in the process of adjusting state policies and developing policy documents. In the analysis below, the critical categories are studied in detail, in the order of increasing the accumulated score.

5.1. Quick response and mitigation of the spread of an epidemic

In the Republic of Moldova the lowest category is *Quick Response and Mitigation of the Spread of an Epidemic* (score 31.1). The result obtained is largely due to the accumulation of the score "0" on the indicators: *Emergency preparedness and response planning*; *Exercising response plans* as well as *Linking public health with security authorities* [Diagram 1].

The analysis of the results indicates that the Republic of Moldova does not have a national plan in place for public health emergencies, which will address the planning of the response to several communicable diseases with pandemic potential. Those provisions were not included in the "National Public Health Strategy for 2014-2020", approved by Government Decision No. 1032 of 20.12.2013 [10]. At the same time, the state does not have a specific mechanism for interaction with the private sector in order to contributing to the preparation of the emergency response.

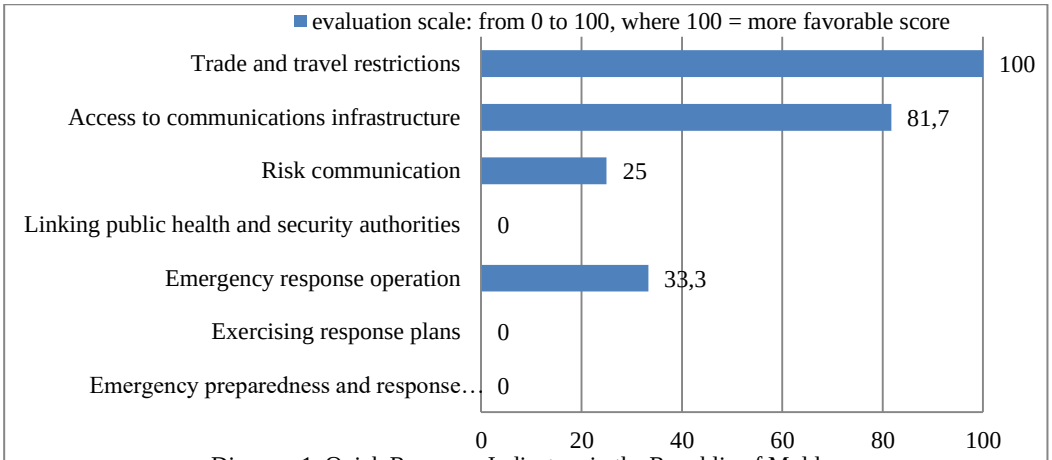

Diagram 1. Quick Response Indicators in the Republic of Moldova

Source: Developed by the author using the Global Health Security Index

The analysis of the data also shows that the Republic of Moldova has not undergone in

recent years an exercise to identify the list of gaps and best practices recommended by the World Health Organization (WHO) or another exercise focused on biological threats.

The list of gaps in health security indicators also includes the non-implementation of at least one joint exercise by the authorities in the field of public health and national security in the Republic of Moldova in order to respond to a potentially deliberate biological event. In addition, no standard operating procedures or other agreements have been drawn up between public health authorities and national security

Although there is evidence that nuclear chemical, biological and radiological hazard training and drills are conducted by national authorities responsible for the management of public health events, these training and drills are not conducted regularly to institutionalize knowledge and practice.

The low value of the Risk Communication indicator is explained by the lack of a risk communication plan specifically for use during a public health emergency in Moldova, as well as how the messages will reach citizens and sectors with different needs in communication. The respective provisions are not found in the "National Strategy for Public Health for the years 2014-2020", approved by Government Decision No. 1032 of 20.12.2013 [10]. At the same time, the "National Communication Strategy for Public Health Emergencies in the Republic of Moldova" is being developed in collaboration with WHO.

However, it is found that communication takes place with the affected communities and

that the messages are adapted according to age, place of residence, language spoken, etc. [9].

Finally, the low value of the *Emergency Response Operation* indicator was reached, among other things, due to the lack of evidence that the *Public Health*

Emergency Coordination Operational Center within the National Agency for Public Health can carry out or have conducted a coordinated emergency response exercise in the last year within 120 minutes of identifying the public health emergency.

5.2. Adequate and robust health system for treating the sick and protecting health workers

The Republic of Moldova does not have the fundamental capabilities of the health system, which are vital for responding to the epidemic or pandemic. There are no indicators in the Health System category that exceed the score of 50 points [Diagram 2].

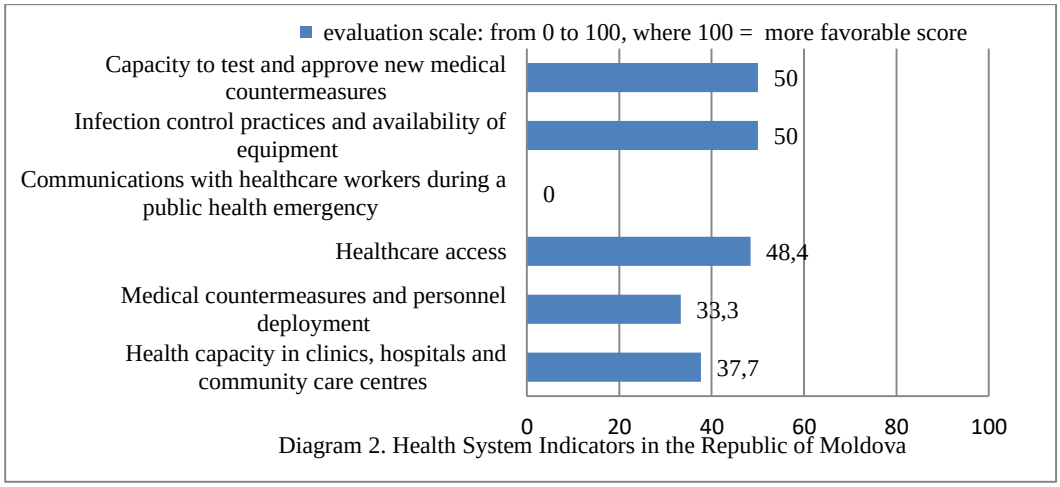

Diagram 2. Health System Indicators in the Republic of Moldova

Source: Developed by the author using the Global Health Security Index

The score "0" obtained on the indicator *Communications with healthcare workers during a public health emergency* indicates the lack of a communication system in place between public health authorities and health workers in the public and private sectors during a health emergency publish. The normative acts regarding the elaboration and implementation of the policies in the field of public health do not contain the respective provisions [10, 11,12].

The low value of the *Medical countermeasures and personal deployment* indicator is explained by the lack of an agreement to purchase medical counter measures (diagnosis and therapy, etc.) for national use during a health emergency with the manufacturing companies. There is also no national plan or program for the development of medical countermeasures.

Gaps in the indicator the *Health capacity in clinics, hospitals and medical centers* is manifested by the lack of isolation facilities for patients with highly communicable diseases in an isolation unit at the time of the pandemic, including in prominent hospitals in Moldova: Medpark International Hospital and Institute of Emergency Medicine.

At the same time, Moldova is facing the insufficiency of certain categories of medical staff, especially in rural areas, where there is a shortage of epidemiologists, doctors of certain specialties, laboratory staff and family doctors.

The Republic of Moldova does not have a public commitment to give priority to health care services for workers who become ill as a result of participating in a public health response.

5.3. Early detection and reporting of epidemics of potential international interest

Data analysis indicates the lack of a functional mechanism for data exchange between ministries that provide human, animal and environmental surveillance in the Republic of Moldova [Diagram3].

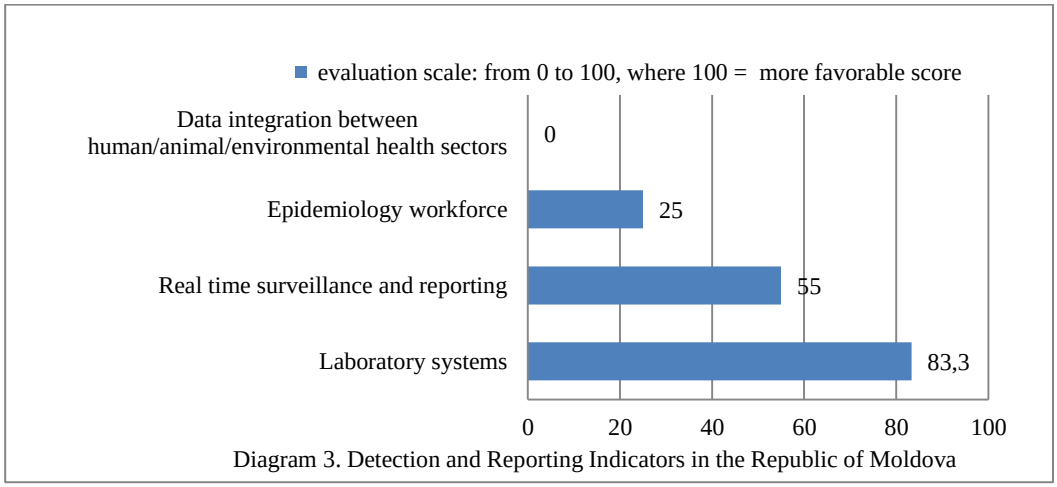

Diagram 3. Detection and Reporting Indicators in the Republic of Moldova

Source: Developed by the author using the Global Health Security Index

The low value of the *Epidemiology Workforce* indicator is explained by the fact that the Republic of Moldova does not have at least one trained field epidemiologist per 200,000 population, which reduces the probability of a rapid response during a public health emergency.

5.4. The general environmental risk and the country's vulnerability to biological threats

The *Environmental Risk* category covers quite broad areas and is composed of indicators: *Infrastructure Compliance, Political and Security Risks, Public Health Vulnerabilities, Environmental Risks and Socio-Economic Resilience.*

Although the scores obtained by the *Environmental Risk* category indicators are among the highest compared to other health security indicators in the Republic of Moldova [Diagram 4], this category is critical not only in the regional context of Eastern European countries but also internationally - out of 195 signatory countries to the International Health Regulations.

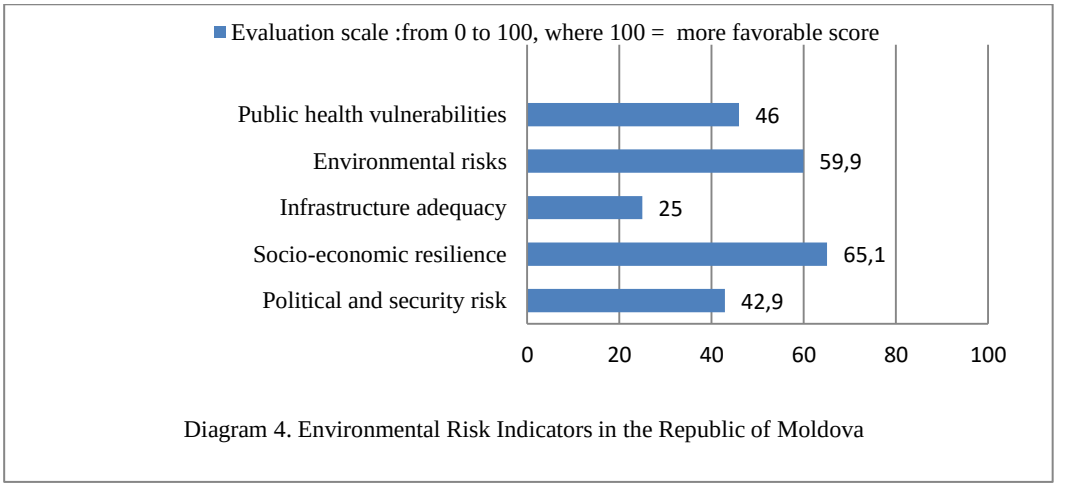

Diagram 4. Environmental Risk Indicators in the Republic of Moldova

Source: Developed by the author using the Global Health Security Index

The respective situation within the category *Environmental Risk* is explained by the higher average level reached in the countries of the Eastern European region and in the world in general, than in the Republic of Moldova.

At the same time, the places obtained by the category indicators are the lowest compared to the rest of the health security indicators in the Republic of Moldova.

From a regional point of view, the indicators within the *Environmental Risk category*, with the exception of the indicators of *Socio-economic Resilience*, accumulate the score below the average of Eastern European countries.

From a global point of view, the Republic of Moldova ranks 78th in terms of the overall average calculated, being in the first part of the ranking of 195 countries. But, according to most indicators of the *Environmental Risk* category, the state occupies the positions in the second part of the ranking: *Political and security risks* (153th place), *Infrastructure compliance* (152th), *Public health vulnerabilities* (118th) and *Socio-resilience economic* (116th).

The slow progress calculated in the prevention of political and security risks is explained by the accumulation of insufficient score in the areas: *Government effectiveness*, *Clarity of established and acceptable constitutional mechanisms for the orderly transfer of power from one government to another*, and absence the score regarding *the Externation of government authority throughout the country*. The analysis shows that Moldova faces major political and security risks, which could undermine the national capacity to counter biological threats.

The analysis of the data also shows that non-compliances in infrastructure such as the road network, air transport are proving to be inadequate the needs. Failure to deliver electricity can also cause damage.

The high vulnerabilities of public health are due to very low general public health expenditures per capita (234.4 according to the Purchasing Power Parity indicator), as well as the lack of access to at least basic sanitary conditions for almost 22% of households in the Republic of Moldova.

Low place of the indicator Socio-economic resilience is influenced by factors: public confidence in government (0 points), robust media coverage through the existence of open and free discussions of public issues, with a reasonable diversity of opinions (accumulation of a low level of points).

Low public confidence in the government could affect its ability to convey effective messages during pandemic crises.

The analysis shows that the abilities of the Republic of Moldova to effectively prevent, detect and respond to outbreaks of diseases can be significantly affected by the broad national risk environment.

6. Conclusions and proposals

Based on the research, two groups of conclusions and proposals can be formulated: in the regional context of Eastern European countries, as well as those directly addressed to decision-makers in the Republic of Moldova.

1. In the regional context of Eastern European countries:

- The overall average of Eastern European countries is quite low reaching the score of 46.3 out of 100 possible. In each critical category, it is important to identify the indicators that have contributed to the countries' insufficient preparedness for the pandemic. Decision-makers in Eastern European countries could use them in the future as benchmarks in the process of improving public policy documents.
- National health authorities should develop epidemic and pandemic-specific preparedness and response strategies as part of wider regional and national security planning efforts.
- In the regional context of Eastern European countries, the most critical categories of health security for the Republic of Moldova are: *Detection and reporting; Rapid response and mitigation of the spread of an epidemic; Health system and environmental risk*.
- Given that the first three categories of the above are considered critical for most Eastern European countries, national governments should give more systematic priority and resources to strengthen health systems, as well as detection and rapid response to biological events before they spread or lead to cascading and regionally destabilizing effects.

2. In the national context, in addition to those mentioned above, the following conclusions and proposals are relevant for the Republic of Moldova:

- Inclusion in the new National Health Strategy 2030 of the provisions on the national preparedness and response plan for public health emergencies, including planning, training, management, preparning, etc. in assessing the risks and vulnerability in cases of pathogens. It is also necessary to create a mechanism dedicated to interaction with the private sector, to help prepare for and respond to outbreaks.

- Responsible national authorities should ensure the integration of data into the human, animal and environmental sectors, by incorporating a "single health" approach as part of emergency response planning and national outbreak preparedness and response efforts. Decision makers should consider the risks of infectious diseases when developing policies and plans related to climate change, land use and urban planning.
- In three of the four critical categories, communication indicators were identified with an insufficient rating or "0" ("Health system" category) indicating the need for a better understanding and measurement - on a transparent basis of the state of national capacities regarding prevention, detection and rapid response to epidemic and pandemic threats.
- Decision-makers should take steps to build and maintain a robust public health workforce, which includes, but is not limited to, physicians, nurses, health care workers, epidemiologists, and other health care professionals that could play a major role in preventing, detecting, and responding to biological crises.
- The analysis also finds that knowledge of the risks is not enough. Political will is needed to protect people from the consequences of epidemics, to take measures to save lives and build a safer world. In this context, the capacity of the Republic of Moldova to effectively prevent, detect and respond to outbreaks of infectious diseases is significantly limited by a fairly broad national risk environment.
- Overall, the Global Health Security Index finds essential weaknesses in the state's ability to prevent, detect and respond to health emergencies; severe gaps in the health system; vulnerabilities to political, socio-economic risks that may undermine pandemic preparedness and response.
- Currently, there have already been selective changes in the health security system of the Republic of Moldova, especially regarding the creation of facilities for the isolation of patients with communicable diseases in a special unit, which were missing at the time of the COVID-19 pandemic. The changes also influenced the increase in the number of daily tests performed, the decrease in the number of infected medical staff, the development of the vaccination process, the choice of vaccine for the population, etc.

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Social networked cities: the portals

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Abstract

What is a "social network" ? It is a social structure made up of a set of social participants (such as people or organizations), sets of group ties, and other social interactions between those participants. The social network perspective provides a set of methods for analyzing the structure of the entire society as a whole as well as a variety of theories explaining the patterns observed in the interaction between individuals, independently of the space factor, if the individuals are in direct contact or they are communicating remotely, from different parts of the world, or even if they do know each other or not.

The extraordinary success of the online communication proves us that the development of the communication technology we have today have drastically changed the connection we can have with co-workers, friends or family members that are located in a different places, making possible an instant communication with people that are parted by great geographical distances: different cities, different countries, different continents.

This presentation comes with an innovative inter-connected communication network for public spaces that can rise a high level of interest from the local communities worldwide, connecting people from different cities with each other and bringing in the urban landscape a direct visual connection with another urban landscape through a virtual connected "window" ("portal") that opens up to the other side towards a different geographical location.

Based on the principles of the existing communication networks and the success of the live web-cams installed by the municipalities that allow people from all around the globe to watch the daily life of an urban location, this solution is very simple, easy to put into practice and with a great potential of improving the leisure time of the inhabitants of any smart city.

Keywords**:** *social connection, communication, live street view, virtual communication*.

1. Introduction

What is a "social network" ? It is a social structure made up of a set of social participants (such as people or organizations), sets of group ties, and other social interactions between those participants. The social network perspective provides a set of methods for analyzing the structure of the entire society as a whole as well as a variety of theories explaining the patterns observed in the interaction between individuals, independently of the space factor, if the individuals are in direct contact or they are communicating remotely, from different parts of the world, or even if they do know each other or not. [1]

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Based on the principles of the existing communication networks and the success of the live web-cams installed by the municipalities that allow people from all around the globe to watch the daily life of an urban location, this solution is very simple, easy to put into practice and with a great potential of improving the leisure time of the inhabitants of any smart city.

1.1. The impact of live web-cams in the world

The worldwide pandemic of Covid have secluded in the enclosed spaces of their homes for a considerable period of time a big majority of the world population, active or not. The lack of travel capability have brought grief, sorrow, the feeling of being bored or psychologically exhaustion to lots of people. As almost all activities have moved on the web, online, lots of people have fulfilled their need to see the world through the same platform.

The live feed web-cams installed in different parts of the world, in key points of different cities, watching a famous square, or monument, or iconic landmark exist before the pandemic times.

But now, those digital "windows" towards the far-away beloved landscapes have become more important and much more accessed.

Those 24-hours active cameras have been installed by the local public authorities, by private companies or by small groups of people and can be seen free of charge online.

Fig. 1. Live camera view of Trevi Fountain – Rome
Source: https://www.skylinewebcams.com/

For example on the Skyline Webcams platform we can find a very clear description from the beginning: "Live Cams from the most beautiful cities of the world" and the list of the web-cam locations accessible there is featuring a lot of "World Heritage" Categorized public landmarks as: Piazza San Marco - Venice, Rome: view of the Colosseum and the ruins of the Ludus Magnum, New York: view of 42nd Street, Madison Ave and the Hudson River from Grand Hyatt New York, Jerusalem: view over the Western Wall and Temple Mount from Simcha Hall at the Kotel, and the list continues with hundreds of live cams from all over the world. [2]

Fig. 2. Live camera view of Milan Cathedral, the Galleria and equestrian statue of Emanuele II
Source: https://www.skylinewebcams.com

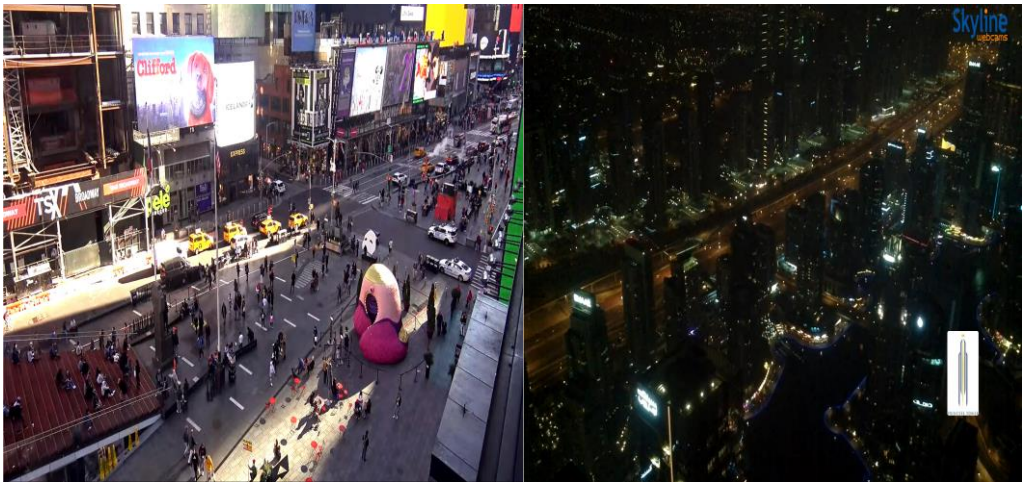

Fig. 3. (a) Live camera view of Times Square - New York; (b) Live camera view of Dubai Marina
Source: https://www.skylinewebcams.com

1.2. Google street view - interesting views

Google Street View is actually a display of interactive panoramas of stitched VR photographs. Most photography is done by car, but some is done by tricycle, boat, snowmobile, and underwater apparatus, as well as on foot.

As Google Street View system is a virtually created continuum, the elements that create this continuum - the street photos themselves are real, they were taken on the real world and sometimes the camera can capture the unexpected, the extraordinary, the unusual.

Observing a live feed of a street camera can be sometimes surprising, as public was astonished by the award winning photographer Michael Wolf, that captured the public's attention with his astonishing collection "*A series of unfortunate events"* as part of the exhibition "Print error / publishing in the digital age" proposed by Alessandro Ludovico, for the Jeu de Paume virtual space.

Fig. 4. Michael Wolf – A Series of Unfortunate Events
Source: https://slidetodoc.com/michael-wolf-a-series-of-unfortunate-events-michael/

Michael Wolf uses his photographic skills to capture pictures of daily life accidents or unusual urban life sights surprised by the camera systems of Google Street View, where city streets can be perceived in a digital and photographic continuum. He takes "pictures" cutting out meaningful and universal elements and perspectives, which become fully entitled "photographs." [3]

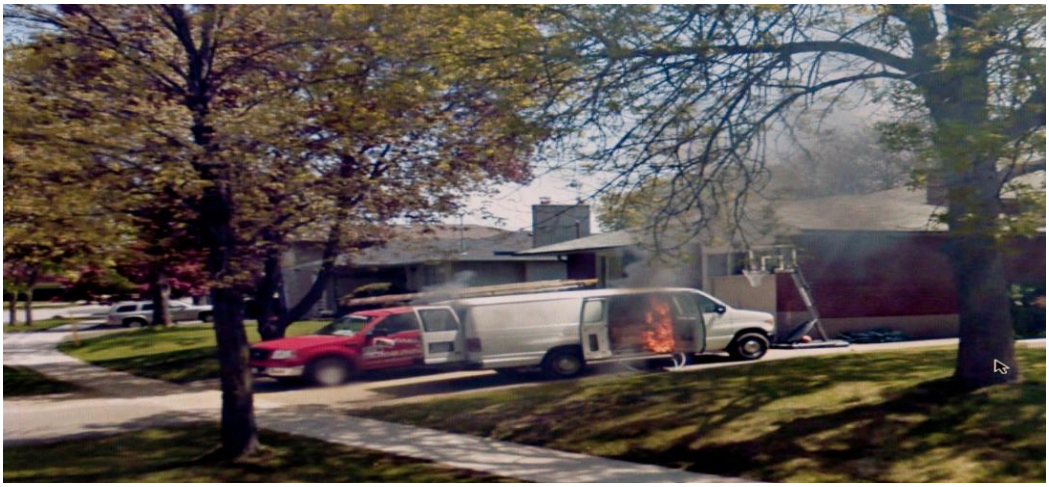

Fig. 5. Michael Wolf – A Series of Unfortunate Events
Source: https://www.cnet.com/pictures/unfortunate-views-of-google-street-view-photos/

There are lots of people that like to spend time wondering the streets of distant cities in a virtual way, using Google Street View in order to visit faraway places, especially in the last two years when the pandemic crisis have forced them to stay home or restrain from going abroad.

What I am proposing here is a much closer to reality experience, as our "portals" are using real live videos of real places with open access to the wide public.

2. The portals

The idea that will be presented in this presentation is very simple and probably very spectacular, a beautiful interactive input that will bring a new and intriguing element in the urban landscape and our cities inhabitants daily life.

We are imagining a network of big size screens that can be placed in a public place of big interest in one city, let's say city A that will show the live cam placed in a different city, let's say city B. On the top of this screen it is placed another live camera that transmits to the other "connected" screen on city B the live feed of the people and the background in front of the screen placed in city A.

It is actually a system similar with two persons making a live chat on their mobile phones where they can see each other, just in a much bigger scale, on a 24h continuous live feed where the people in one place can see through this "PORTAL" - a virtual window towards the other city.

Fig. 6. Portal between Grand Place de Bruxelles and Athenaeum Palace Bucharest location
Source: Photomontage by Monica Frangulea, photo inside the portal by Oana Blaga

2.1. What would attract us to the PORTAL?

The presence of such a portal in an urban location can be the reason of more interesting thing to happen: cultural events, open air exhibits or multimedia shows that can be watched by audiences in both cities live, in the same time!

In this case, the portals can facilitate an unprecedented cultural exchange with big impact for the cultural landscape of both sides of the portal.

The portal can also attract a large audience as we could see interesting things about the daily life of a far away place:

- How is the weather on the other city?
- How are the people dressed? What is the style and trends of the other place?
- What is the general mood of the people there? Are they happy? Are they sad?
- Are they busy? Do they look preoccupied? Do they look worried or they seem mostly relaxed?
- what are they eating or drinking on the street?

2.2. Positioning the PORTAL in the city

For a more immersive visual experience, the portals should be placed as close to the ground level as possible, giving the impression that the people could "walk through" and to enhance the impression that the people in front of the other portal are actually right in front of you.

This would also increase the strength of the main symbol that the portal network is representing: we are all living in the same world, we can be all connected, the people on the other side of the world are all equal with all of us, as citizens of the same planet.

People can go to watch the portal just to see random people from the other side but it can happen that in time people can start to get organized and arrange

through other communication systems to met in front of the portal in purpose: " I live in Bucharest and I have a family of friends in Brussels and we are going to meet in front of the portal, we are going to talk on the phone but we are going TO SEE EACH OTHER in real size!"

The question of recording also the sound is debatable, as it could create the phenomenon of noise pollution but this matter can be optional from case to case.

A more quiet location of one portal can be disturbed by a strong continuous noise of a busy urban area if the position of the connected portal is placed in an agglomerated place or even if there is a significant time zone difference between the two places and while on one side it is night time, more quiet, on the other side it can be rush hour daytime for example.

Another interesting fact is also that we can observe the architecture on the other side, as it would be best that the portals are placed in positions that would face famous landmarks, so the people from the other side of any portal can see an interesting, iconic part of the other city, a place that would be worth visiting if they would come in person to visit the city they are only watching through a digital screen.

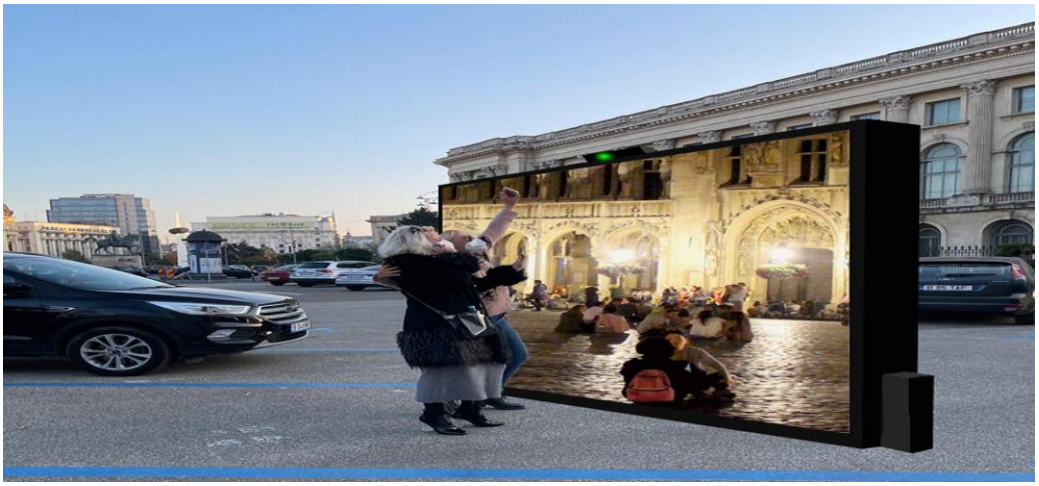

Fig. 7. Portal between Grand Place de Bruxelles and Athenaeum Palace Bucharest location
Source: Photomontage by Monica Frangulea, photo outside the portal by Oana Blaga

Then there is also the question *What city would we connect to ?*

There is a number of things we should take into consideration when we try to decide what city would we like to see on the other side of the portal we would install in our own city.

First of all, would we like to see a city of similar cultural background with ours, similar climate, similar race with our city inhabitants, or we would rather connect to a totally different place ?

An important matter is also the time difference between different cities in the world.

Two cities with a big time difference live-video connected through the portal would mean that while in one city it is daytime, in the other is night time and this would raise the problem of visibility of the image on the portal screen.

If in one city it is night time, a portal showing a daylight cityscape would be very visible and easy to observe. But the opposite can raise some difficulties, as during daytime a darker screen can be less visible. There is also the problem of the reflections of the city lights or sunlight on the screen surface itself, but this difficulty can be solved by using certain types of advanced technology screens, that we will be mentioning on our last chapter: "**The technology behind the PORTAL".**

Fig. 8. Portal between Grand Place de Bruxelles and Athenaeum Palace Bucharest location
Source: Photomontage by Monica Frangulea, photo outside the portal by Oana Blaga

So where would we place the portals ?

The possibilities are endless: what placed are we proud of in our city ? What would we like to show to the world ?

Where would we place a portal ? Here there are just a few suggestions:

- central squares
- places of historical relevance
- places of cultural or technological relevance
- places of industrial relevance
- green areas, parks
- places of economical importance - financial district,
- important natural landmarks - river side, beach front, places where you could see the city from a high observation point
- places where the portal can be visible for a big number of people: Amphitheater shaped urban areas, a square at the bottom of an urban stair or a descending road
- places of industrial relevance

Fig. 9. Portal placed Kungsträdgården - Stockholm connected with South Beach – Miami
Source: Photomontage by Monica Frangulea, photo outside the portal – Alamy

Another matter we would like to address is what type of location from one city would be interesting to connect with another city and what location in the other city should be picked ? In other words, would we connect similar places or different ones? Would we connect a park portal with a central square portal? Or a central square one with a beech front portal as in the image (Fig.9.)?

And then there can be also a big difference of ambience temperature, a different season, for example a portal in Australia would show summer time to a portal in Europe where it would be winter time.

Those details are quite important and it would be interesting how the public would react to different connection scenarios of the portals. Of course, there can be placed multiple portals in one city, connected to different portals in different cities, giving the urban dwellers the possibility of choice and opening to a diversity of places, cultures and landscapes.

3. Big video screens in the world - examples

The first example we would like to present is the **Berkeley Art Museum and Pacific Film Archive (BAMPFA)** Designed by Diller Scofidio + Renfro and opened in 2016 where a massive LED screen has been installed on the building's exterior for outdoor screenings. [4]

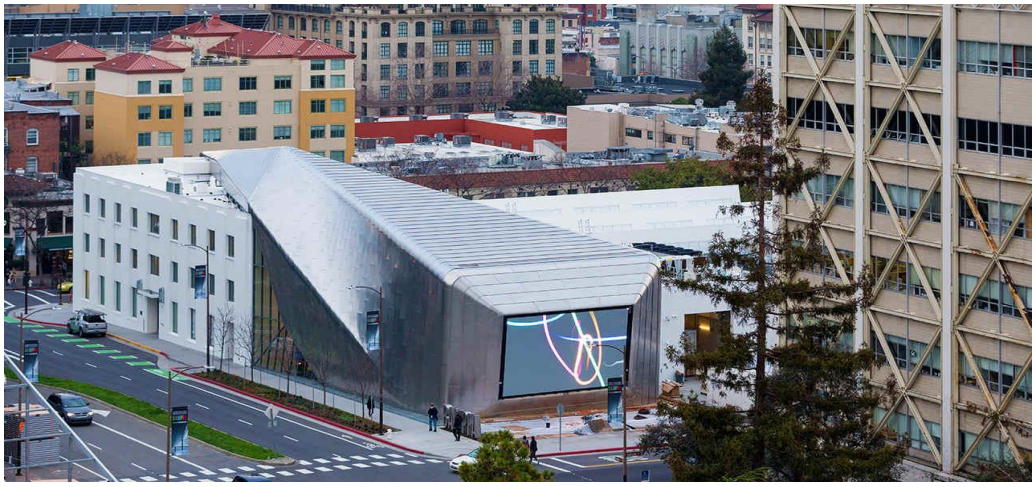

Fig. 10. Berkeley Art Museum and Pacific Film Archiver with massive exterior LED screen
Source: https://www.visitcalifornia.com/uk/attraction/bampfa

In February 2019, two cameras were installed on the second balcony of the Campanlle building in Berkley where a peregrine falcon pair had their nest, so people can watch the peregrines all day, every day.

To share the hatching of the eggs and the new chicks' arrival with the community, the UC Berkeley Art Museum and Pacific Film Archive (BAMPFA) put the livestream video from the nest box on their big screen from 8 a.m. to 6 p.m. on April 25.

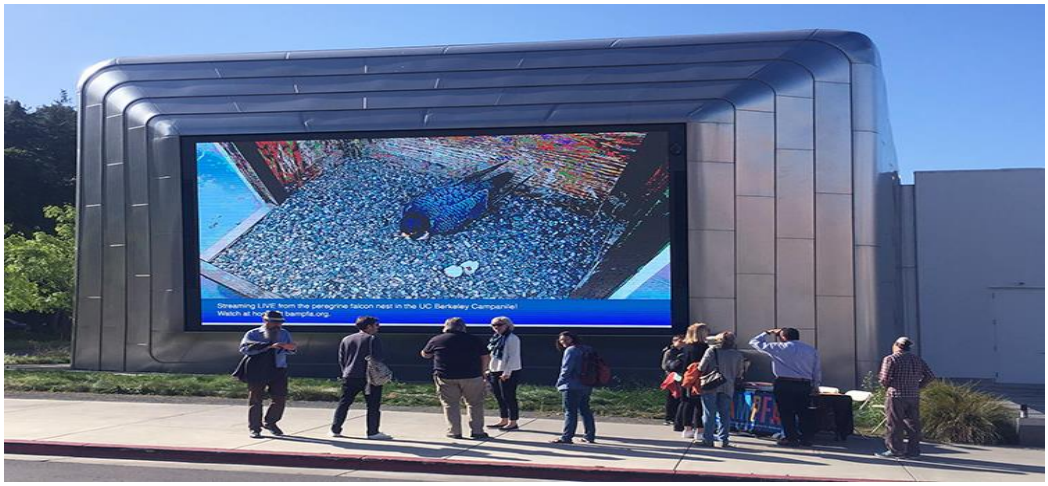

Fig. 11. Berkeley Art Museum and Pacific Film Archiver exterior LED screen
Source: https://news.berkeley.edu/2019/04/26/falcon-chicks-make-their-big-screen-debut/

More than 500 people — and several reporters — stopped by throughout the day to watch the new family and ask questions of the peregrine experts who were stationed outside.[5]

Another interesting example is the impressive LED screen placed in the heart of Milan's shopping district this year in the spring to display the Digital Milan Fashion Week runway shows.

Milan Fashion Week was unfolding entirely on computer screens and social media platforms this round for the first time ever, as the persistent virus resurgence dashed any hopes of even a handful of physical shows.[6]

Fig. 12. LED screen streaming a Prada fashion live show during Milan's fashion week in Milan, Italy, 2021
Source: AP Photo/Antonio Calanni

Fig. 13. LED screen streaming a Fendi fashion live show during Milan's fashion week in Milan, Italy, 2021
Source: AP Photo/Antonio Calanni

Milan Fashion Week, one of the world's leading fashion events, was able to greet fashion enthusiasts thanks to super-sized digital signage from Samsung Electronics installed also on the Duomo Cathedral in Milan, Italy.

Fig. 14. Super-sized digital signage from Samsung Electronics installed at the Duomo Cathedral in Milan, Italy-January 2021.
Source: http://koreabizwire.com/samsung-led-signage-airs-milan-fashion-weeks-digital-runaway-show/164957

With the 103-square-meter display, Samsung LED signage supports the industry's highest level of 9,000 nits of brightness — technological prowess not interrupted by Italy's famously abundant sunlight — providing a vivid image from the event online. [7]

Fig. 15. Super-sized digital signage from Samsung Electronics installed at the Duomo Cathedral in Milan, Italy-January 2021.
Source: http://koreabizwire.com/samsung-led-signage-airs-milan-fashion-weeks-digital-runaway-show/164957

4. The technology behind the PORTAL

As we saw at the previous example of the big screens transmitting the live fashion shows at Milano Fashion Week this year, the technology for THE PORTALS already exists.

SAMSUNG has created for example as a solution THE WALL screen family with MicroLED that can solve such a request.

MicroLED technology transfers micrometer-scale LEDs into LED modules, resulting in what resembles wall tiles comprised of mass-transferred clusters of almost microscopic lights. Mounted together as a uniform canvas and plugged in, they create a visual experience similar to what you get with premium QLED TVs.

The modular design allows to form any dimension of street portal-size screen.

The Wall's microLED technology possesses inherent color qualities, with two times superior color purity and a wider color gamut than conventional LED displays, that produce vibrant-yet-natural colors for a one-of-a-kind experience.

Robust durability against everyday impacts with shock-resistant technology, plus superior energy efficiency, results in reliable performance with long-lasting quality.

An exceptionally black base plus **ultra-low reflection** black technology deliver pure black for unparalleled contrast and detail.[8]

Fig. 16. Samsung's The Wall
Source:https://www.cnet.com/tech/home-entertainment/samsung-microled-makes-massive-modular-tv-a-reality/

We will conclude this presentation with the question: how much of an impact can have such a PORTAL in our city ?

Our city inhabitants would have a window in the middle of a familiar urban landscape where they can peek thru and see a totally different place. Would they like it? Would they be attracted to visit and take a look at what the portal is showing to them? Would they feel that their city has changed just by "touching" another city?

Technology is the major change that the future will bring us. That will impact the most. Our lives, our invironment.

As Scott McQuire is telling us in his *Geomedia: Networked Cities and the Future of Public Space*: "Alteration of the 'place' that media technologies occupy in the city means that experience of both media and urban space becomes subject to new dynamics. Diverse and often contradictory tendencies are being played out simultaneously, underlining the fact that current transformations are both profound and uncertain in their ends." [9]

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Gestionarea durabilă a pădurilor urbane în orașele inteligente

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Abstract

Dezvoltarea oraşelor inteligente face parte dintr-o serie de obiective de dezvoltare durabilă centrate pe bunăstare economică, socială, culturală,, iar unul dintre domeniile definitorii pentru evaluarea calităţii vieţii îl reprezintă modul în care sunt gestionate spaţiile publice verzi, implicit pădurile urbane.

Ca principiu, tranziţia la oraşele inteligente nu înseamnă renunţarea la toată dezvoltarea existentă şi înfiinţarea unor oraşe noi, după tipare noi, standardizate, ci dimpotrivă. Acest proces trebuie centrat pe contextul şi ecosistemele actuale. Prin concepte şi tehnologii noi, oraşele inteligente trebuie să restabilească echilibrul natural primordial, iar spaţiile verzi să fie adaptate circumstanţelor actuale şi astfel să contribuie la atenuarea schimbărilor climatice resimţite la nivel global.

Din această perspectivă, în România, tranziţia către oraşele inteligente trebuie să pornească de la presiunile cu care se confruntă mediile urbane, în special Capitala, în special la carenţa spaţiilor verzi, amplasarea, tipologia, starea şi managementul acestora.

Tema este deosebit de vastă, astfel că studiul curent reprezintă un preambul al unei serii de studii întreprinse având ca obiectiv final restabilirea echilibrului natural şi conservarea biodiversităţii din mediul urban.

Cercetarea are în vedere identificarea principalelor deficienţe ale modului în care au fost create şi gestionate spaţiile verzi din Bucureşti şi elaborarea

direcțiilor prioritare pe care autoritățile trebuie să le impună pentru dezvoltarea pădurilor urbane și gestionarea durabilă a acestora.
Rezultatele preliminare indică faptul că elementele antropice au fost dezvoltate pe seama scăderii întinderii și calității elementelor naturale, în special în anii în care dezvoltarea imobiliară și comercială a fost orientată spre centrul orașului. Mai mult, în demersurile efectuate cu privire la spațiile publice verzi, multe dintre speciile folosite nu (mai) sunt adaptate condițiilor climatice și urbane actuale.
Lucrarea se adresează autorităților locale, agenților economici, cercetătorilor și publicului larg, fiecare dintre aceștia având un rol important în crearea și gestionarea durabilă a pădurilor urbane românești.

Cuvinte cheie**:** *dezvoltare durabilă, calitatea vieții, împădurire, specii adecvate*.

1. Introducere

În ultimele decenii, orașele lumii au devenit din ce în ce mai aglomerate și poluate, ca urmare a creșterii exponențiale a populației din mediul urban. Rezidenții acestor zone au depășit populația din mediul rural începând cu 2007, ajungând, în 2018, la 55% din populația globală, iar tendința de creștere este relativ constantă. Potrivit estimărilor Națiunilor Unite, pentru anul 2050 se preconizează că populația urbană va reprezenta 68% din totalul locuitorilor. (United Nations, 2019).

În orașele aflate în plină expansiune, oferta spațiului verde urban este adesea în conflict cu creșterea cererii de locuințe (Erlwein and Pauleit, 2021). În orizontul previziunilor privind continuarea urbanizării - creșterea spațiului locativ și evoluția schimbărilor climatice - este recunoscută nevoia de renaturalizare a orașelor prin reconectarea acestora la biosferă și intensificarea spațiilor urbane verzi. Acestea devin cele mai la îndemână soluții pentru reducerea stresului termic, îmbunătățirea climatului urban și reducerea dezechilibrelor actuale din mediile urbane, în contextul tranziției către orașele inteligente. Orașul inteligent este un concept în curs de dezvoltare care urmărește atenuarea provocărilor dezvoltării continue a urbanizării și a impactului schimbărilor climatice în orașe. Proiectele de orașe inteligente întreprinse de guverne și de factorii de decizie au în vedere durabilitatea energetică urbană și tranziția la emisii scăzute de carbon (Zhang and Li, 2020), adaptarea la schimbările climatice prin crearea spațiilor verzi și albastre din orașe (European Commission, 2016), reducerea radiațiilor provocate de undele scurte prin intermediul arborilor (Erell, 2017), îmbunătățirea confortului termic uman în aer liber (Bowler et al., 2010) și multe alte obiective care țintesc creșterea calității vieții din mediul urban.

Chiar dacă spațiile verzi sunt promovate ca soluții bazate pe natură pentru îmbunătățirea climatului urban inteligent, specialiștii prevăd faptul că schimbările climatice vor influența calitatea spațiilor verzi, accentuând concurența dintre diferitele specii de arbori și afectând viabilitatea biologică și economică a mai multor populații de arbori (Hanewinkel et al., 2012). Se așteaptă ca aceste schimbări climatice să influențeze semnificativ structura pe specii a pădurilor și să afecteze, totodată, atât funcționarea ecosistemelor forestiere, cât și serviciile ecosistemice pe care acestea le-ar putea oferi omenirii (Lindner et al., 2014).

Într-un astfel de context, trebuie menţionat că, până la apariţia conceptului de oraş inteligent, în majoritatea studiilor, spaţiile verzi au fost tratate doar ca parametri cantitativi, mergându-se pe premisa că numai extinderea suprafeţei spaţiilor verzi poate îmbunătăţi calitatea vieţii din mediul urban. Mai mult, este o reală lipsă de studii care să aibă în vedere interacţiunea dintre creşterea densităţii urbane şi calitatea spaţiilor verzi existente (Haaland and Bosch, 2015), în vederea efectuării unei planificări riguroase care să facă faţă cererii crescute de locuinţe noi şi nevoii populaţiei pentru un mediu curat.

Privind din această perspectivă, studiile recente, care au în vedere impactul densificării asupra climatului din mediul urban, sugerează că, printr-o abordare holistică, oraşele inteligente pot miza şi pe alte soluţii complementare, care să ridice presiunea exercitată asupra mediului înconjurător şi asupra calităţii vieţii locuitorilor din marile aglomerări urbane. Astfel, realizarea noilor construcţii, în înălţime, concomitent cu sporirea spaţiilor verzi, ar putea oferi un confort termic mult sporit pietonilor (Lee et al., 2020), conducând la o temperatură mai scăzută a aerului în timpul zilei şi la o temperatură mai ridicată a aerului pe timp de noapte (Jamei et al., 2016). Potrivit lui Ali-Toudert and Mayer (2006), „străzile largi, orientate E–V, sunt mai predispuse la disconfort termic decât canioanele străzilor înguste şi orientate N–S, datorită timpilor mai lungi de expunere la soare", caz în care „vegetaţia joacă un rol important" (Sanusi et al., 2016). Potrivit lui Zölch şi colaboratorilor săi (2016) „calităţile ecologizării urbane şi amplasarea arborilor stradali au o influenţă decisivă asupra confortului termic exterior". Coroanele dense, foliate ale copacilor reduc transmisivitatea radiaţiei solare directe la 1%–5% (Konarska et al., 2016), reducând temperatura echivalentă fizică (PET) direct sub coroana copacului cu până la 16°C (Lee et al., 2020). Rezultatele altor studii indică faptul că anumite specii de stejar (Quercus petraea, Quercus pubescens etc.) şi de pin (Pinus nigra), mai tolerante la secetă, îşi pot extinde arealul în Europa, la altitudini mai mari, în detrimentul altor specii de foioase, cum ar fi fagul (Fagus sylvatica), paltinul de munte (Acer pseudoplatanus), ulmul de munte (Ulmus glabra), teiul cu frunza mare (Tilia platyphyllos) sau chiar de răşinoase, cum ar fi bradul (Abies alba) sau chiar extrem de răspânditul molid (Picea abies).

Având în vedere toate aceste elemente, prin acest studiu se realizează o analiză asupra modului în care s-a extins cel mai mare oraş din România – Municipiul Bucureşti, maniera în care au fost create şi gestionate spaţiile verzi şi care au fost speciile folosite, în încercarea de a identifica principalele deficienţe cu privire la întinderea şi calitatea elementelor naturale. În acest scop, studiul realizează şi o analiză asupra planurilor de urbanism, pentru a desprinde principalele concluzii cu privire la măsurile concrete care au fost prevăzute pentru crearea pădurilor urbane şi gestionarea durabilă a acestora.

2. Zona de studiu

Bucureştiul se află în sud-estul României (44º24′49″N, 26º5′48″E), în Câmpia Vlăsiei, parte a Câmpiei Române, având o formă circulară în suprafaţă de 228 km^2. Populaţia depăşeşte oficial 2 (două) milioane de locuitori, însă, potrivit estimărilor

informale, populaţia fără domiciliu sau în tranzit este peste 3 milioane, cu probabilitatea de a se depăşi chiar 4 milioane de locuitori. Clima este temperat-continentală cu ierni blânde (temperatura medie de -2,9°C) şi veri caniculare (cu o temperatură medie de 22,8°C). Volumul precipitaţiilor este, de asemenea, moderat, în jurul valorilor de 500–600 mm anual. Densitatea populaţiei este 7.933,2 loc./km^2 în 2019, ocupând al doilea loc în rândul capitalelor Europene, după Paris (Fig. 1).

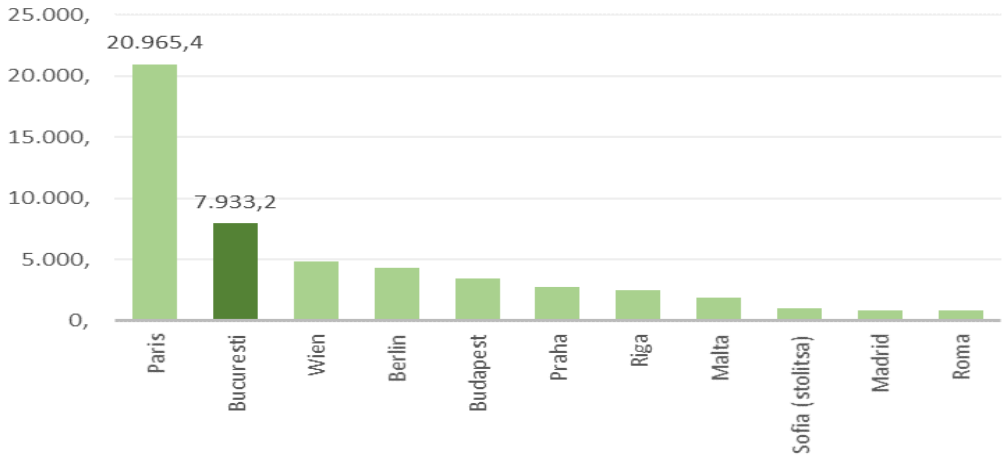

Fig. 1. Densitatea populaţiei în capitalele UE
Sursa: Prelucrarea autorilor în baza datelor Eurostat [DEMO_R_D3DENS]

În general, cartierele din sud au avut o densitate mai mare faţă de cele din nord, cauza derivând din perioada comunistă, când au fost construite blocuri de locuinţe aglomerate. Acestea au preluat o mare parte a populaţiei din afara capitalei, venită în Bucureşti pentru un loc de muncă, ori pentru studii. Zona periferică a capitalei, deşi are construcţii joase (1-2 etaje), suprafeţe verzi, o umiditate mai ridicată şi aer curat, este expusă vântului, valurilor de căldură şi la geruri. Strategia locală prevede trei inele de circulaţie: inelul principal, inelul median şi inelul exterior. Inelul central delimitează centrul Capitalei de cartierele rezidenţiale. În ultimele trei decenii, spaţiul din interiorul inelului central a fost ocupat de construcţii foarte înalte – clădiri de afaceri şi diverse instituţii, deşi zona este expusă riscului de cutremur. Şi între inelul central şi cel median, în special în zona de nord şi cea de est, au fost construite o sedie de clădiri de birouri foarte înalte. Cea mai înaltă clădire din ţară este Sky Tower, cu o înălţime de 137 de metri. Chiar dacă oraşele inteligente au în vedere clădiri înalte, pentru reducerea temperaturii la sol, acest aspect este mai puţin posibil de atins în Bucureşti, ca urmare a undei seismice, fapt care determină mulţi arhitecţi să se orienteze cu dezvoltarea imobiliară pe orizontală. Ca urmare a retrocedării terenurilor, multe din parcurile şi grădinile capitalei (IOR, Tineretului, Brâncuşi etc.) au fost ocupate de parcări, clădiri sau chiar terenuri pe care urmează să se construiască (Fig. 2).

Fig. 2. Stânga: imagine din satelit, Parcul Brâncuşi retrocedat;
Dreapta: partea de est a Parcului IOR, retrocedată.
Sursa: Prelucrarea autorilor în baza datelor

Foarte multe imobile vechi – case singulare sau blocuri din perioada interbelică sub zece apartamente – au fost vândute, ulterior demolate şi transformate în ansambluri imobiliare, conţinând sute de apartamente sau chiar clădiri de birouri. Inclusiv terenurile virane au fost ocupate de clădiri înalte (Asmita Gardens), cum, de altfel, fostele întreprinderi socialiste, în special din zona de nord, au fost transformate în ansambluri rezidenţiale sau clădiri de birouri. Toate aceste aspecte au făcut ca mulţi arhitecţi să considere Bucureştiul a fi un kitsch urban. Peste 30% din forţa de muncă a Capitalei a fost concentrată în clădirile de birouri recent construite în partea de nord, în timp ce infrastructura rutieră şi reţeaua de metrou, din această parte a capitalei, a rămas la nivelul anilor 1980. Toate aceste elemente de natură imobiliară au aglomerat metropola, cele mai multe situaţii fiind realizate în detrimentul spaţiilor verzi (Fig. 3).

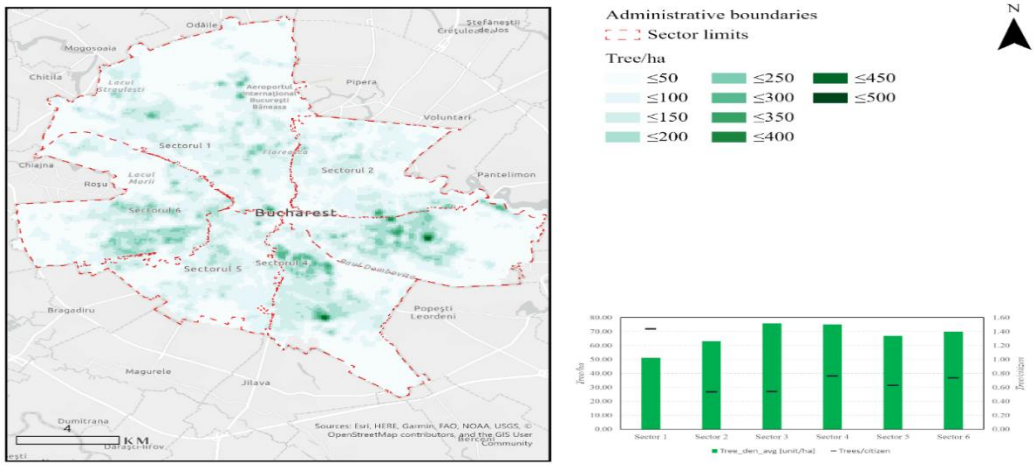

Fig. 3. Numărul de arbori la hectar – Bucureşti, 2021
Sursa: Prelucrarea proprie a autorilor

Potrivit Planului Urbanistic General al Municipiul Bucureşti se recomandă, din considerente ecologice şi de economisire a cheltuielilor de întreţinere de la buget, utilizarea speciilor locale adaptate condiţiilor climatice şi favorabile faunei antropofile specifice, cu excepţia segmentelor decorative cu caracter special din spaţiile publice cu acces nelimitat (parcuri, grădini etc.) şi cele de folosinţă specializată (grădini botanice, zoologice etc.). Cu toate acestea, în puţinele preocupări identificate în Sectorul 3, privind crearea pădurilor urbane, se remarcă popularea cu specii puţin adecvate condiţiilor climatice specifice, în schimbare.

Fig. 4. Stânga: plantaţii de chiparos de baltă; Dreapta: Plantaţii de mesteceni argintii.
Sursa: Prelucrarea proprie a autorilor

Cu privire la administrarea spaţiilor verzi din spaţiul intravilan al localităţilor din România, există Art.16 din Legea nr. 24/2007, completată prin Legea 313/2009, potrivit căreia autorităţile locale au obligaţia de a înfiinţa registre ale spaţiilor verzi, care trebuie să fie actualizare ori de câte ori intervin modificări. Acest registru a fost finalizat în anul 2011 fiind publicat pe pagina de internet a Primăriei Municipiului

Bucureşti, nefiind însă niciodată aprobat printr-o hotărâre a Consiliului General al Municipiului Bucureşti, fiind contestat de Curtea de Conturi, în 2014. Astfel, gestionarea spaţiilor verzi din Bucureşti este supusă OUG nr. 195/2005, iar Art.71 alin.(1) prevede interzicerea schimbării destinaţiei terenurilor amenajate ca spaţii verzi, reducerea suprafeţelor acestora ori strămutarea lor.

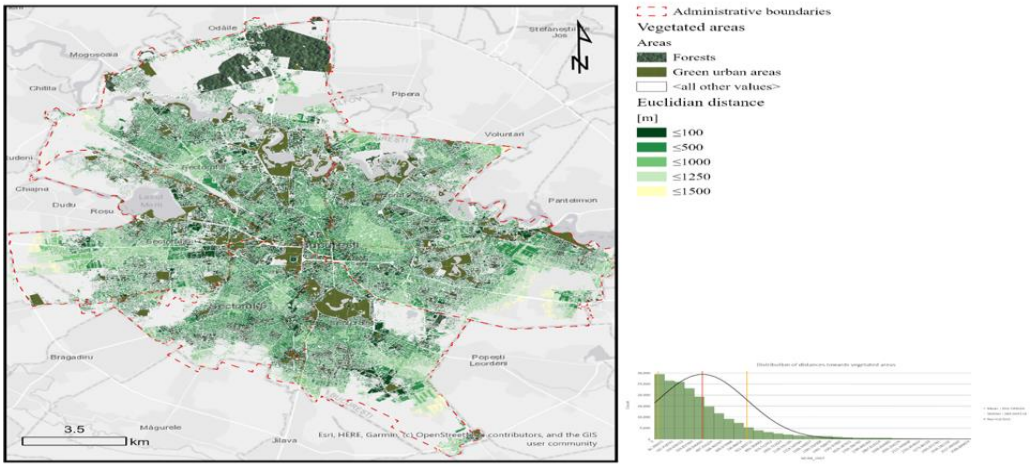

Fig. 5. Spaţiile verzi din Bucureşti, 2021
Sursa: Prelucrarea proprie a autorilor

Cu toate acestea, potrivit Curţii de Conturi, datele publicate de Primăria Municipiului Bucureşti în anul 2011 indicau un spaţiu verde de peste 20 mp/locuitor pentru că în Registru au fost incluse, atât Pădurea Băneasa, cât şi o serie de spaţii verzi private, deţinute de persoane fizice ori de către persoane juridice (Fig. 5). În realitate, suprafaţa verde nu depăşeşte 9 mp/locuitor, faţă de target-ul asumat privind atingerea de 26 mp/locuitor, potrivit normelor UE, până în 2013.

3. Metodologie

Capitala României este zona urbană cea mai aglomerată din România (Fig. 6).

Suprafaţa locuibilă a crescut în ultimii treizeci de ani cu peste 60% în Bucureşti. Densificarea este accentuată de populaţia care a migrat către Capitală pentru găsirea unui loc de muncă sau pentru studii. Aşa cum reiese din Fig. 7, spaţiul locativ din Bucureşti reprezintă peste 17% din totalul spaţiului locativ urban românesc, în condiţiile în care suprafaţa totală a Bucureştiului nu depăşeşte 230 km^2.

Fig. 6. Densitatea populației, 2020
Sursa: Prelucrarea proprie a autorilor în baza datelor INSSE [DEMO_R_D3DENS]

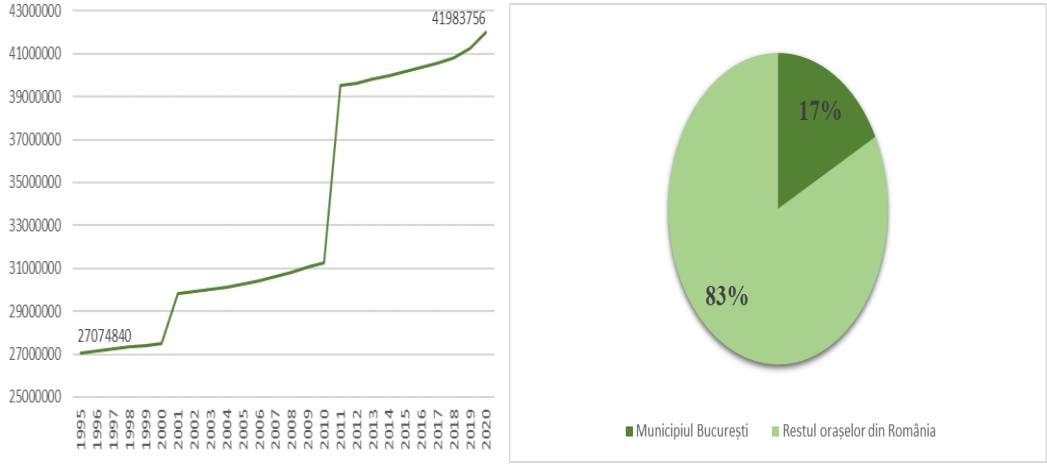

Fig. 7. Stânga: Creşterea spaţiului locativ din Bucureşti, 1990-2020;
Dreapta: Ponderea spaţiului locativ din Bucureşti din totalul spaţiului locativ urban românesc
Sursa: Prelucrarea proprie a autorilor în baza datelor INSSE [LOC103A]

Pentru a obţine suficiente informaţii despre politica actuală de planificare urbană şi de gestionare a spaţiilor verzi din Bucureşti şi pentru a dezvolta scenarii realiste cu privire la ritmul densificării, am investigat planurile de urbanism local care au intrat în vigoare în ultimii ani. Recent, au fost constatate o serie de nelegalităţi în privinţa PUZ-urilor de sector – fiind atacate în instanţă pentru suspendarea efectelor, urbanismul practicat în Bucureşti, în ultimii 15 ani, cauzând creşterea densificării, aglomerarea traficului şi pierderea spaţiilor verzi. Din acest punct de vedere, potrivit ultimelor declaraţii venite din partea Primăriei Municipiului Bucureşti, planurile de urbanism zonal vor fi înlocuite cu un plan urbanistic general.

În încercarea de a stabili corelaţii între dinamica spaţiului verde şi cea a spaţiului locativ din Bucureşti, am fost preocupaţi pentru găsirea datelor statistice. În niciuna din bazele de date disponibile nu au fost găsite aceste informaţii. În statisticile INSSE nu există aceste date, nici în categoriile specifice, nici la obiectivele de dezvoltare durabilă (O11 şi O15).

Harta interactivă a spaţiilor verzi de la nivelul UE este inactivă (https://www.eea.europa.eu/themes/sustainability-transitions/urban-environment/urban-green-infrastructure/urban-green-infrastructure-1), singurele date disponibile cu privire la spaţiile verzi limitându-se la procente din total suprafaţă şi la anul 2012. Mai mult, în adâncirea căutării datelor statistice, au fost găsite informaţii la nivel global, pentru intervalul 2000-2014, (https://data.world/unhabitat-guo/7babf915-12a0-4ceb-ad9c-7ee24b776614), raport în care România nu figurează cu date raportate. Prin urmare, studiul nostru s-a bazat pe evoluţia spaţiului locativ, aşa cum a fost publicată la INSSE, şi pe evoluţia spaţiilor verzi, informaţii preluate din Raportul Curţii de Conturi.

4. Rezultate

În încercarea de a stabili corelaţii între dinamica spaţiului verde şi cea a spaţiului locativ din Bucureşti, am preluat datele din Tabel 1 în aplicaţia Eviews12.

Tabel 1. Evoluţia suprafeţei locuite şi a spaţiilor verzi

Anul	Suprafaţa locuită	Spaţii verzi (inclusiv lacuri)
2007	30.614.459,00	3.262,30
2008	30.818.183,00	3.001,90
2009	31.043.116,00	2.921,30
2010	31.244.573,00	2.962,90
2011	39.503.057,00	2.108,60
2012	39.629.542,00	2.062,70
2013	39.818.252,00	2.062,70
2014	39.980.844,00	2.081,80

Sursa: Prelucrarea autorilor în baza datelor preluate de la INSSE [LOC103A] şi Raportul Curţii de Conturi tabelul de la pag.29 (SINTEZA Rapoartelor de auditul performanţei utilizării fondurilor bugetului local pentru amenajări peisagistice şi întreţinere spaţii verzi la nivelul Municipiului Bucureşti, în perioada 2007–2014 disponibil la https://www.curteadeconturi.ro/uploads/483e5daa/808f6c90/b3a17224/8a208e63/ 3c6c13a2/51b0862f/cddc744f/e37f4a24/sinteza_peisagistica_14-12-2015.pdf)

S-a testat astfel natura seriilor din tabelul precedent. Sub rezerva numărului mic de înregistrări, rezultatele sugerează o structură de tip I (1) pentru cele două serii analizate. În continuare, au fost calculaţi coeficienţii de corelaţie lineară între aceste variabile calculate în prima diferenţă. Rezultatul corelării acestor indicatori se regăseşte în Fig. 8.

Covariance Analysis: Ordinary
Date: 12/04/21 Time: 13:46
Sample: 2008 2014
Included observations: 7
Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	D(GREEN_...	D(SQM)
D(GREEN_HA)	1.000000 ----- -----	
D(SQM)	-0.949666 -6.778667 0.0011	1.000000 ----- -----

Fig. 8. Corelaţii între variabile, 2007-2014
Sursa: Prelucrarea proprie a autorilor în EViews12 în baza datelor din Tabel 1

Se remarcă aşadar existenţa unei legături indirecte, de intensitate înaltă, între dinamica suprafaţei ocupate de spaţiile verzi din Bucureşti şi cea a suprafeţei locuibile. Acest aspect este confirmat şi de t-statistic şi de probabilitatea ataşată ipotezei.

Ecuaţia de regresie rezultată, este următoarea:

$$d(GREEN\_HA)_{it} = -35,26 - 0,0992_i \cdot d(sqm)_{it} + u_{it}$$

Se constată că parametrii ecuaţiei sunt negativi, aspect care confirmă ipoteza potrivit căreia, cu cât spaţiul locativ a crescut, cu atât suprafaţa ocupată de spaţiile verzi a scăzut. În analiza curentă, coeficientul de determinaţie (R^2 - ponderea rolului factorilor determinanţi din model în raport cu variaţia totală a variabilei efect) este de 90.18%, ceea ce înseamnă că 90.18% din variaţia faţă de medie a suprafeţei spaţiilor verzi poate fi explicată de model. Acest lucru demonstrează faptul că suprafaţa locuită a sporit în detrimentul spaţiilor verzi şi confirmă concluziile Curţii de Conturi.

Este îngrijorător că, deşi există obiective de dezvoltare durabilă asumate în acest sens, maniera de gestionare a spaţiilor verzi a fost contrară acestora şi în dezacord cu prevederile legale care interzic schimbarea destinaţiei spaţiilor verzi.

5. Discuţii

Multe oraşe, cum ar fi Varşovia sau Viena, posedă suprafeţe împădurite semnificative (Fig. 9), dar acestea se află în principal la periferie şi pot fi foste moşii de vânătoare regale sau aristocratice, cu o lungă perioadă de gestionare şi utilizare pe care oamenii le folosesc intens pentru toate tipurile de recreere (Bell, Blom et al. 2005). Cele mai multe suprafeţe verzi din marile capitale care nu se situează în topul celor mai împădurite metropole sunt arii special create care necesită îngrijire specifică şi adaptabilitate la condiţiile climatice actuale, în schimbare. Pentru a preîntâmpina apariţia efectelor catastrofale, menţinerea sănătoasă a acestor spaţii verzi se poate realiza doar prin prisma principiilor de gestionare durabilă.

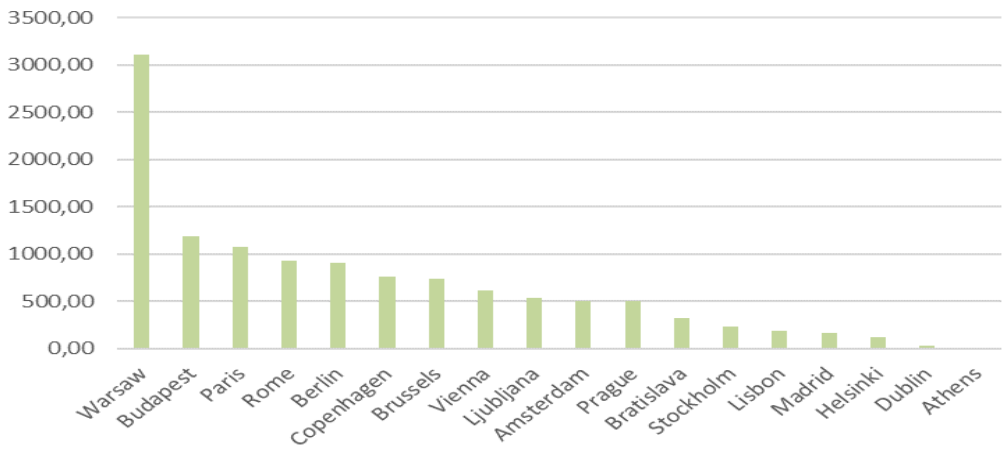

Fig. 9. Cele mai împădurite capitale din UE
Sursa: Prelucrarea proprie a autorilor în baza datelor preluate de pe https://data.world/unhabitat-guo/7babf915-12a0-4ceb-ad9c-7ee24b776614

Durabilitatea pădurilor urbane este definită de menţinerea vegetaţiei sănătoase şi funcţionale şi a sistemelor asociate care oferă beneficii pe termen lung dorite de comunitate (Dwyer and Nowak 2003). Însă, interacţiunile rezidenţilor din metropole cu ecosistemele urbane nu sunt întotdeauna pozitive, iar o analiză reală a beneficiilor va trebui să pună în balanţă efectele negative cu cele pozitive ale deciziilor care influenţează bunăstarea populaţiei umane, atât pe termen scurt, cât şi pe termen lung (Lyytimäki, 2015).

Aşa cum reiese din analiza întreprinsă mai sus, în Municipiul Bucureşti antropicul a cucerit natura, impactul factorului decident, prin nerespectarea obligaţiilor de dezvoltare durabilă asumate şi a legislaţiei locale adoptate, fiind vădit demonstrat. La această situaţie se adaugă densificarea şi creşterea parcului auto, împreună contribuind la creşterea temperaturii medii anuale din metropolă. Potrivit statisticilor disponibile pentru anii 1901-2016 (perioadă pentru care au fost găsite date oficiale şi complete), s-a observat creşterea temperaturilor medii anuale cu 0,6 grade Celsius, în ultimii 100 de ani, anii devenind din ce în ce mai călduroşi, accentuându-se simţitor în ultimul deceniu

Se observă, de asemenea, diminuarea cantităţii de zăpadă, iarna, şi creşterea numărului de zile caniculare, vara, cu temperaturi neobişnuit de mari, inclusiv toamna. Trebuie menţionat faptul că ploile torenţiale s-au intensificat, afectând sănătatea spaţiilor verzi rămase. Apa în exces rămâne printre arbori, iar căldura din timpul verii transformă apa în vapori fierbinţi care pârjolesc coronamentele favorizând apariţia bolilor şi a dăunătorilor (castanii şi teii din zona Kiseleff).

Având în vedere întreaga situaţie, pentru reducerea temperaturii la sol, în Bucureşti nu se poate pune problema dezvoltării imobiliare pe verticală, ca urmare a riscului seismic, efectele catastrofale fiind deja pe deplin resimţite în anii ‘30 şi 1977. În acest sens, pentru redresarea situaţiei actuale, extinderea ştiinţifică a spaţiilor verzi poate juca un rol de ameliorare a efectelor negative ca urmare a

excesului de urbanizare prin densificare. Astfel, prin o serie de funcţionalităţi specifice, care pot fi traduse economic prin folosirea conceptului de servicii ecosistemice, speciile arboricole pot fi integrate strategic în procesul de luare a deciziilor. În lipsa unei formule universale care ar putea ajuta administraţia publică în procesul de luare a deciziilor referitoare la gestionarea şi dezvoltarea spaţiilor verzi, este necesară dezvoltarea de indicatori şi metode de analiză care să justifice o anumită structură a acestora. În acest context, nu este exclusă nici aclimatizarea controlată a anumitor specii de arbori, astfel încât prin reconstrucţia vegetaţiei forestiere şi conservarea biodiversităţii din mediul urban bucureştean să fie o posibilă soluţie pentru reducerea efectelor schimbărilor climatice, iar ecosistemele forestiere să nu fie perturbate şi să îşi poată perpetua speciile ce îl compun, în integralitatea lor.

Un aspect deloc de neglijat se referă la trăsăturile morfologice foliare ale speciilor de arbori, interceptarea şi retenţia poluanţilor fiind influenţată de concentraţia poluanţilor din atmosferă (care oferă probabilitatea statistică de interceptare a indicatorilor), condiţiile meteorologice locale (care controlează viteza particulelor în aer) şi de trăsăturile funcţionale ale vegetaţiei (capacitatea epidermei de a reţine şi transporta poluanţii şi capacitatea de transfer stomatal) (Grote et al., 2016). Mai mult, capacitatea arborilor de a intercepta precipitaţii, a reţine cantităţi de apă şi a favoriza evaporarea înainte ca apa pluvială să devină un vector de eroziune este determinată de factori precum intensitatea şi durata precipitaţiilor, condiţiile climatice locale (intensitatea solară, temperatura, viteza vântului, umiditatea relativă) şi structura coronamentului (Kuehler et al., 2017). Nu în ultimul rând, zgomotul, disconfortul acustic, este recunoscut ca unul dintre cele mai mari riscuri de mediu legate de sănătatea fizică şi psihică, plasând povara bolilor asociate (burden of disease) ca a doua după calitatea aerului în Europa (WHO, 2018). În această situaţie, perdelele forestiere pot înlocui, în cazurile în care administraţia nu este constrânsă de spaţiu, panourile fonoabsorbante (Bolund and Hunhammar, 1999).

6. Concluzii

Rezultatele indică faptul că elementele antropice au fost dezvoltate pe seama scăderii întinderii şi calităţii elementelor naturale, în special în ultimele decenii când dezvoltarea imobiliară şi comercială a fost orientată în interiorul celor două inele (central şi median) şi prea puţin spre inelul exterior, ori peste acesta. Studiul a confirmat, corelaţia foarte puternică dintre creşterea suprafeţei locuibile şi scăderea suprafeţei spaţiilor verzi. Mai mult, în demersurile efectuate cu privire la spaţiile publice verzi, multe dintre speciile folosite nu sunt adaptate condiţiilor climatice şi urbane actuale. Aşa cum reiese din cele menţionate mai sus, condiţiile climatice actuale sunt diferite, iar gestionarea spaţiilor verzi trebuie să ţină cont de acest aspect.

Într-un astfel de context, orice clădire nouă trebuie să fie foarte atent plasată, iar planul de urbanism promis de autoritatea locală trebuie să înglobeze urgent cadrul administrativ obligatoriu care să aibă în vedere înfiinţarea şi gestionarea

durabilă a pădurilor urbane, cu toate detaliile incluse, în special aspectele de ordin ştiinţific privind speciile care pot fi folosite, conjunctural.

Având în vedere toate aceste aspecte, studiul curent reprezintă, mai degrabă, un semnal de alarmă pentru autorităţile locale, agenţii economici, cercetători şi publicul larg, pentru conştientizarea importanţei spaţiilor verzi din Bucureşti. Fiecare dintre aceştia are un rol important în crearea şi gestionarea durabilă a pădurilor urbane, mai ales în contextul transferului către oraşul de tip inteligent. Acest studiu este un preambul al mai multor studii succesive, prin urmare, în viitoarele cercetări întreprinse de autori vor fi analizate în detaliu, trăsăturile funcţionale ale vegetaţiei actuale pentru a se formula concluzii cu privire la eficienţa speciilor existente pentru combaterea efectelor schimbărilor climatice şi formularea unor soluţii privind cele mai recomandate specii, într-un astfel de context.

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GIS solutions for smart city development

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Abstract

The geographic information system (GIS) offers advanced capabilities for smart city projects. In this article we aim to show some possibilities of using GIS technology in support of the development of smart cities. In essence, the smart city concept is based on geospatial data to enhance the understanding of complex urban systems. It is important that city managers can quickly obtain relevant information about the urban infrastructure and urban services, as well as stakeholders (citizens) feedback. GIS technology is applied in smart city projects for geospatial and spatiotemporal data analysis, spatial statistics, surface analysis and location analysis.

As a result, given these considerations, we want to highlight some GIS applications - with examples - that could be integrated to work together into the smart city, referring to the possibility of developing the urban model, sharing geospatial information, the possibility of online traffic analysis, the possibility of obtaining feedback of the citizens. All these applications lead to the improvement of the bidirectional information process, ie the decision makers can obtain certain information, but also the citizens can express their opinion regarding certain projects of the municipality. The paper also shows the importance of open data to be used in GIS applications.

Hence the importance of GIS training for all those who interact in the smart city area, as well as awareness of the importance of accurate geospatial information, which will provide confidence in the urban information system to users.

Keywords: *GIS, urban, traffic, drive-time areas, crowdsourcing, ArcGIS Urban, AGOL, CityEngine, open data.*

1. Introduction

At the national level, the National Recovery and Resilience Plan (PNRR) must be implemented, which cannot be achieved if the creation of a Guide on the management and implementation of landscaping and urban planning documentation is considered, including in GIS format. [12] The National Recovery and Resilience Plan (PNRR) is a strategic document setting out the investment priorities and reforms needed for recovery and sustainable growth, linked to the green transition and taken into account by the European Commission. The implementation of PNRR requires the involvement of specialists in various fields of activity, including surveyors with advanced GIS skills.

Approved by the European Commission on September 27, 2021, PNRR contains reforms and investments structured around six pillars and 15 components. De facto, PNRR is a source of financing and a coherent implementation of the development objective adopted towards Romania through these sectoral strategies.

The 2030 Agenda for Sustainable Development adopted by the UN in New York (2015) is a historical document, which was also adopted by Romania with its specific (2018) and proposes a better future through its 17 objectives. Romania needs to change its current development paradigm to meet the challenges of the 21st century. PNRR meets urgent needs, amid the COVID-19 pandemic.

It is therefore necessary that this action be on a large scale and not fragmented into one-off approaches. In line with technological developments, other types of ICT infrastructure need to be developed that can contribute to the implementation of the Smart City / Smart Village concept: the use of drones to inspect risk areas or situations, and real-time monitoring centers through real-time access to the system of cameras, sensors and other data collection devices, GIS databases at metropolitan level, open data - open data platform in which data available at city level (sectoral data) are accessible to the public, urban data center and real-time monitoring of the state of the city (correlated with the GIS database from PUG – General Urban Plan), the application for informing citizens and identifying problems at the local level. Updating PUG documentation in GIS format is very important, to be dynamic and to provide the citizens or the current situation from the documentation.

Another aspect highlighted in the PNRR is elaboration or updating in GIS format of the spatial planning plans (Planning Plan for the County Territory - PATJ, Planning Plan for the Territory of the Metropolitan Area - PATZM) and of the urban plans (General Urban Plan - PUG, Zonal Urban Plan - PUZ), respectively of the urban mobility plans (Sustainable Urban Mobility Plan - PMUD) for the alignment to new principles of the urban policy of Romania.

Urban / metropolitan / ZUF (Functional Urban Area) GIS databases (also connected to PUG) must communicate vertically (city, county, region) and most of the data collected must be open data.

The problem of open data is a real one in Romania, in the sense that there is not yet enough open data to be published at least in the form of services that can be accessed and used in GIS. Technological solutions are needed to manage traffic flow more efficiently - increasing road capacity while minimizing delays and environmental impact.

2. The link between GIS and PNRR

PNRR proposes concerted actions in strategic areas aimed to modernize and increase the potential of the Romanian economy, by reporting to the national strategic objectives in correlation with the contribution to climate change and the digital transition.

The concept of Smart city / Smart village involves the use of new technologies, in line with the field of intervention "Development of highly specialized services and support structures for public administrations and enterprises" [11]:

- Using UAV/UAS to inspect risk areas or situations
- Monitoring of the city center in real-time – by providing real-time access to all cameras, sensors and other data collection devices
- Intelligent management sof the green space systems
- Monitoring and security system of the public space
- Integration of heritage objectives through digitization or digital reconstruction: (VR / AR) virtual reality / augmented reality
- GIS databases at the metropolitan level
- Open Data - a platform where data is available and accessible to the public at the city level – can be connected with https://data.gov.ro
- Online cloud platform for use by the public administration to retrieve data from geospatial services
- Document registration and issuance system - allows online registration and issuance of documents, electronic signatures, etc.
- Urban data center and real-time monitoring of the state of the city (correlated with the GIS database from PUG)
- City application (application for informing citizens and identifying problems at the local level)
- Online payment of taxes and duties
- Online platform and / or mobile application for mapping energy consumption at neighborhood or city level
- Automated management of irrigation systems for green spaces
- Smart sanitation infrastructure - smart bins with sensors and GPS-based technology, which provides data on the degree of filling of bins
- Real-time monitoring of the state of the technical-municipal infrastructure and of the consumption.

The PNRR will promote procedures based on the following principles [11]:

- elaboration and management after approval of the landscaping and urban planning documents in GIS system;
- introduction of the possibilities of electronic signing of documentation;
- increasing road safety and increasing air quality;
- integration of spatial information from spatial planning and urban planning documentation with spatial information from databases at the level of local authorities and other competent authorities;
- permanent maintenance of documentation data;

- integration of the approved lower rank documents in the higher rank ones (integration of PUZs and PUDs in PUGs);
- addressing urban resilience and the risks of natural and man-made disasters;
- integration of components to improve energy performance at the urban level;
- integration of innovation elements - smart city;
- encouraging forms of software mobility;
- integration of transport and land use for sustainable development;
- introduction of cost-benefit analyzes - monetization of direct and indirect social, economic and environmental benefits;
- use of 3D modeling to substantiate the decision;
- quality assurance in constructions (approval of the Territorial Planning, Urbanism and Construction Code, BIM technical regulations, National Register of Buildings).

3. City type approaches

Recently, the process of migration from rural to urban areas has intensified, especially due to: greater opportunities to find a better and better paid job, access to education and better quality health services. At the same time, urbanization is correlated with economic growth. That is why urban and peri-urban areas are constantly expanding, thus creating technical, social and political challenges.

On the other hand, the accentuated evolution of the technology leads to the need for the rapid implementation of Smart City / Digital Twin solutions. These concepts help to achieve Goal 11 of the UN Agenda [13]: "Make cities and human settlements inclusive, safe, resilient and sustainable" In order to understand the common elements and the differences between these approaches, in figure 1 the concepts were highlighted the main concepts regarding the cities.

Fig. 1. City Type Approaches

4. GIS possibilities - case studies examples

At present, the evolution of GIS technology has created adequate conditions for the development of solution-supporting systems at all stages in the planning and design process - although there is still much work to be done to fulfill the promises.

For example, among the ESRI solutions that can be adapted to different situations are Drone2Map, ArcGIS Urban, CityEngine, Dashboard, Survey123. Figure 2 shows some GIS steps that competed in the development of digital management.

In the following we will show some examples of the use of modern software solutions, which can be easily integrated and can be used by the local administration to facilitate the interaction with the citizens. The collected input data can be represented in layers, including socio-economic data, utility infrastructure based on the type of data, and are stored in the database as records, vectorial or raster representations or attribute data of the geospatial features.

Example 1 UAV / UAS Data - The drone images can be georeferenced using the Ground Control Points (GCPs) which are well-defined points both on the ground and on imagery. The image distortions are corrected and stitched together to produce an accurate single image for the entire area. In figure 3 is emphasized an example of products that can be obtained and used to create a 3D model of a built area.

Fig. 2. GIS Capabilities that Contribute to the Development of Digital Management

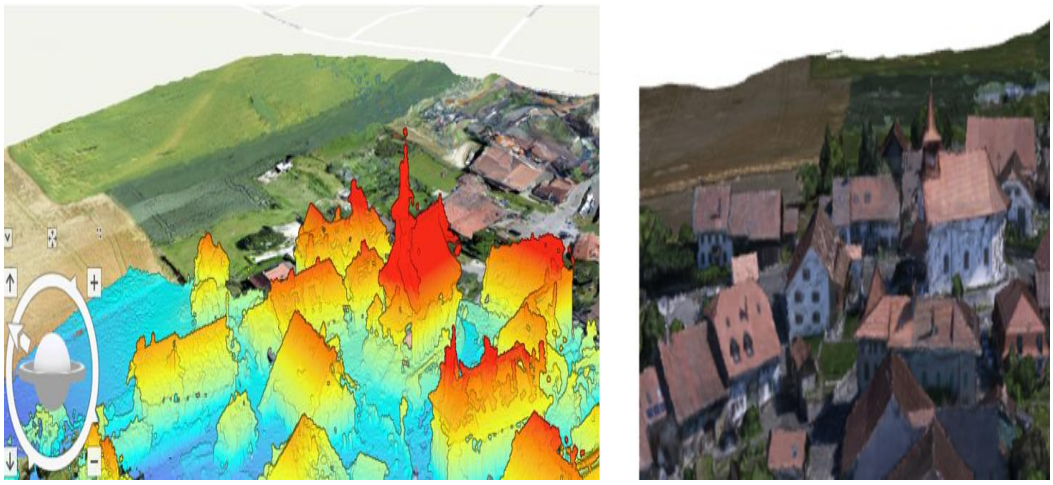

Fig. 3. Point Cloud and 3D Model Generated as a Result of Drone Flight
(processed in Drone2Map, data source: SenseFly)

Example 2 Geospatial Planning using ArcGIS Urban and ESRI CityEngine - A main GIS application for geospatial planning is ArcGIS Urban, used to create 3D renderings of city landscapes, proposed buildings, and compare proposed site projects across key stakeholders, being a web-based system for managing urban development, through a fully interactive 3D environment and offering high quality and flexible planning tools. [8] Defining Zoning and Land Use Plans are useful for visual and analytical representation that allows planners to design while at the same time showing their work to stakeholders (Citizens, Real Estate Agencies, Government, Architects, Developers, etc.) An example of interesting application of the 3D models is that for geospatial planning of the surveillance cameras location in the projected area, using visibility tools in CityEngine. The local administration needs to offer the possibility of the digital submission as best-practice for private developers to submit 3D models and plans over the web for review.

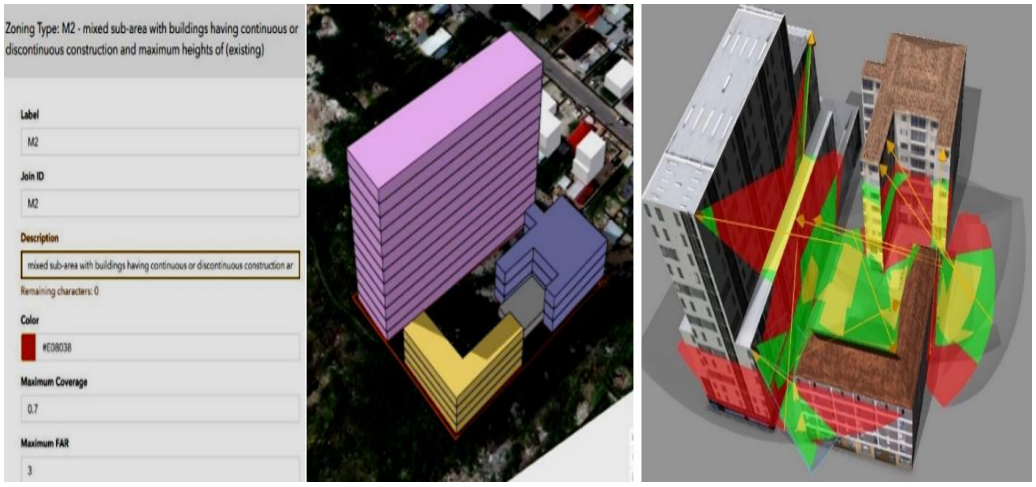

Fig. 4. Spatial Planning in ArcGIS Urban (left side) and Scenario of the Surveillance Cameras Location in the Projected (right side in CityEngine) (adapted from [8])

Example 3 Field Data Collection - In present, the process of using crowdsourcing in land administration is a big challenge. Crowdsourcing represents the act of taking a job or a specific task usually performed by an employee of a company or contractors, and outsourcing it to a large group of people or a community (crowd or mass) via the Internet, through an open call. [5] Some of the specialists consider the concept of crowdsourcing as a niche within the geosciences fields. We can consider that crowdsoucing is synonymous with the concept of Volunteered Geographic Information (VGI), having similarities in the use of 'non-traditional' data providers and being facilitated through web2.0 technology and mobile phones.[6]

The first example is focused on providing data on changes that occur in urban areas, by developping an application useful for data collection that highlights changes of the buildings - authorized or not. (figure 5)

This approach can be implemented for example by city mayors in order to identify: illegal buildings or changes or extensions of them, greenery that was built illegally or the state of the heritage buildings based on images and location provided by interested citizens. One of the main challenges faced by all Local Governments in Romania is the lack of accurate information on the natural and man-made resources under their jurisdiction, representing a major obstacle not only in formulating various development projects but also in implementing them accurately.

	A	B	C
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3	text	Prenume	Operator Surname
4	image	Semnatura	Signature
5	begin group	Date_imobiliar	Data for Urban Information System
6	begin group	Date_fara_proprietar	Data obtained without interacting with the owner
7	dateTime	Data_ora	Date and hour
8	integer	Numar_postal	Postal Number
9	select_one artera	artera	Artery
10	text	Den_artera	Street Name
11	select_one dest_cladire	dest_cladire	Building Destination
12	integer	nr_nivele	Level Number
13	select_one tip_acop	tip_acop	Roof Type
14	geopoint	pozitia	Location
15	image	imagine_constr	Building Image
16	text	obs	Additional Information about Changes
17	end group		
18	select_one info	info	Can You Obtain Additional Information from the Owner?
19	begin group	Informatii	Data obtained based on owner's answers
20	select_one pereti	pereti	Wall Type
21	select_one fundatie	fundatie	Basement
22	select_one str_rez	str_rez	Structural Frame
23	select_one dot_edil	dot_edil	Urban Endowment

	type	name	label
2	select_one str_rez	str_rez	Structural Frame
3	select_one dot_edil	dot_edil	Urban Endowment
4	select_one mod_admin	mod_admin	Administration Type
5	select_one mod_det	mod_det	Ownership Basis
6	select_one tip_prop	tip_prop	Property Type
7	select_one stare_intret	stare_intret	Maintenance Status
8	select_one aut_constr	aut_constr	Building Permit
9	select_one PV_rec	PV_rec	Acceptance Protocol of the Bulding
10	select_one mod_incalz	mod_incalz	Heating Type
11	select_one certif_energ	certif_energ	Energy Certificate
12	end group		
13	text	infos	Additional Info
14	begin group	date_prop	Data about the owner(s)
15	text	nume_prop	Owner's Name
16	text	prenume_prop	Owner's Surname
17	text	init_tata	Father's Initial
18	integer	cnp	CNP
19	text	nationalitate	Nationality
20	date	data_nasterii	Birth Date
21	text	nr_tel	Telephone
22	email	e_mail	E-mail
23	select_one ind	ind	Divided/Undivided
24	decimal	cota_ind	Undivided share
25	integer	num_prop	Number of Owners

Fig. 5. Fields and Domains for a Crowdsourcing App to Collect Changes of the Buildings [6]

The second example is an application is created to collect data about changes in the urban green environment. (figure 6) Using aerial photogrammetry (UAV/UAS imagery), the builtup area can be inspected using the building's footprint and the tax losses can be avoided. The information can also be obtained by a GIS survey, even through a crowdsourcing app, but in this case the collected data needs to be verified by an employee of public administration.

select_one LandParcel	LandParcelData	It is a Land Parcel?			
begin group	LandParcelInfo	Data about a Land Parcel			${LandParcelData}='yes'
select_one GreenSpaceUse	GreenSpaceUse	GreenSpaceUse	multiline	1	
select_one GreenSpaceBuilt	GreenSpaceBuilt	GreenSpaceBuilt	likert	1	
image	PhotoGreenSpace	PhotoGreenSpace			${GreenSpaceBuilt}='yes'
select_one LegalStatus	LegalStatus	LegalStatus	multiline	1	
end group					
select_one Tree	Tree	It is a Tree?			
begin group	TreeInfo	Data about a Tree			${Tree}='yes'
integer	Height	Height			
text	Address	Address			
image	Photo	Photo			
select_one RiskLevel	Risk	Risk	multiline	1	
select_one Viable	ViableState	ViableState	multiline	1	
select_one Type_of_Tree	TreeType	TreeType	multiline	1	
select_one TreeSpecies	Species	Species	minimal	1	
integer	Diameter	Diameter			
select_one MaintenanceStatus	MaintenanceStatus	MaintenanceStatus	multiline	1	
select_one Trim	Trimmed	Trimmed	multiline	1	
end group					
text	Operator	Operator			
dateTime	Data	Data		now()	
note	Notifications	Notifications			
geopoint	Location	Location			

1	list_name	name	label	ima
240	TreeSpecies	198	Cedrus_deodora	
241	TreeSpecies	199	Torreya_nucifera	
242	TreeSpecies	200	Ceratonia_siliqua	
243	TreeSpecies	201	Magnolia_acuminata	
244	TreeSpecies	202	Quercus_ilex	
245	TreeSpecies	203	Prunus_fruticosa_Globosa	
246	TreeSpecies	204	Celtis_occidentalis	
247	TreeSpecies	205	Rhamnus_frangula	
248	TreeSpecies	206	Fraxinus_quadrangulata	
249	TreeSpecies	207	Populus_angustifolia	
250	TreeSpecies	208	Robinia_hispida	
251	TreeSpecies	209	Lonicera_japonica	
252	TreeSpecies	210	Ulmus_carpinifolia	
253	TreeSpecies	211	Quercus_imbricaria	
254	TreeSpecies	212	Ulmus_procera	
255	TreeSpecies	213	Ulmus_laevis	
256	TreeSpecies	214	Celtis_glabrata	
257	TreeSpecies	215	Ulmus_pumila	
258	TreeSpecies	216	Gymnocladus_dioica	
259	TreeSpecies	217	Alnus_incana	
260	TreeSpecies	218	Salix_petandra	
261	TreeSpecies	219	Juniperus_squamata	
262	TreeSpecies	220	Prunus_triloba	
263	TreeSpecies	221	Acer_buergerianum	
264	TreeSpecies	222	Magnolia_soulangeana	
265	TreeSpecies	223	Weigela_hybrida	
266	TreeSpecies	224	Vaccinium_corymbosum	
267	TreeSpecies	225	Fraxinus_americana	
268	TreeSpecies	226	Fraxinus_ornus	
269	TreeSpecies	227	Lonicera_pileata	
270	TreeSpecies	228	Camellia_japonica	
271				
272	LandParcel	1	Yes	

Fig. 6. Designing Fields for a Crowdsourcing App to Collect Changes in the Urban Green Environment [7]

It is also possible to integrate all of the applications created for citizens in an ArcGIS Hub site using ArcGIS Online. The ArcGIS Hub site is used by the general public to learn how they can report a nonemergency problem to help improve the community.

Example 4 WebApp for Highlight Urban Changes - GIS offers possibilities to integrate data from multiple sources to be presented in WebApps. In figure 7 it is highlighted a WebApp based on imagery sources, created to analyze urban changes at two moments in time. We used imagery services to analyze changes from the North-East Area of Bucharest. It can be observed the situation from the past (2014) in the magnifying glass by comparison with 2020.

Fig. 7. WebApp for Highlighting Urban Changes – Residential Area – Fabrica de Glucoza Street (2020 – left side, 2014 – in the magnifying glass)

Example 5 Dashboard Application for Technically Expertised Buildings – Bucharest –

Presenting data of interest in the form of a Dashboard is very useful to show the situation at a certain time. For example, in figure 8 is highlighted such an application that can be implemented at the city hall level and in which the status of the works can be introduced, in case the construction has entered the consolidation process.

Example 6 - Traffic Analysis based on Real Time Services - One of the very useful aspects that can be used in GIS is to analyze the traffic situation at a certain time. These detailed situations can be identified on the basis of more advanced technology [1], but quick analyzes that can be done using real-time data services should also be considered.

Spatial planning and strategies created are based on different criteria, taking into account various indicators. One of these indicators should be those related to traffic analysis, in order to prioritize infrastructure works. ArcGIS Online enables the use of near real-time traffic data services through the Esri Living Atlas Traffic Service. [11]

A dynamic traffic mapping service with updated data every five minutes and capabilities to visualize traffic speeds in relation to free-flow speeds as well as traffic incidents can be used. Traffic incidents also have associated attributes that can be viewed and identified.

These data are very useful to provide context for routing, navigation and field operations. The IncidentType field in traffic incident layers can have the following values: Accident, Congestion, Construction, Disabled Vehicle, Lane_Restriction, Mass Transit, Miscellaneous, Other News, Planned Event, Road Hazard, Road_Closure, Weather.

The Severity field in the incident traffic layers can have the following values: critical, major, minor, low impact, where critical indicates a road closure and major indicates the blocking of several lanes. Figure 9 shows the situation on Prahova Valley, using the data from 1.12.2021 (4.15pm and 6pm) and from 4.12.2021 (4.15pm), and the way of highlighting an incident (closed road), on the right side.

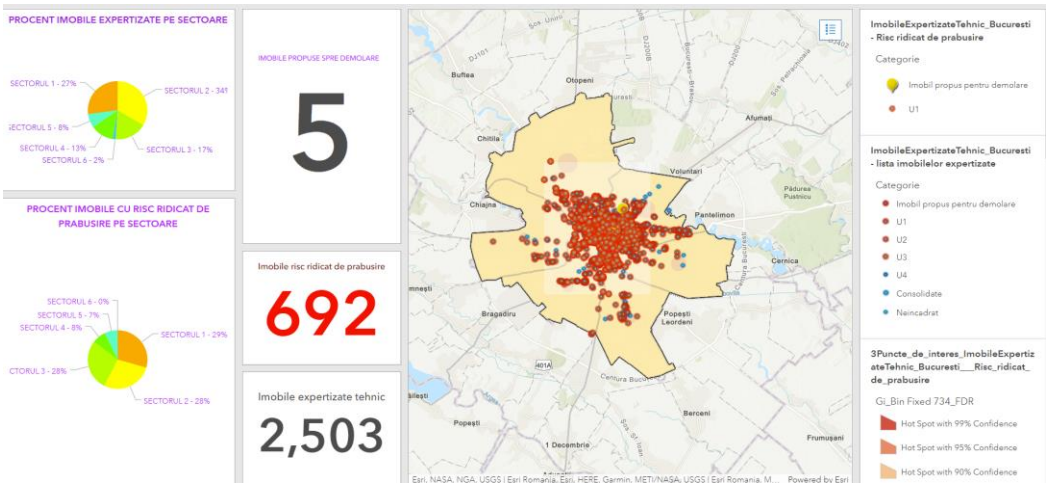

Fig. 8. Dashboard for Technically Expertised Buildings in Bucharest (until 2015) (adapted from [7])
Source: https://amccrs-pmb.ro

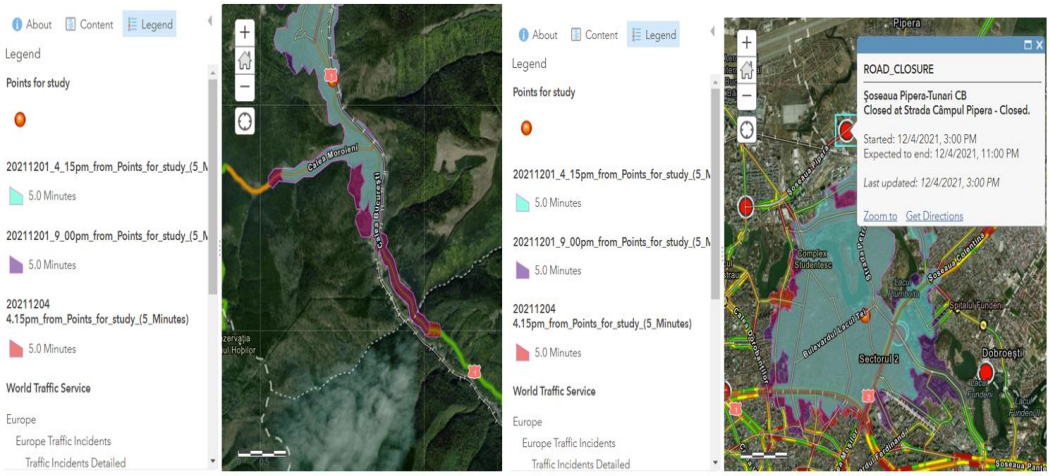

Fig. 9. Examples of drive-time areas that can be covered at any given time in 5 minutes, based on real-time data services

5. Conclusions

The “spatial planning” component is present as a measure in the PNRR, and the involvement of specialists in this field is essential. The proposed reforms can contribute to the operationalization of the concepts of "smart city" and "smart villages", respectively. Architects and urban planners propose urban plans, builders put in place investments in infrastructure, utilities and buildings, and surveyors participate in both topographic surveys, which are the support for PUD, PUZ, PUD, and the tracing of topographic elements, construction stages and tracking over time the evolution of construction.

However, now are specialists trained at the master's level (Spatial Planning and GIS for Sustainable Development – PSGISDD) at the Faculty of Geodesy and they can make a significant contribution through the data they can collect, process and store on an urban digital platform, created as a digital infrastructure containing up-to-date geospatial data and information. The urban landscape is changing day by day, the problems that arise need to be resolved quickly so that the living and living standards correspond to a developed society. Romania has to recover the gap with the European average in many areas. A contribution to these planned measures will therefore have the community of specialists in geodetic engineering, those who practice a profession with an important social and economic impact for society. The contributions of geospatial data specialists (geodesists) with GIS skills to the implementation of PNRR can be present in almost all 15 components of the plan to modernize Romania, in accordance with the Recovery and Resilience Mechanism (MRR) and in the context of post-crisis recovery COVID-19:

- digital geodatabase at the level of local administration;
- property taxation system based on cadastre and land book geospatial data;
- decision-making process based on real data from the cadastre, orthophotoplans used as services;
- modernization and expansion of transport infrastructure - expropriations, removal of land from the agricultural circuit, measurements for construction;
- sustainable urban mobility - mobile mapping, traffic studies;
- inventory of the forestry sector and surveying in the construction sector;
- renovation / consolidation of buildings, historical monuments and buildings located in protected areas – using laser scanning, 3D modeling of the historical monuments and the archaeological sites;
- digital transformation aimed to improve public administration by establishing the necessary framework for achieving the interoperability of ICT systems of various public institutions, ensuring coherence with the eIDAS Regulation and implementing the "one time only" principle, integrated in Regulation (EU) 2018/1724 on the single digital portal - geospatial data are fundamental;
- elaboration / updating of the landscaping and urbanism documents in GIS format;
- acquiring advanced digital skills.

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Pandemic drive for synchronized smart political atmospheres

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Abstract

The etymology of the word atmosphere connects in our view the COVID-19 with the "airquake" concept of Peter Sloterdijk, materialized as consecutive to gas warfare and media-curated order of the postmodern era. This new "airquake '' overlaps the invasion of social networks power and deliberately sought globalization. In order to prepare our plead for synchronizing smart atmospheres, we explore the concepts of smart limit and smart place as derived from interdisciplinary architectural and technological approach, together with the new concept of smart political atmospheres, exploring further C. Borch's statement that "atmospheric design is intimately related to power".

We will complete in contradistinction the spherical trilogy proposed by Sloterdijk. E-governance is an aspect of a recently emerged sphere of the technological smart leap. This might be the ultimate one and we will define it as a meta-sphere, because it combines all the features of the sphere trilogy. This meta-sphere shares characteristics with the binomial user-technology bubble, the plurispheres of interdependent but self-sufficient modern environments, and with the broad ideological sheltering macrosphere of belonging-together that the internet offers.

The foam of smart atmospheres is no longer vague, but shaped by the meta-sphere of technology control. Atmospheres defined by visual, acoustic, aromatic, haptic, political, informational and architectural characteristics, will suffer a shift as a response to the pandemic, from collective to individual, from hierarchical to distributed (Elmer). This will limit it's architectural and multisensory sides to those related to homes, but will expunge politics and technology to a paradoxical familiar-remote field.

We see necessary synchronizing e-governance with these pandemic segregated immunity fields; synchronize is the generic word that correlates e-governance persuasion, decrease of the technology gap, andragogy and architectural staging in order to attain the larger objectives of efficient "management of possibilities"(Foucault).

Keywords*: smart place, smart atmosphere, meta-sphere, e-governance, synchronize*.

1. Main

1.1. Atmospheres

We choose to start this plea for a so-called synchronization of architectural atmospheres, by searching for meanings in the etymology of the word "**atmosphere**" composed of atmo - the Greek ἀτμός - atmos with its own meaning of vapors, and another Greek word σφαῖρα *(sphaira),* with the meaning of ball or globe. To the extent that we venture to find similarities between Greek and Sanskrit, we will reach a deeper meaning, in Sanskrit the closest term is that of *Atman* with the meaning of soul or inner self, inner voice. It's interesting how we can reconnect this group of sounds with the German word atmen, which means to breathe. In the same way, the closest phonic term to the sphere in Sanskrit is *Sphur* - to effulge, to radiate, with the associated noun *Sphuran* - brightness, enlightenment, superposed on a parallel meaning of throbbing, palpitating. It is difficult to overlook the phonetic similarity of the two words in Greek and Sanskrit, and we can thus move on to the valences of the word atmosphere that have become of interest today: self-effulgence, or reflection, self-radiation towards outside. The atmosphere is a term about the perception of the outside by the human psyche, and at the same time a radiation of the soul, of the psyche outside itself.

We find this term of great interest in the current pandemic context through its ability to influence human behavior. A visionary, P. Sloterdijk [17] highlighted in 2009 several types of hazard, so-called "**airquakes**'' by contradistinction with "earthquakes", defining the hazard related to phenomena with specific propagation, through the air: phenomena that do not lethally affect the body of a being, but the environment in which it lives, as examples given the use of poison gas during the First World War, or the prevalence of media induced misinformation or manipulation, another type of degraded environment, that of information. ”Atmoterorism”, at its extreme limit, is a type of terrorism linked to atmospheres, an anthropic hazard that turns the enemy's environment into a weapon aimed at him, e.g. Sarin gas use. This visionary theory of the German philosopher offers us the possibility of a very interesting classification of the current pandemic, as "airquake" - an unknown disease, possibly deadly, transmitted by air.

This pandemic changes all the atmospheric components, from the physical ones (the level of pollution and greenhouse gases) to the subtle ones, perceived and generated psychologically, through the competition of several aspects of modern life: technology, politics, identity. This shift in the quality of global atmospheres can be understood as having the quality of an ideological anthropological hazard superimposed on the medical type, because there remain unresolved issues related to the lack of local and global synchronization of human life atmospheres. Through the characteristics of the global response to the pandemic, interest shifts from the atmosphere of social and urban space, the outer place, to the little-considered atmosphere so far, of personal housing, which becomes atmosphere-generating and at the same time receives both material and psychological external influence. There is a migration, using Elmer's scheme, from a hierarchical social system to a

distributed system, from the collective to the individual character of any decision. This will limit architectural and multisensory perception happenings to those related to homes, but will expunge politics and technology to a paradoxical familiar-remote field.

The relatively sudden transformation of social life interests the architect through the opportunity to find solutions in the new paradigm in which the classic functions related to education programs, administration, commerce, offices all end up occupying the same place in space by digitally increased valence of the private home. Staging and re-decoration of interiors are the new ”it ” occupations among the young and the old, be they professional architects and designers, or simply citizens locked inside their own *coquille*, that was eight hours per day vacant before the emergency lock-down procedures.

In order to better understand the conditions for the emergence of a possible ideological hazard in this pandemic context, we will present again and anew some concepts specific to architecture, with their new variants given by modern society. These concepts are essential in defining a certain atmosphere and very sensitive to changes in the quality of atmospheres.

1.2. Places and limits

The place is a basic piece of the construction of an architectural theory, associated with each act of building and with each community living together, united by the permanence of the concept of "belonging together". If we were to propose a starting point for his understanding, the place could be seen in the same way as the American writer Robert Pogue Harrison, in the sense of the strange loop strange highlighted by Hofstadter [7], through his relationship with the soul (*atman*): “In the fusion between place and soul, the soul is a recipient of the place to the same extent that the place is a recipient of the soul ”[4]. The blunt definition of the dictionary is: a position determined in space. Here is the source of the search for meaning: a first critical question arises, namely, "determined by whom, in what way, for whom?". Another, more provocative question: "what is space?". From here begins an interdisciplinary adventure, because place and space are basic concepts of architecture and philosophy.

A natural step would be to be able to give this familiar word some definitions of equivalence: the place is a physically and theoretically delimited space; the place is a uniquely identifiable area; the place could be a unit of measurement of perception in architecture. A modern theory, rooted in phenomenology, of architecture adds over the layers of historical and constructive significance, the star concept of *genius loci*, a spirit of place that inevitably defines and influences the atmosphere of the place, the accumulation of perception with the consciousness of a *Geschichte* in the sense of Heidegger and a political-geographical situation at a given time. Moreover, we will continue by discussing a concept **smart place**, which unites the field of interest of the place as an essential working concept of architecture, with its corresponding data generated and analyzed in real time and the effects of analyzing this amount of data, respectively the self-regulation capacity.

In order to make friends with this abstract concept - the "place"- we can bring it closer by adorning it with **limits**. We can explain spatial limits (home, neighborhood, park), cultural limits (areas loaded with a unifying tradition), exhaustive limits (coordinates of the nature of longitude and latitude to define an exact geographical position) or atmospheres (places of street events, adoration of religious idols). Another kind of limit is the mentioned concept of Christian Norberg-Schulz, so familiar to the world of architectural theorists, *genius loci*. The Norwegian theorist nostalgically redefines this *genius loci* for the theory of architecture. A concept very adaptable to cultural entities, which draws its sap from the eloquence of tradition and is invoked to justify and imagine architectural atmospheres, helping to identify a place to another, in space and time, thus limiting it, but keeping and yet the ephemeral and immaterial character [13]: "Architecture means to visualize the genius loci, and the task of the architect is to create meaningful places, whereby he helps man to dwell." [14]

The defining element of place as seen in architectural theory is the boundary, the limit. We therefore justify the existence of the work-place by the existence of the limits that separate it and identify it from other places. But how can we explain a limit to **the intelligent place**? It is not limited to the geographical place or its construction, but to an entire evanescent and permeable virtual structure, through its ability to influence other places and other systems, or to self-influence, to self-generate. Influencing other intelligent places and influencing oneself, we find here the bases of visualizing a model that inferentially connects all intelligent places globally, recurrently, and determined by means of technologically generated algorithms.

A place is an existential space, defined by the limit of this space traveled in time. A smart place is similarly delimited, and digitally augmented in addition. The personal home is a smart place, because it meets all these characteristics, being of interest through the effect of its atmosphere on social life. We will refer to the home, in the sense of shelter and intelligent place, when we will use the term "place" from now.

The place and its limit, as essential concepts of architecture, would be interesting to study with methods that belong to science, especially when they are in deed connected to cybernetics and state-of-the-art technologies.

The functioning of **an intelligent place** can be seen by analogy with that of a living organism: it generates data and information, even having the ability to synthesize them, it can be experienced both physically and digitally; at the same time, he gathers the information he metabolizes and can self-regulate according to it. We cannot talk about reproductive capabilities, but an interesting phenomenon is observed, especially in recent months dominated by the effects of the pandemic: an intelligent place can be projected outside its physical boundaries, in countless lines, and is extensively perceived or experienced visually, audibly and informational from any distance, through technological interfaces and with the help of the common will of the members of society. We can talk about places that already virtually circumscribe multiple other places, with a tendency to globalize the smart place.

The role of **the intelligent limit** is even more interesting, somehow resulting from this virtual generalization of the place it brings into existence. Permeable or perhaps repressive, discretionary or imposed, the intelligent limit should in itself be an object of study. The phenomena of information exchange make it possible for the collected data to be used in any other intelligent places that depend on this data. We can adjust the level of indoor lighting according to sensors that measure the intensity of natural light, but the data provided by these light sensors can be used at the territorial level in conducting studies on the evolution of energy consum, or studies on the global atmospheric qualities, or maybe the effects of climate change. These studies will return data to other smart place systems, or back to the basic system, the original smart place. The limits of the intelligent place are, in the extreme, subject to disintegration, paradoxically, for the benefit of its prosperity.

1.3. Neutral identity as a risk factor

The globalization of the intelligent place in parallel with the disintegration of the intelligent limit, is a phenomenon with potential for antropic hazard of ideological type. This, superimposed over the pandemic conditions that impose a low physical limit in terms of space, is interesting to look at from the perspective of catastrophe theory in mathematics.

We applied the theory of catastrophe to the relationship between the congruence of values for the social and the governing environment, and the **identity of the intelligent place**, with a bifurcation factor considered to be the increasing level of control ceded to technology, where e-governance may draw. This mathematical theory helps us to analyze how allowing an increase in the control exercised by technology (this undebatable new idol) can affect the evolution of intelligent place atmospheres, by creating conditions for shifts (negative or positive) in the degree of social acceptance of this control. This characteristic of unpredictability in behavior is the premise of a potential anthropogenic hazard.

A determining factor of this leap is the value of the **identity of the place**. Awareness of the importance identity of the place has, must lead to concerns about the assessment, preservation and prediction of this identity which has an organic nature by being impermanent, but can be reproduced indefinitely through rehabilitation, conservation, restoration and raising that are *sine qua non* acts of sustainable development.

The identity of a smart place can vary freely between two opposing boundaries. We assimilate the positive value with a strong identity, sustained over time by the continuity of collective memory, a real cultural or ethnic representation and the authenticity and multitude of data in local and foreign exchanges. These cumulative characteristics can be visualized in the form of a three-dimensional urban mandala, the three dimensions being geography, culture and information. The negative value is given by the dismantling of the feeling of belonging, by the loss or destruction of cultural values and by nonexistence or lack of credibility correlated with the manipulative intentions of the information that constitute inputs-outputs. Between these two extremes, the identity passes through a value range of the *no*

man's land type which, in our conception, does not constitute a minimum of identity, but a neutrality specific to new places artificially implanted or rooted in tradition but inorganically rehabilitated, without authentic cultural landmarks or which can be mastered over time, driven and administered by scientific methods and technology.

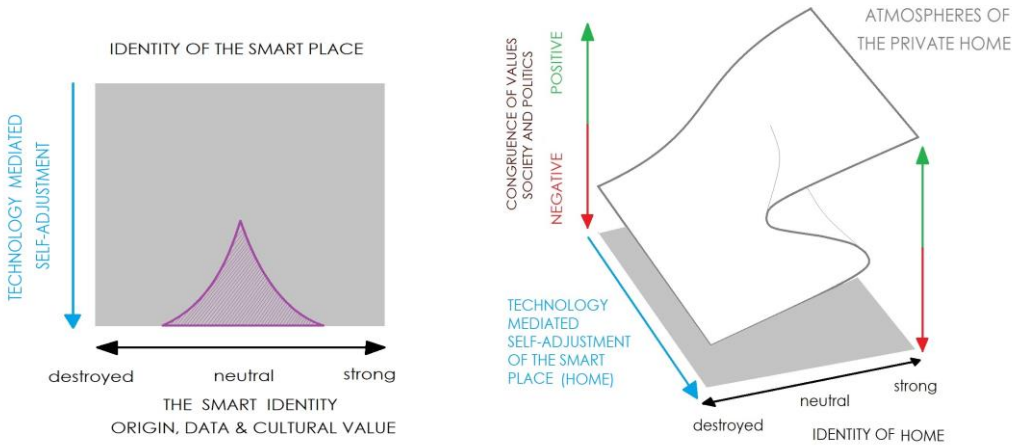

Fig. 1 and **2.** Catastrophe Theory - the cusp of unstable smart atmosphere behavior.

The stronger the place has an identity, the higher the chance of coordination of social aspirations with the ethics of local policies. The more the identity of the intelligent place is indifferent, even until its annulment, the more the place will be lived with frustration, rejected and left to decay (neglect, depopulation, crime) with the help of undebated unethical policies.

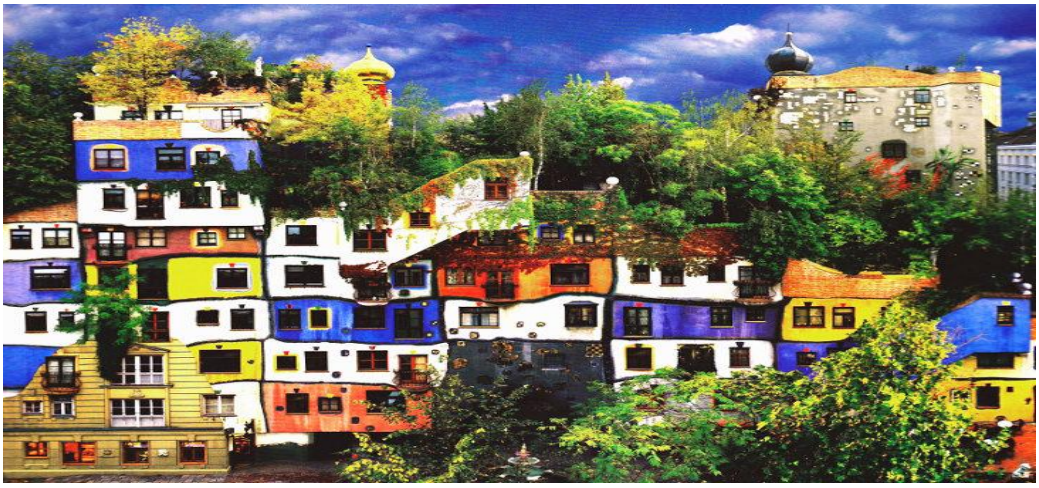

Fig. 3. Positive architectural identity of the place - Hundertwasserhaus, Kegelgasse, Vienna, Austria
Source:https://inhabitat.com/hundertwassers-incredible-living-building-hosts-more-greenery-on-its-facade-than -original-land /

Fig. 4. Neutral architectural identity of the place denied by owners - Block of flats, Ferentari, Bucharest, Romania
Source: https://www.google.ro/amp/s/www.vice.com/amp/ro/article/bjdnbd/unde -the-family-evacuated-of-boron-has-arrived

This theoretical application is a plea in favor of the current current of architecture, having avant-garde supporters like Peter Zumthor, a new approach to living space with the full engagement of all the senses, dethroning the absolute supremacy of sight, and putting in a new spotlight on the intuition that gathers its subtle and subliminal information from all sources of sensory reception: hearing, smell, haptic interaction, atmosphere. This atmosphere, intelligent or not, is what gives the strength and resilience of the intelligent place, it is that quality that an individual can evaluate instantly, without even distinguishing all the constructive or visual details of this place. The intuition of the atmosphere of the place is probably related to the evolution of our species, to the survival instinct of *homo sapiens* put in front of an opponent equipped with the same sharp weapon of intelligence, the other man. This intuition can also be manipulated, but this is the subject of another discussion.

1.4. The smart metasphere or smart political atmosphere

Identity is a defining factor of the atmosphere of the place, and the atmosphere is always defined by a plethora of aspects related to architecture, senses, cultuel, history, politics and digital world. All these components can be divided into two major classes, a material class, physical (architecture and sensory perception) and an informational class (overlapping cultural, historical, political and digital characteristics of the place). Smart political atmospheres are very subtly defined by all these factors, and it is not enough to look at a photograph to intuit the atmosphere of that place, because we will lack determinations related to some essential senses like smell and hearing, or the vibration given by this continuous connection. and interconnection with the political sphere, media and internet,

always subliminally linked with the *id* of the place, the culture or traditions still followed, the perceived and happened history, *Geschichte* in the sense of Heidegger.

It is interesting how, through the atmosphere raised to the rank of intelligent atmosphere, the foam [7] of smart atmospheres is no longer vague, but shaped by the **metasphere** of technology control. We further distinguish the definition by Sloterdijk: we inhabit a society that is best described as a foam, a concentration or even overpopulation of bubbles, which has as characteristics: a high complexity, a high degree of entropy and lack of a center of reference. The constituent elements of postmodern foam are these bubbles, microspheres that are supported in an interdependent and codependent structure, at the same time inaccessible to each other and inseparable from each other. Sloterdijk describes this structure as chaotic, inspired by the concept of "connected isolations" imposed by the architecture group Morphosis.

Fig. 5. Bucharest Dristor blocks of flats - foam example in urban landscape

This formation, this abstract concept applied at the social level, describes us, with the greatest accuracy, the society of the moment, in which each of us builds a microsphere, a world of our own, a home, but these personal worlds do not intersect, although some the others. Therefore, this pluralistic formation has no meaning, purpose or immunity in itself.

Urban housing is a very telling example of social foam. At the same time, they become of great interest in the pandemic context, as absolute physical support, for all human activities, in case of imposing absolute isolation measures. Homes are no longer simple sets, they are no longer limited to the role of *backstage*, but become intelligent places par excellence, of an unprecedented complexity, all the more exposed to ideological hazard. Housing units remain, both in their vertical development and in their horizontal development, communicating microspheres but completely cognitively inaccessible to each other. As places per se, their particular atmospheres are influenced by the type of identity (negative, positive, neutral) and political circumstances. At the same time, urban housing is self-generating its own

atmosphere, by connecting to the smart urban and regional atmosphere, radiating this atmosphere created, in the sense of the etymology initially discussed, in this smart social atmosphere.

In the current pandemic context we can contemplate this orb, a recently emerged sphere of the technological smart leap. This might be the ultimate one and we will define it as a metasphere, because it combines all the features of the sphere trilogy as seen by Sloterdijk. This metasphere shares characteristics with the binomial user-technology bubble, the plurispheres of interdependent but self-sufficient modern environments, and with the broad ideological sheltering macrosphere of belonging-together that the internet offers. Currently, the defensive role of architecture is undermined by the access to information given by the Internet correlated with the society's own predisposition to misinformation. However, a solution can emerge from the holistic approach, because so far we have approached the material political atmospheres strictly materially and spatially. Using the space-time unit, we can address the current situation by analyzing the second term, applying the concept of time over intelligent atmospheres. How is time a relevant topic in this case?

1.5. Synchronizing smart political atmospheres

We have determined the identity of the place, i.g. of the home, as essential in maintaining a stable smart atmosphere. We have shown that we can interpret the neutrality of the identity of the place as a risk factor in the dynamics of intelligent atmospheres. Is there a factor that can flatten the effect of catastrophic behavior, the way that in the mathematical theory we reach the butterfly chart?

The identity in general and that of this microsphere of the home in particular, has another aspect, which we call the ability to **synchronize**; it is a tendency and a need to relate in harmony with the other microspheres within the metasphere - the intelligent political atmosphere. "Synchronize" is the generic word that correlates e-governance persuasion, decrease of the technology gap, andragogy and architectural (recently enhanced) staging in order to attain the larger objectives of efficient "management of possibilities" (Foucault).

We consider the time factor interesting to apply once relative to the course of human life, and on the other hand relative to the evolution of technology seen as a development over time of the process from Lotek (low-tech) [18] to Hitech (high-tech). The adult human character with decision-making power has a temporal evolution marked by ages, from youth to old age. The technique used by the community (smaller or larger, in our case the family) has evolved historically, or even during the life of the characters, from the traditional technique, based on empirical knowledge and manufacturing, to advanced technology, industrial, digital, with the corresponding marking of the industrial revolutions culminating in the last, the fourth.

Time relative to human life and relative to the progress of technology is an important factor for the identity of the intelligent place, which exists as an atmosphere in the field of perception (always prone to prejudices of experience),

experimentation (facilitated or not by hand) and information (digitally accessible). The moment (in time) of "intuition" and "irradiation" of the atmosphere is defining for its quality.

On the young - old axis (inexperienced vs. experienced) we find the so-called conflict between generations, which in connection with e-government, materializes through the opposition of attitude between young members of society (who have a relative apathy and lack of interest and information in connection with politics and administration, evident by absenteeism and declining turnout, accentuated in the pandemic context of 2020) and senior members of society for whom these topics are of great interest. Synchronization on this axis has on the one hand aspects of persuasion policies in order to stimulate the interest of young people in political and governmental events and in selecting the correct media information, in order to avoid misinformation and manipulation (the main means of manipulation are currently social networks, environment for the new *modus vivendi* of young people). On the other hand, the elderly and those who are interested and socially engaged in the democratic and electoral process, are the most disadvantaged in terms of access to technology and andragogy, especially on the use of information systems.

So we have a paradoxically apathetic social category of young people, with skills and know-how in technology, doubled by a high capacity to accumulate knowledge (rhetorically referred to as the millennials), and a social category of elderly (baby boomers) who are engaged in democratic conversation and discourse, but who have little knowledge of the use of technology. These two desynchronized categories are put more in difficulty, by the so-called social distance, more precisely physical, by isolation in the microspheres of their homes, resulting in a large social mass with difficulties in experiencing democracy and the benefits offered by e-government. We can make an argument for the above by contemplating the data regarding the turnout in Romania in 2020 in the parliamentary elections, where despite the important stake of the electoral act, we had another decrease compared to the last election year. We cannot say that the motivation would be the anxiety of illness, the media constantly reporting a worrying crowd of visitors in shopping malls and other public locations. We see as a reason the lack of synchronization, interruption of communication and mutual support, both material, psychological and informational, in the context of physical distancing.

These necessary policies to synchronize smart atmospheres can only start in the field of education, with a boost to the identity of the smart place by introducing in the curriculum compulsory education about politics and governance, starting at an early age, perhaps at the same age as children start using advanced technology (tablets, smart phone, etc.); the other half is to find optimal andragogy programs with an emphasis on mastering information technology, so that independent access to governance platforms and information can be done easily without age discrimination. As an example, the Romanian vaccination platform was almost inaccessible to use for appointments to older citizens, who mostly relied on younger relatives to schedule theirs.

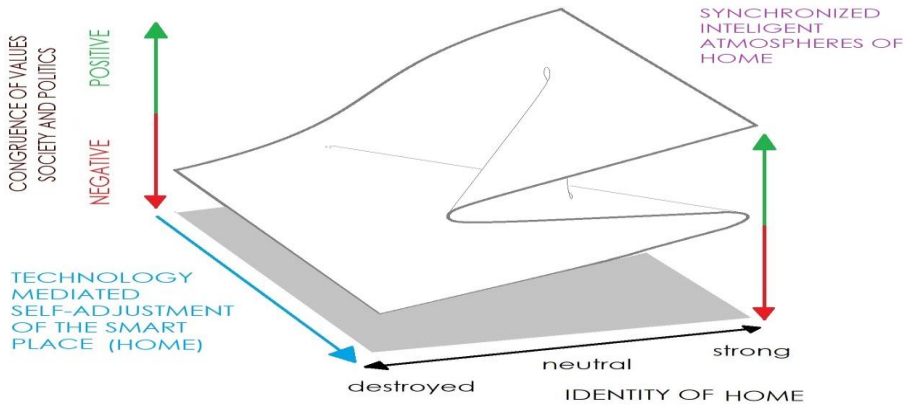

Fig. 6. The butterfly surface of behaviors resulted from synchronizing smart atmospheres

On the graph of surfaces generated by the behavior of smart atmospheres, following the introduction of the bifurcation factor of taking control by technology, we observe an intermediate area, a level representing behaviors so unlikely that can be ignored. Adding a new variation, a "butterfly factor", in the theory of catastrophe, we obtain a new family of behavioral surfaces, allowing the visualization of a way to overcome the uncertainty given by the cusp dual behaviour value. A drawing to help us in our visualization should contain five dimensions, but we can approximate a shape of the behavior surface if we keep two variables constant. A butterfly factor can generate a reduced area focused on the type of neutral identity (characteristic of most housing units that represent the places where most human activities happen in the lock-down periods characteristic of a pandemic such as 2020).

2. Conclusions

We interpret the possibility of this surface of balanced behavior as a chance for resilience in the most difficult psychological conditions, those of a neutral identity of the inhabited interior space, combined with the lack of social interaction, the takeover of technology (where e-government platforms might be perceived), and lack of congruence between personal values and those pursued by the administrative power. Synchronizing intelligent atmospheres together with moving the identity of places from the neutral zone can generate a social response that will ensure a better chance of survival in the event of a more dangerous pandemic event than in 2020.

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Sincronizarea atmosferelor smart

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Abstract

Vedem evenimentul pandemic din 2020 ca pe o oportunitate interesantă de a sublinia importanța cercetării atmosferelor arhitecturale ca influențe de comportament social. Etimologia cuvântului "atmosferă" conectează în viziunea noastră dezastrul de tip „airquake" al lui Peter Sloterdijk (concretizat iată încă o dată consecutiv dezvoltării armamentului cu gaze toxice din 1914 și supremației atmosferelor sociale curatoriate de media din era postmodernă). COVID-19 - acest nou tip de „airquake" se suprapune demonstrațiilor de putere ale rețelelor sociale și a unei accentuate globalizări. Pentru a ne pregăti pledoaria pentru sincronizarea atmosferelor inteligente, definim din nou conceptele de limită inteligentă și loc inteligent derivate din abordarea arhitecturală și tehnologică interdisciplinară, împreună cu noul concept de atmosfere inteligente. După ce C. Borch a declarat că proiectarea atmosferelor arhitecturale este intim legată de putere (2), studiem conceptul de atmosferă inteligentă care sintetizează trăsături senzoriale arhitecturale, tehnologice și politice..

Atmosferele politice inteligente vor completa în contradistincție trilogia sferică propusă de filosoful P. Sloterdijk în 2004: "bubbles" - microsfere marcate dihotomic, globuri - sau macrosfere și "foams" - - spume - plurisfere. E-guvernarea este un aspect al unei sfere digitale globale recent apărute concomitent saltului inteligent tehnologic. Acesta ar putea fi ultimul tip de sferă, și o vom defini ca meta-sferă, deoarece combină toate trăsăturile trilogiei sferelor Sloterdijk. Ea include binomul utilizator-tehnologie, plurisferele mediilor moderne interdependente, dar autosuficiente, cu adăpostul ideologic larg al apartenenței-împreună pe care internetul (ca macrosferă) îl garantează.

În condițiile reale de pandemie, spuma atmosferelor inteligente nu mai este vagă, dar este modelată de noua meta-sferă a controlului tehnologic, favorizând ideile de apropiere socială și distanțare fizică. Atmosferele inteligente definite prin caracteristici vizuale, acustice, aromatice, haptice, politice, informaționale și arhitecturale vor suferi o schimbare ca răspuns la pandemie, de la colectiv la individual, de la ierarhic la distribuit (moduri de învățare Elmer). Acest lucru poate limita influența aspectelor arhitecturale și multisenzoriale ale atmosferelor inteligente la cele legate de locuințe, dar va diminua influența aspectelor politice și informaționale,

într-un mod în care atmosferele politice vor deveni în cele din urmă un domeniu paradoxal, concomitent familiar şi îndepărtat.
Vedem sincronizarea necesară a acestor câmpuri de imunitate segregate de pandemie; sincronizarea este cuvântul generic care corelează persuasiunea e-guvernării, reducând decalajul tehnologic şi arhitectural pentru a atinge dezideratul real de „gestionare a posibilităţilor" eficientă (Foucault).

***Cuvinte cheie**: loc inteligent, atmosferă inteligentă, meta-sferă, e-guvernare*.

1. Articol

1.1. Atmosfere

Alegem să începem această pledoarie pentru o aşa zisă sincronizare a atmosferelor arhitecturale, prin căutarea de sensuri în etimologia cuvântului "**atmosferă**" compus din atmo - grecescul ἀτμός *(atmos)* cu sensul propriu de vapori, şi un alt cuvânt grecesc σφαῖρα *(sphaira),* cu sensul de minge sau glob. În măsura în care ne aventurăm să găsim similarităţile între limba greacă si limba sanscrită, vom ajunge la un sens mai profund, în sanscrita cel mai apropiat termen este acela de *Atman* cu sensul de suflet sau eu interior, voce interioara. E interesant cum putem lega din nou acest grup de sunete cu cuvântul german atmen adică a respira. În acelasi fel, cel mai apropiat fonic termen fata de sfera în sanscrită este *Sphur* - a străluci, a radia, cu substantivul asociat *Sphuran* - strălucire, iluminare. Este greu de trecut cu vederea asemănarea fonetică a celor două cuvinte din greacă si sanscrită, şi putem astfel ajunge la valenţele cuvântului atmosferă care au devenit de interes astăzi: strălucirea sinelui, sau reflecţia, radiaţia sinelui în exterior. Atmosfera este un termen despre percepţia exteriorului de către psihicul uman, şi în acelaşi timp o radiaţie a sufletului, a psihicului în exteriorul lui.

Găsim acest termen de mare interes în contextul pandemic actual prin capacitatea lui de influenţare a comportamentului uman. Un vizionar, P. Sloterdijk evidenţia în 2009 câteva tipuri de hazard, aşa zise "**airquakes**" prin contradistincţie faţă de "earthquakes", definind hazardul legat de fenomene cu propagare specifică, pe calea aerului: fenomene care nu afectează letal corpul unei fiinţe, ci mediul în care aceasta trăieşte, ca exemple date fiind utilizarea gazului otravitor în cursul primului război mondial, sau prevalenţa manipulării prin dezinformare, un alt tip de mediu înconjurător degradat, cel al informaţiei. Atmoterorismul, la limită, este un tip de terorism legat de atmosfere, un hazard antropic care transformă mediul înconjurător al inamicului într-o armă îndreptată împotriva acestuia. Această teorie vizionară a filozofului german ne dă posibilitatea unei încadrări foarte interesante a pandemiei actuale, ca "airquake" - o boală necunoscută, posibil mortală, transmisibilă pe calea aerului şi imposibil de pronosticat ca evoluţie viitoare.

Această pandemie modifică toate componentele atmosferice, de la cele fizice (nivelul poluării şi a gazelor de seră) până la cele subtile, percepute şi generate psihologic, prin concurenţa mai multor aspecte ale vieţii moderne: tehnologie,

politică, identitate. Acest shift în calitatea atmosferelor la nivel global poate fi înţeleasă poate avea calitatea unui hazard antropic de tip ideologic suprapus peste cel de tip medical, pentru că se suprapun probleme rămase nerezolvate legate de lipsa de sincronizare la nivel local şi global a atmosferelor vieţii fiinţelor umane. Prin caracteristicile răspunsului global la pandemie, interesul se muta de la atmosfera spaţiului social şi urban, a locului exterior, către atmosfera puţin luată în seamă pâna acum, a locuinţei personale, care devine creatoare de atmosferă şi în acelaşi timp primeşte influenţe în acelaşi timp din exterior, atât materiale cât şi psihologice. Există o migraţie, folosind schema lui Elmer, dinspre un sistem social ierarhic la un sistem distributiv, dinspre caracterul colectiv spre cel individual al oricărei decizii. Aceasta va limita aspectele arhitecturale şi multisenzoriale la cele maidegrabă legate de cadrul familiar al locuinţei, dar va împinge domeniile politicii şi tehnologiei către un câmp paradoxal al conştiinţei, în acelaşi timp îndepărtat şi inaccesibil şi apropiat, la un click distanţă, deci ciudat de familiar, de prezent în viaţa intimă a fiecărui cămin în parte.

Această transformare relativ bruscă a vieţii sociale interesează arhitectul prin oportunitatea găsirii de soluţii în noua paradigmă în care funcţiunile clasice legate de programe de învăţământ, administraţie, comerţ, birouri ajung toate să ocupe acelaşi loc în spaţiu prin augmentarea digitală a valenţelor locuinţei.

Pentru a înţelege mai bine condiţiile de apariţie a unui posibil hazard ideologic în acest context pandemic, vom prezenta în reluare şi vom extinde câteva concepte specifice arhitecturii, cu noile lor variante date de societatea modernă. Aceste concepte sunt esenţiale în definirea unei anumite atmosfere şi foarte sensibile la modificări în calitatea atmosferelor.

1.2. Locuri si limite

Locul este o piesă de bază a construcţiei unei teorii arhitecturii, asociată cu fiecare act de edificare şi cu fiecare grup de fiinţe umane care locuiesc împreună, uniţi de permanenţa conceptului de ”belonging together”. Dacă ar fi să propunem un punct de plecare pentru înţelegerea lui, locul ar putea fi văzut în acelaşi fel cu literatul american Robert Pogue Harrison, în sensul buclei stranii evidenţiate de Hofstadter, prin relaţia lui cu sufletul (*atman*):„În fuziunea dintre loc şi suflet, sufletul este un recipient al locului în aceeaşi măsură în care locul este un recipient al sufletului” [4]. Definiţia dicţionarului este: o porţiune determinată în spaţiu. Iată izvorul căutărilor de sens: o primă întrebare critică se naşte şi anume„determinată de cine, în ce fel, pentru cine?”. O alta întrebare, mai provocatoare:„ce este un spaţiu?”. De-aici începe o aventură interdisciplinară, pentru că locul şi spaţiul sunt concepte de bază ale arhitecturii dar şi ale filosofiei.

Un pas firesc ar fi să reuşim să dăm acestui cuvânt atât de familiar câteva definiţii de echivalenţă: locul este un spaţiu delimitat fizic şi teoretic; locul este o suprafaţă unic identificabilă; locul este o unitate de măsură a percepţiei în arhitectură. O teorie modernă, cu rădăcini în fenomenologie, a arhitecturii adaugă peste straturile de semnificaţie istorice si constructive, conceptul vedetă de *genius loci*, un spirit al locului care defineşte şi influenţează inevitabil atmosfera locului,

cumularea percepției cu conștiința unei *Geschichte* în sensul lui Heidegger și a unei situații politico-geografice la un moment dat. Mai mult vom continua prin discutarea unui concept de **loc inteligent**, care să unească domeniul de interes al locului ca și concept de lucru esențial al arhitecturii, cu baza de date generate de el în timp real și cu efectele analizei acestei cantități de date, respectiv capacitatea de autoreglare.

În scopul familiarizării cu acest concept de "loc" paradoxal abstract, putem să ni-l apropiem sau să ni-l apropriem atribuindu-i **limite**. Putem explica limite spațiale (cartierul, parcul), limite culturale (zone încărcate cu o tradiție unificatoare), limite exhaustive (coordinate de natura longitudinii și latitudinii care să definească o poziție geografică exactă) sau atmosfere (locuri evenimentelor stradale, ale ocultului, ale divinizării). Tot un fel de limită este și amintitul concept al lui Christian Norberg-Schulz, atât de familiar lumii teoreticienilor de arhitectură, *genius loci*. Teoreticianul norvegian redefineste nostalgic acest *genius loci* pentru teoria arhitecturii. Un concept foarte adaptabil entităților cu caracter cultural, care își extrage seva elocvenței din tradiție și care este invocat pentru justificarea și imaginarea atmosferelor arhitecturale, ajutând la identificarea unui loc față de altul, în spațiu și în timp, limitându-l deci, dar păstrându-și însă caracterul efemer și imaterial [15]:*„Architecture means to visualize the genius loci, and the task of the architect is to create meaningful places, whereby he helps man to dwell."* [16]

Elementul definitoriu al locului așa cum este văzut în teoria arhitecturii, este limita, hotarul. Justificăm deci existența lucrului-loc prin existența limitelor care îl separă și îl identifică față de alte locuri. Cum oare însă putem explica o limită pentru **locul inteligent**? Acesta nu se rezumă la locul geografic sau edificarea lui, ci la o întreagă structură virtuală efemeră și permeabilă, prin capacitatea sa de a influența alte locuri și alte sisteme, sau de a se autoinfluența, a se autogenera. Această structură se întemeiază pe sensul, direcția și modulul locului inteligent. Influențând alte locuri inteligente și influențându-se pe sine, găsim aici bazele vizualizării unui model care leagă prin determinări de tip inferențial, toate locurile inteligente la nivel global, în mod recurent, și în baza unor algoritmi generați tehnologic.

Un loc este un spațiu existențial, definit de limita acestui spațiu parcurs în timp. Un loc inteligent este delimitat asemănător, și în plus augmentat informațional. Locuința personală este un loc inteligent, deoarece întrunește toate aceste caracteristici, fiind de interes prin efectul atmosferei ei asupra vieții sociale. Ne vom referi la locuință, la cămin, în sensul de adăpost și de loc inteligent, când vom folosi termenul "loc" în continuare.

Locul și limita lui, ca și concepte esentiale ale arhitecturii, ar fi interesant de studiat cu metode care aparțin științei, cu atât mai mult când sunt văzute prin prisma ciberneticii și a tehnologiilor de ultimă generație.

Funcționarea unui loc inteligent poate fi văzută prin analogie cu cea a unui organism viu: el generează date și informații, având chiar capacități de sintetizare a acestora, el poate fi experimentat atât fizic, cât și digital; concomitent, el adună informațiile metabolizează și se poate autoregla în funcție de ele. Nu putem vorbi de capacități de reproducere, dar un fenomen interesant se observă, mai ales în ultimele luni dominate de efectele pandemiei: un loc inteligent se poate proiecta în afara granițelor lui fizice, în nenumărate replici, și poate fi perceput sau

experimentat vizual, auditiv şi informaţional de la orice distanţă, prin intermediul interfeţelor tehnologice şi cu ajutorul voinţei comune a membrilor societăţii. Putem vorbi de locuri care circumscriu virtual deja multiple alte locuri, cu tendinţă la limită de globalizare a locului inteligent.

Rolul **limitei inteligente** este şi mai interesant, cumva rezultat din aceasta generalizare virtuală a locului pe care îl aduce în existenţă. Permeabilă sau poate represivă, discreţionară sau impusă, limita inteligentă, prin caracterul ei fractal, ar trebui să fie în sine un obiect de studiu. Fenomenele de schimb informaţional fac ca datele colectate să poată fi folosite în orice alte locuri inteligente care depind de aceste date. Putem regla nivelul iluminatului stradal în funcţie de senzori de măsurare a intensităţii luminii naturale, dar datele furnizate de aceşti senzori de lumină pot fi utilizaţi la nivel teritorial în efectuarea de studii de evoluţie a eficienţei sistemelor de energie alternativă, sau de studii globale referitoare la calităţile atmosferei sau la efectele schimbărilor climatice. Aceste studii vor întoarce date în alte sisteme de locuri inteligente, sau înapoi în sistemul de bază, locul inteligent iniţial. Limitele locului inteligent sunt, la extremă, supuse unei destrămări, în mod paradoxal, în beneficiul prosperităţii acestuia.

1.3. Identitatea neutră ca factor de risc

Globalizarea locului inteligent în paralel cu destrămarea limitei inteligente, iată un fenomen cu potenţial de hazard antropic de tip ideologic. Acesta, suprapus peste condiţiile pandemiei care impun o limită fizică redusă în spaţiu locului, este interesant de studiat din perspectiva teoriei catastrofei.

Am aplicat teoria catastrofei la relaţia dintre congruenţa valorilor pentru mediul social şi cel de guvernare, şi **identitatea locului inteligen**t, cu factor de bifurcaţie considerat a fi controlul cedat tehnologiei, în creştere. Această teorie matematică ne ajută să supunem analizei modul în care permiterea creşterii controlului exercitat de tehnologie (acest idol contestabil), chiar mediat de moderarea politică susţinută de social) poate afecta evoluţia atmosferelor locului inteligent, prin crearea condiţiilor de salt (negativ sau pozitiv) în gradul de acceptare socială a acestui control. Această caracteristică de comportament imposibil de prezis constituie premisa unui potenţial hazard antropic.

Un factor determinant al acestui salt o constituie valoarea **identităţii locului**. Conştientizarea importanţei identităţii locului trebuie să conducă la preocupările legate de evaluarea, conservarea şi predicţia acestei identităţi care are o natură organică prin faptul că este muritoare dar se poate reproduce la infinit prin procedee de reabilitare, conservare, restaurare şi ridicare la rang de condiţie *sine qua non* a dezvoltării durabile.

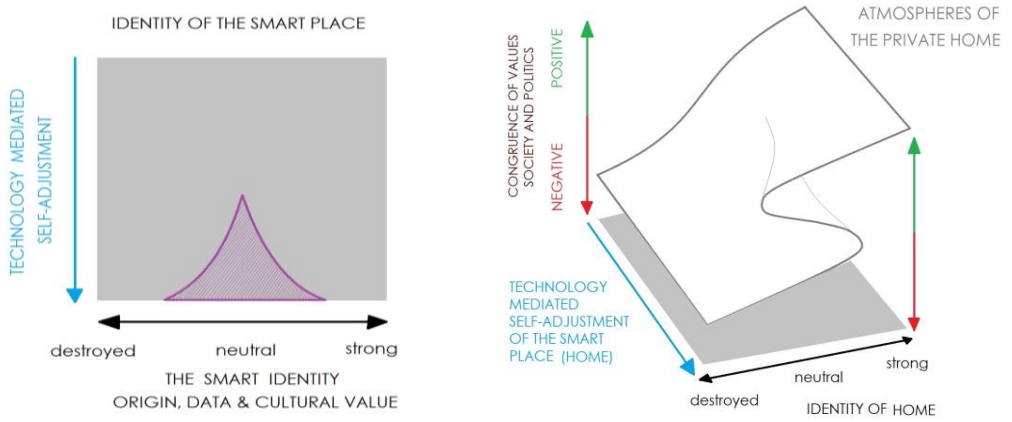

Fig. 1 şi **2**. Teoria catastrofei - un "*cusp*" de instabilitate a atmosferelor.

Identitatea unui loc inteligent poate varia liber între două limite opuse. Valoarea pozitivă o asimilăm cu o identitate puternică, susţinută în timp prin continuitatea memoriei colective, o reală reprezentare culturală sau etnică şi autenticitatea şi multitudinea datelor în schimburile locale şi externe. Aceste caracteristici cumulate pot fi vizualizate sub forma unei mandale urbane tridimensionale, cele trei dimensiuni fiind geografia, cultura şi informaţia. Valoarea negativă este dată de demontarea sentimentului de apartenenţă, de pierderea sau distrugerea valorilor culturale şi de inexistenţa sau lipsa de credibilitate corelată cu intenţiile manipulative ale informaţiilor ce constituie intrări-ieşiri. Între aceste două extreme, identitatea trece printr-un interval valoric de tipul *no man's land* care, în concepţia noastră, nu constituie un minim al identităţii, ci o neutralitate specifică locurilor noi implantate artificial sau cu tradiţie dar reabilitate neorganic, fără repere culturale autentice sau care pot fi însuşite în timp, conduse şi administrate prin metode ştiinţifice şi prin intermediul tehnologiei.

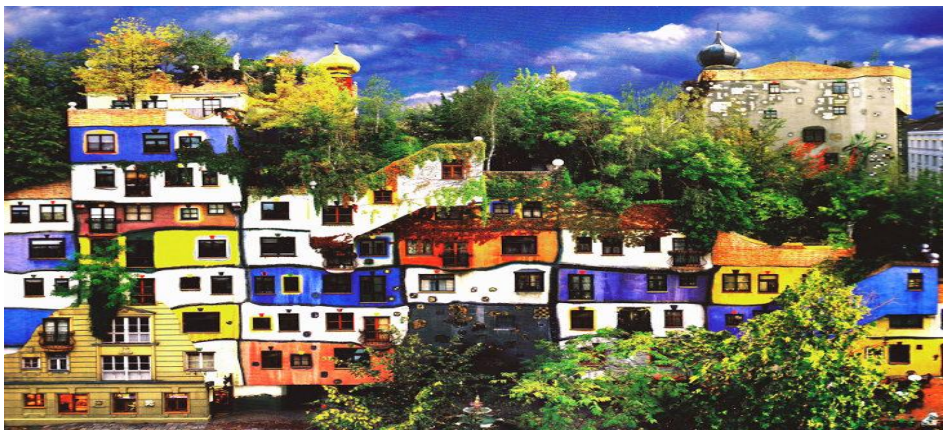

Fig. 3. Identitate arhitecturală pozitivă - Hundertwasserhaus, Kegelgasse, Vienna, Austria
Sursa: https://inhabitat.com/hundertwassers-incredible-living-building-hosts-more-greenery-on-its-facade-than-original-land/

Fig. 4. Identitate arhitecturală neutră care este rejectată de locuitori în timp - bloc de apartamente, Ferentari, Bucureşti, România
Sursa: https://www.google.ro/amp/s/www.vice.com/amp/ro/article/bjdnbd/unde-a-ajuns-familia-evacuata-de-bor

Cu cât locul are o identitate mai puternică cu atât gradul de coordonare a aspiraţiilor sociale cu etica politicilor locale este mai ridicat. Cu cât identitatea locului inteligent este mai destructurată, chiar până la desfiinţare, cu atât locul va fi trăit cu mai multă frustrare, respins şi lăsat pradă descompunerii (e.g.paragină, depopulare, infracţionalitate) prin politici nonetice.

Această aplicaţie teoretică este o pledoarie în favoarea curentului de arhitectură actual, având ca susţinători de avangardă pe Peter Zumthor şi Juhanni Pallasmaa, o nouă abordare a trăirii spaţiului cu angajarea plenară a tuturor simţurilor, detronând supremaţia absolută a văzului, şi punând într-o nouă lumină intuiţia care îşi adună informaţiile subtile şi subliminale din toate sursele receptării senzoriale: auz, miros, interacţiune haptică, atmosferă. Această atmosferă, inteligentă sau nu, este cea care dă forţa şi rezilienţa locului inteligent, este acea calitate pe care un individ sau un colectiv o poate evalua instantaneu, fără chiar a distinge toate detaliile constructive sau vizuale ale acestui loc. Intuirea atmosferei locului este probabil legată de evoluţia speciei noastre, de instinctul de supravieţuire a *homo sapiens* pus în faţa unui adversar dotat cu aceeaşi armă a inteligenţei, celălalt om. Această intuiţie poate fi şi ea manipulată, dar acesta este subiectul altei discuţii.

1.4. Metasfera sau atmosfera politică inteligentă

Identitatea este un factor definitoriu al atmosferei locului, şi atmosfera este

întotdeauna definită printr-o pletora de aspecte care ţin de arhitectural, senzorial, cultural, istoric, politic şi digital. Toate aceste componente pot fi împărţite în două clase majore, o clasă de tip material, fizic (arhitectură si percepţie

senzorială) şi o clasă de tip informaţional (suprapunerea caracteristicilor culturale, istorice, politice şi digitale ale locului). Atmosferele politice inteligente sunt foarte subtil definite de toţi aceşti factori, şi nu este suficient să privim o fotografie pentru a intui atmosfera respectivului loc, pentru că ne vor lipsi determinări legate de unele simţuri esenţiale ca mirosul şi auzul, sau vibraţia dată de această continuă conectare şi interconectare cu sfera politică, media şi IT, legate mereu subliminal cu *id*-ul locului, cultura sau tradiţiile încă urmate, istoria percepută şi întâmplată, *Geschichte* în sensul lui Heidegger.

Este interesant cum, prin atmosfera ridicată la rangul de atmosferă inteligentă, spuma atmosferelor smart nu mai păstrează un caracter vag, nedefinit,, ci se lasă modelată de **metasphera** controlului tehnologic. Distingem în continuare prezenţa spumei definită de Sloterdijk: inhabităm o societate care este cel mai bine descrisă ca o spumă, o concentrare sau chiar suprapopulare de bubbles, care are ca şi caracteristici: o mare complexitate, un mare grad de entropie şi lipsa unui centru de referinţă. Elementele constitutive ale spumei postmoderne sunt aceste bubbles, microsfere care susţinute într-o structură interdependentă si codependentă, în acelaşi timp inaccesibile şi inseparabile una faţă de cealaltă. Sloterdijk descrie această structură ca haotică, inspirandu-se din conceptul de ”connected isolations” impus de grupul de arhitectură Morphosis.

Această formaţiune, acest concept abstract aplicat la nivelul social, ne descrie cu cea mai mare acurateţe societatea momentului, în care fiecare dintre noi îsi construieşte o microsferă, o lume proprie, un cămin, dar aceste lumi personale nu se intersectează, deşi se susţin unele pe celelalte. Prin urmare, această formaţiune pluralistă nu are o semnificaţie, un scop sau o imunitate în sine.

Locuinţele urbane sunt un exemplu foarte grăitor de spumă socială. În acelaşi timp, devin de mare interes în contextul pandemic, ca suport fizic absolut, pentru toate activităţile umane, în cazul impunerii unor măsuri de izolare absolută. Locuinţele nu mai sunt simple decoruri, nu se mai limitează la rolul de *backstage*, ci devin locuri inteligente prin excelenţă, de o complexitate neanticipată până acum, cu atât mai expuse la hazardul de tip ideologic. Unităţile locative rămân în continuare, şi în cazul dezvoltării lor pe verticală, şi în cazul dezvoltării lor pe orizontală, microsfere comunicante dar complet inaccesibile cognitiv una faţă de alta. Ca locuri per se, atmosferele lor particulare sunt influenţate de tipul de identitate (negativă, pozitivă, neutră) şi de circumstanţele politice. În acelaşi timp locuinţele urbane sunt îşi autogenerează propria atmosferă, prin conectarea la atmosfera inteligentă urbană şi regională, radiind această atmosferă creată, în sensul etimologiei discutate iniţial, în această atmosferă inteligentă socială.

În contextul pandemic actual putem contempla acest orbo sferă apărută relativ recent şi care corespunde unui salt tehnologic catre conceptul de smart. Acesta ar putea fi şi ultima sferă,pe care o vom defini ca metasferă, pentru că va combina acest concept toate caracteristicile descrisei trilogii a sferelor filosofice ale lui Sloterdijk Această metasferă adună atributele bulei binomiale tehnologie-user, ale plurisferelor mediilor moderne interdependente dar autosuficiente, sub acoperământul larg şi protector al macrosferei de ”a aparţine împreună” pe care ne-o asigură internetul. În momentul actual, rolul defensiv al arhitecturii este subminat

de accesul la informaţie dat de internet corelat cu predispoziţia la dezinformare. Totuşi, o soluţie poate apărea din abordarea holistică, pentru că până acum am abordat strict material şi spaţial atmosferele politice inteligente. Apelând la unitatea spaţiu-timp, putem aborda situaţia actuală analizând al doilea termen, aplicând conceptul de timp peste atmosferele inteligente. Cum este timpul un subiect relevant în acest caz?

1.5. Sincronizarea atmosferelor politice inteligente

Am determinat identitatea locului, i.g. a locuinţei, ca esenţială în păstrarea unei atmosfere inteligente stabile. Am arătat că putem interpreta neutralitatea identităţii locului ca un factor de risc în dinamica atmosferelor inteligente. Există oare un factor care poate aplatiza efectul de comportament catastrofic, aşa cum în teoria matematică se ajunge la graficul de tip fluture?

Identitatea în general şi cea a acestei microsfere a locuinţei în particular, mai are un aspect, pe care o denumim capacitatea de **sincronizare**; este vorba de o tendinţă şi o necesitate de relaţionare în armonie cu celelalte microsfere în cadrul metasferei - atmosferei politice inteligente. ”Sincronizare” este un termen generic care corelează conceptele de persuasiune prin e-governance, scăderea gap-ului tehnologic, andragogia şi staging-ul arhitectural în scopul de a obţine obiectivul mai larg şi mai important acela de eficientizare a "managementului posibilităţilor" (Foucault).

Factorul de timp îl considerăm interesant de aplicat o dată relativ la decursul vieţii umane, şi pe de alta parte relativ la evoluţia tehnologiei văzută ca o desfăşurare în timp a procesului dinspre Lotek (low-tech) spre Hitech (high-tech). Personajul uman adult cu putere de decizie are o evoluţie temporală marcată de vârste, dinspre tinereţe către bătrâneţe. Tehnica pe care o foloseşte comunitatea (mai mică sau mai mare, în acest caz cea familială) a evoluat istoric, sau chiar pe parcursul vieţii personajelor, dinspre tehnica tradiţională, bazată pe cunoştinţe empirice şi manufacturare, către tehnologia avansată, industrială, digitală, cu marcajul corespunzător al revoluţiilor industriale culminând cu ultima, cea de-a patra.

Timpul relativ la viaţa umană şi relativ la progresul tehnologiei, este un factor important pentru identitatea locului inteligent, care există ca atmosferă în domeniul percepţiei (mereu predispusă la prejudecăţile experienţei), a experimentării (facilitată sau nu de dotările la îndemână) şi a informaţiei (accesibilă digital). Momentul în timp al ”intuirii” şi ”iradierii” atmosferei este definitoriu pentru calitatea ei.

Pe axa tânăr - bătrân (neexperimentat - experimentat) găsim asa-zisul conflict între generaţii, care în legătură cu e-government, se materializează prin opoziţia de atitudine între membrii tineri ai societăţii (care au o relativă apatie şi lipsă de interes şi de informaţie în legătură cu politica şi administraţia, evidentă prin absenteismul şi scăderea prezenţei la vot, accentuate în contextul pandemic din 2020) şi membrii seniori ai societăţii pentru care aceste subiecte sunt de mare interes. Sincronizarea pe această axă are ca aspecte pe de-o parte politici de persuasiune în scopul stimulării interesului tinerilor în evenimentele politice şi de

guvernare şi în selectarea informaţiilor media corecte, pentru evitarea dezinformării şi manipulării lor (principalele medii de manipulare sunt în prezent reţelele sociale, mediul pentru noul *modus vivendi* al tinerilor). Pe de altă parte, persoanele în vârstă şi care sunt interesate şi angajate social în procesul democratic si electoral, sunt cele mai defavorizate la capitolul accesului la tehnologie si la andragogie, cu precădere pe tema utilizării sistemelor informatice.

Avem deci o categorie socială paradoxal apatică a tinerilor, cu competenţe şi know-how în tehnologie, dublată de o mare capacitate de acumulare de cunoştinţe (la care ne referim cumva retoric când folosim termenul de mileniali), şi o categorie socială cu vârste înaintate (baby boomers) care sunt angajaţi în conversaţia şi discursul democratic, dar care nu deţin cunoştinţe despre utilizarea tehnologiei, decât în mică măsură. Aceste două categorii desincronizate sunt puse mai mult în dificultate, prin aşa zisa distanţare socială, mai exact fizică, prin izolarea în microsferele propriilor locuinţe, rezultând o mare masă socială cu dificultăţi în experimentarea democraţiei şi a avantajelor oferite de e-government. Putem aduce un argument pentru cele de mai sus prin sintetizarea datelor referitoare la prezenţa la vot în România în 2020 la alegerile parlamentare, unde în ciuda mizei importante actului electoral, am avut încă o scădere prin comparaţie cu ultimul an electoral. Nu putem spune că motivaţia ar fi anxietatea de îmbolnăvire, media raportând în mod constant o aglomerare îngrijorătoare de vizitatori în shopping mall-uri si alte locaţii. Vedem ca motiv desicronizarea, întreruperea comunicării şi susţinerii reciproce, atât materiale cât şi psihologice si informaţionale, în contextul distanţării fizice.

Aceste politici necesare de sincronizare a atmosferelor inteligente pot porni doar din domeniul educaţiei, cu o impulsionare a identităţii locului inteligent prin introducere în programa de învăţământ a educaţiei obligatorii despre politică şi guvernare, cu începere de la vârste timpurii, poate la aceeaşi vârstă la care copiii încep să utilizeze tehnologia avansată (tablete, telefon smart, etc); cealaltă jumătate de soluţie o constituie găsirea programelor optime de andragogie cu accent pe stăpânirea tehnologiei legate de informaţie, în aşa fel încât accesarea independentă a platformelor de guvernare şi a informaţiilor să poată fi făcută cu lejeritate fără discriminare legată de vârstă.

Pe graficul suprafeţelor generate de comportamentul atmosferelor inteligente, în urma introducerii factorului de bifurcaţie al preluării controlului de către tehnologie, observăm o zonă intermediară, un palier de comportamente atât de improbabile încât nu sunt luate în considerare. Adăugând o variaţie nouă, un aşa zis "*butterfly factor*", în teoria catastrofei, obţinem o nouă familie de suprafeţe de comportament, permiţând vizualizarea unui mod de depăşire a incertitudinii date de comportamentul specific cusp-ului. Un desen care să ne ajute să în vizualizarea noastră ar trebui să conţină cinci dimensiuni, dar putem aproxima o formă a suprafeţei de comportament dacă păstrăm constante două variabile. Un factor-fluture poate genera o suprafaţă restrânsă şi centrată pe tipul de identitate neutru caracteristic majorităţii unităţilor locative care constituie locul de desfăşurare a majorităţilor activităţilor umane în perioadele de lock-down caracteristice unei pandemii cum e cea din 2020.

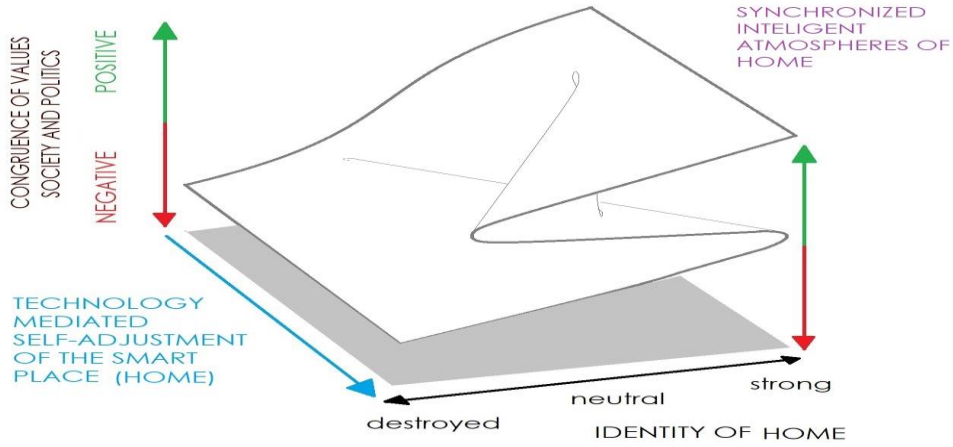

Fig. 5. Suprafața de tip fluture a comportamentelor rezultate din sincronizarea atmosferelor smart

2. Concluzii

Interpretăm posibilitatea existenței acestui palier de comportament echilibrat ca pe o șansă de reziliență în cele mai dificile condiții psihologice, acelea ale unei identități neutre a spațiului interior locuit, combinat cu lipsa interacțiunii sociale, a preluării controlului de către tehnologie prin platforme de tipul e-government, și a tulburărilor de congruență între valorile personale și cele urmărite de puterea administrativă. Sincronizarea atmosferelor inteligente împreună cu scoaterea identității locurilor din zona neutră poate oferi o șansă reală de supraviețuire în cazul unui eveniment pandemic mai grav decât cel din 2020.

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The role of the religious authorities and leaders in making or expanding new civilizations in the cyberspace

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Abstract

The cyberspace has now evolved to a level that has surrounded all aspects of human life. It can speed up generation and evolution of new cultures, identities and finally civilizations in such a pervasive level that it is not comparable with the same time-taking process in the past and while this is happening, there are many unknown information from unreliable resources that target the minds and the hearts of the masses directly without being answered or controlled in this space.

Having studied and used previous sociological findings, firstly we supposed that the culture and identity correlate to each other and together on the proper grounds, can make civilization. Secondly it is believed that now we have got two different worlds, stuck together, interacting one another, called the cyber world and the physical world.

In this research, we tried to categorize the characteristics of the cultural trends that are happening in the cyberspace and their impacts on formatting social phenomenon, in the physical or real world such as creating identity crisis etc.. We also studied the role of the religious leaders in making the civilizations by case studying the Holy Prophet of Islam and brought up some examples from Muslim leaders in making or expanding faith based civilizations.

Finally according to Islamic point of view, the religious authorities are authorized for the spiritual guidance and providing practical plans for the felicity of mankind, both for this material world and the Hereafter. And as the cyber world is another dimension of this material world, we conclude that the duties and concerns are the same but the means to fulfil the mission and the forms are different so we tried to adapt the circumstances and categories the damages and solutions in the cyber world to give outlines of a profound faith based civilization.

Keywords: *Cyber world, Culture, Identity, Spiritual guidance*.

1. Introduction

Since civilization is a manmade phenomenon the divine religions by their own, are not considered as civilization but they can facilitators and initiators of this phenomenon. Indeed this is the followers of the religions that can put forth their efforts to enforce the divine rules, make religious cultures, form the religious identity and finally with other elements including passage of needed time, make a strong faith based civilization to achieve felicity both in this world and in the hereafter.

The cyberspace or virtual space on the other hand has now progressed in such a vast level that rather than a media or technology, it encompasses all areas of human beings lives. Therefore some terms like cyber life contrary to real life is now used frequently everywhere. Many scholars believe that the physical world and the cyber world are such intertwined and interconnected to each other in all political, economic, social cultural and etc. that any activity in one world can cause changes in another in the shortest possible time. So regarding the consequences of the cyberspace on the culture and identity, we can witness how it is speeding up of the growth and expansion of the civilizations.

Here is the exact place that the questions of this article arises:

1. How does religion influence the generation and expansion of civilizations in the past and the present time?

2. Regarding the models taken from the behaviors of the religious leaders in the past, how can the religious authorities adapt their duties and missions in the modern cyber world?

2. Essentials

When we discuss the fundamental causes of the creation of the cyber world, we have no way to define the real world first. We would rather call it physical world because, contrary to real world is unreal world while virtual world with the forthcoming definition is a real world too but on a different realm.

2.1. The cyberspace

Cyberspace amorphous, supposedly “virtual” world created by links between computers, Internet-enabled devices, servers, routers, and other components of the Internet’s infrastructure. As opposed to the Internet itself, however, cyberspace is the place produced by these links. It exists, in the perspective of some, apart from any particular nation-state [1] Adding to that the “internet of things” as another new phenomenon in the cyberspace shows that this world not only surrounds the human life, but also it is extended to our things and goods. This technology has developed the communication functions that formerly was only transmitting message between sender and receiver, and promoted to various functions such as management of projects, requirements and human relations by smart utilization of things [2]

It also has dimensions that has to be emphasized on; one of which is its relation with the physical world that we are living in. The physical world is relied on constant reality and essence and belongs to the existence of the creation.

On the other hand, the cyber world differs from the physical world in the creation. Human wisdom based on perceptions, cognitions and conceptions created a hyper-real world named the cyberspace or virtual space that is a human-centered world that all the content there, is the result of the ideological actions and negotiations. Therefore the hyper-real world is built up of structural components and genuine elements [3].

This world can be defined as a decentralized extensive complex place where different individuals and groups with varied attitudes, beliefs and ideologies linked to it from all around the physical world without borders and use the data and produce content that in other words I can say they live in this space.

Using the term "live" and "virtual life" simultaneously with real life refers to the idea of two worlds stuck together and their mutual interactions. Having in mind that the most important feature of the cyberspace is being digital participatory space that everyone as stated above at the same time that uses the data can take part in content production like what we see in Wikipedia, Facebook and other social medias.

Cyberspace can make a unified global standard and is within everyone's reach everywhere so that even local cultures glocalize and turn in to international matters

2.2. Civilization

A word that in Persian is "Tamaddon" and in Arabic is "Al-Hadharah" and various scholars gave numerous definitions for it from different scopes. Some took it as deepest and most extensive level of social changes [4] and some believe it as a phenomenon including varied social, political, economic and cultural events during the history of human community [5]. Although all these being studied in the context of history, the civilization has a transhistorical nature apart from socio-historical developments.

Will Durant believed "Civilization is social order promoting cultural creation. Four elements constitute it: economic provision, political organization, moral traditions and the pursuit of knowledge and the arts. It begins where chaos and insecurity end."[6]

Although the term civilization in the contemporary meaning established after the 18th century, Abu Zaid Abd al-Rahman Ibn Khaldun an early Islamic sociologist, addressed the concept with the terms "Al-Hazara" and "Al-Omran". He believed civilization as the social or group-forming of human beings and started from Bedouin settlement. [7] He also considered "asabiyya" -a social solidarity- as the bond of cohesion among humans in a group-forming community and a the fundamental element in formation of civilizations at any level of civilization from nomadic society to states and empires. [8]

Allamah Muhammad Taqi Jafari, after separating the concept of civilization from culture, with a value-oriented approach defines the term as "a cohesion among humankind in their rational life, with fair relationship and collaboration of all persons and groups within the community in advancing material and spiritual objectives in all spheres. [9]

Malek Bin Nabi a contemporary Algerian thinker, takes "human", "ground" and "time" are principal components of a civilization. From his point of view, to make a new civilization, human beings and their wisdom and culture must change in the first phase. [10]

According to him, the lack of new ideas in Islamic thought and not the fundamental Islamic thoughts and Ideology, emerged the civilizational ruin in the Islamic world. He argued that in order to solve the problems of civilization and to recover its former magnificence, Islamic society has improve the three intellectual, practical and economic factors of development in the modern world and to become an environment in which individuals feel empowered [11]

2.3. Religious uthority

The religious authority in a general sense is a person who has passed the religious education and trainings in certain schools or with special teachers and professors. The one who is also involved with spiritual practices and lives a religious life and follows the religions instructions and grows to a certain level of knowledge and spirituality that he or she will be eligible to convey the divine message to people and guide the society. This instruction and enlightenment of the society will be attained by teaching them the rules, rituals, manners and behaviors by traditional methods and means or via modern technologies and borderless communication medias in the forms of audio, visual or written content. In Islamic tradition gaining knowledge is obligatory for every one and understanding divine rules is dedicated to those who possess intellect and wisdom. So from the verses of the Holy Qur'an and sayings of the Holy Prophet of Islam and His Progeny, we find out that; Everyone is advised and ordered to gain due knowledge to understand the correct way of living in this world and to achieve felicity in the hereafter. Otherwise if one is not able to do so, he or she has to refer to the eligible and qualified scholars and experts in this field and following those people is obligatory for them. And finally from another angle, the religious leaders and authorities have mission and duty to guide the individuals and the community.

In the Muslims' most holy scripture, Qur'an, God addressed the scholars and educated persons with different titles such as "*Ulema*"[12], "*A'limun*'' [13], "*Allazina Ya'lamun*" [14], which mean the scholars or those who have been given knowledge, "*Qaumun ya'qelun*" those who use reason[15], "*Qaumun yatafakkarun*" [16] those who think a lot and more importantly "*Ulul Al-Bab* " [17] which means those who possess intellect. One who possess intellect or intellectuals of the society have got characteristics and duties regarding the knowledge and intellect that God has granted to them and some of them briefly from the verses of the holy Quran are;

- those who fulfill Allah's covenant and do not break the pledge solemnly made [18]
- and those who join what Allah has commanded to be joined,
- and fear their Lord,
- and are afraid of an adverse reckoning[19]

In the Holy Quran (39:09) and (35:19) there are interesting comparison between two groups of people, first is between the ignorant and the educated and the second is between those who are blind in front of the truth and those who witness and have awareness and insight. In both verses God conclude that they are never equal and of the same value!. Thus the educated ones and owners of intellect and knowledge have different rank and therefore they have different extra responsibilities towards their knowledge and the people.

2.3.1. *Their responsibility towards their people*

Certain statements with same or similar wording, from The Holy prophet of Islam [20] and three infallible Imams (Leaders) of Muslims; Imam Ali [21], Imam al-Baqir [22] and Imam al-Sadiq(PBUH) [23] were quoted as saying repeatedly that "Zakat (Islamic tax) [24] of having knowledge is to spread that knowledge or teaching it to uneducated. In this statement, the prophet and the Imams analogized the financial possession to possession of knowledge and concluded that just as the owners of money must pay the legal Shariah based tax those who are granted with knowledge and intellect have to teach and guide the others as the tax of their knowledge.

2.3.2. *Their responsibility towards the society*

There are numerous sermons from the Holy Prophet of Islam and His infallible descendants quoted as saying that the "Scholars are inheritors of the prophets" [25].

Imam al-Sadeq(PBUH) added to that "take care of where the knowledge comes from, because in all times there are some good successors of us refraining our teachings from distortion of the misled persons or misinterpretation of the ignorant ones [26]. These sayings mean that as believed that just as the Prophets were responsible for religious and spiritual guidance of mankind, the educated persons with spiritual and knowledge standards have the responsibility and the duty to serve God and to save the individuals and the society.

2.3.3. *The people's obligation to refer to the knowledgeable*

The other side of the coin is that the people have to follow their religious leaders. This is a culture that the Holy Quran and the infallible leaders of the Muslim community insisted on as one of the principles of the faith based society and civilization. In the holy Qur'an (4:59) God ordered "O believers! Obey Allah and obey the Messenger and those in authority among you…". This was an order to obey God firstly, His messenger secondly and those in authority. Regardless of some interreligious disagreements in determining the examples of "those in authority", according to one narration proved by many Islamic evidences, this term refers to the progeny of the Holy Prophet firstly and to the eligible spiritual highly educated scholars who are aware of the Holy scriptures and knowledge and ability of understanding the rules and regulations secondly. As instance there is a statement narrated from the twelfth infallible descendant of the holy prophet to his followers, "In the events and crisis of the times refer to the ones who narrate our saying27

2.3.4. *Characteristics of the scholars that people must obey*

For sure narrating statements is neither logical nor according to what they meant was not enough. So this obeying and referring is to whom who rather than knowledge, have gained special level of piety and spirituality. Imam Hasan al-Askari(PBUH) was quoted as saying that " People should obey and follow the ones among the scholars of shariah law -jurists- who is more self-disciplined, religious, pious and obedient to his Lord, and not all the scholars have these criteria" [28]

3. The religious authorities and the civilization

As I brought up from different scholars of sociology and philosophy, they agree on some elements and factors in common. One of the main elements was culture that is an umbrella term and includes education and training, spiritual and moral traditions, art, ideology and etc.. The other principle that should bring in to notice is the concept of "building societies". Regarding Ibn Khaldun there must be a group-formed community with something he called asabyyah as the main elements of civilization. But according to contemporary scholars like Allama M.Taqi Jaffari, rational and justice oriented collaboration of all members of the society to achieve common objectives is the other bonds of making a society. This common objective and collaboration is the fruit of common identity and organizing the components of the society. And finally this is the religious authorities and scholars in all religions that can use all the modern facilities of cyberspace and etc. to unite the social solidarity and identity and make or expand faith based civilizations which will happen rationally by fulfilling the previous steps.

3.1. Building Culture

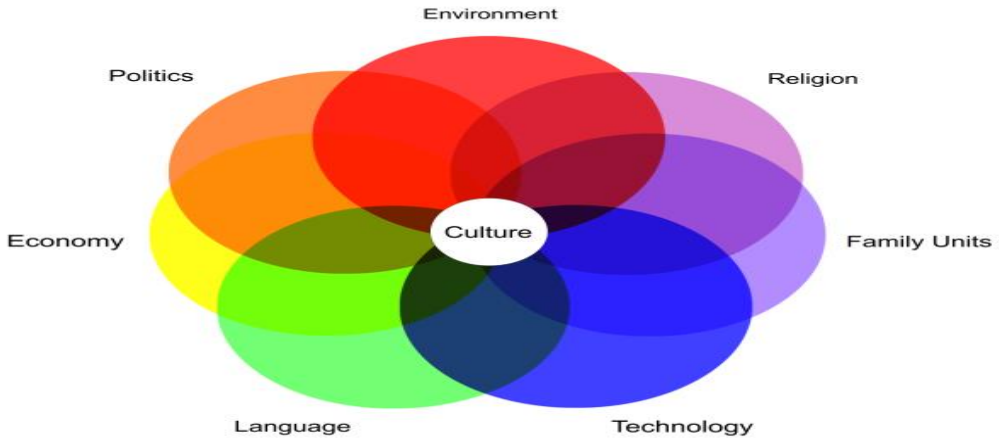

Diagram 1

Source:*https://luciennediver.net/2013/08/14/worldbuilding-workshop-part-i/*

Culture is a complicated matter that leads other fundamental and infrastructural human activities in the society. It's able to speed up or slowdown the procedures. Therefore building culture is one of the means for a society to attain its goals to make a civilization. Culture as Allama Jafari classified differs from civilization. Culture belongs to the life effects such as religion, art, language and literature and behavioral and ethical goals while civilization surrounds the whole society and communal systems and is technique and facility for human to dominate the circumstances [29]. It is also different from the identity but these three concepts have direct interconnection to each other and they effect one another. According to what mentioned about the obligations of the religious authorities it's their area of expertise to take care of culture and the effective elements on it such as religion, family, belief system of the community, economy and etc., whether in the physical world or via cyberspace. In a faith based culture the values and educational content must be based on the religious resources and scriptures. For instance the cultures based on divine religions promote a spiritual lifestyle that although takes care of material life, it's another concern is the hereafter and God satisfaction.

3.1.1. *Education*

In the faith based systems, education is on the first priority. In Islamic scriptures there are numerous content highlighting the value of education and the instructors. The very first verses of the Holy Qur'an that were revealed to Prophet Muhammad (PBUH) were ordering him to read "*Read in the Name of your Lord who created* [30] and then God mentioned "*He Who taught (the use of) the pen*" [31], "*Taught man that which he knew not*"[32] There are also other verses that I already discussed in the subject of the owners of knowledge and intellect that are other example of this priority.

As stated that the religions are not the civilization but they prepare the grounds and infrastructure for it, the Holy Prophet of Islam paid his main efforts in educating the society. He and his progeny stated "The scholars are inheritors of the prophets". There is another statement from Him saying that "*gain knowledge even by travelling to China, because seeking knowledge is obligatory for every Muslim*"[33]. Another instance is the public schools of Imam al-Baqir and Imam al-Sadiq (peace be upon them) that regarding the historical reports, they had nearly 4000 students came from varied locations. They were from different denominations of Islam that, and the lessons were in different fields of Jurisprudence, Quranic exegesis, Literature and Poem, Geography, Astronomy and physics and other sciences of the time [34].

3.1.2. *Training*

To have people of high culture, and to lead them have spiritual and religious life, they must be trained by eligible instructors and trainers. So in the faith based system, education and training and the means of education and educators are important. But regarding the Islamic Holy scriptures the instructors must first start education from themselves. There are a lot of Qur'anic verses advising the individuals to self-construction.

Spiritual Self-construction

In different verses of the Holy Quran and in the conduct of the Holy prophet as the initiators of the Islamic civilization, we see that they advise the individuals to fear of God and be pious, purify the intentions and actions from the sins, observing the Shari'ah laws and refrain from disobeying God. In the Holy Qur'an God ordered His messenger to say to people that "*I follow only what is revealed to me*" [35]. There are many other verses asking, suggesting or ordering the servants of God and especially those who are granted intellect and knowledge " *So be mindful of your duty to Allah, O men of understanding, that ye may succeed*" [36]. But the key point here is also in the holy Qur'an where the Holy prophet recite these verses to people that " *Will you bid others to piety and forget yourselves, while you recite the Book?...*"[37] teaching them a tutor and trainer must be whom firstly trained.

So faith, fear of God, piety and other moral values are the first priority for one who wants to make a powerful soul.

Construction of the society

When we talk about construction of the society what we mean is to institutionalize the religious spiritual and moral values in the private and public spheres of the lives of the individuals and in their relations with the community. So it requires its own planning and facilities. This mission could be accomplished by the interference of the religious leaders in three main places.

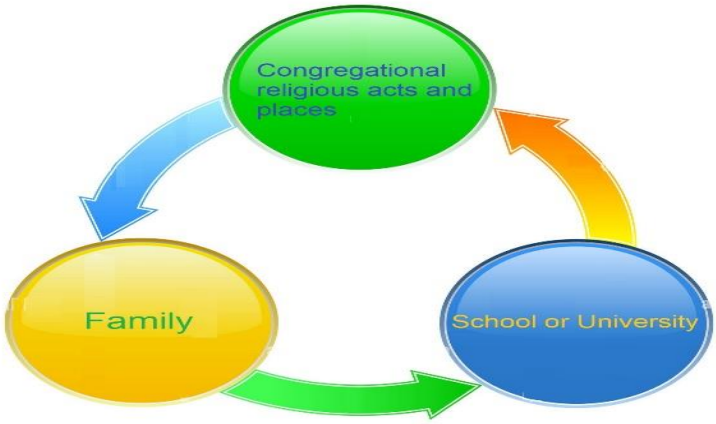

Diagram 2

Family

The first and the foremost and the basic social unit of each community and the target to all positive or negative cultural plan. The holy prophet of Islam was unique in revitalization of family and woman in a Bedouin nomadic community. He rebuilt the family on the respect between members especially towards parents and the value of woman as mother and wife. He stated "*The heaven is under the footsteps of the mothers*" [38] and Imam al-Ridha (PBUH) stated "The mothers' rights are the

most important and the most binding" [39] There are numerous sayings from Him and His progeny about the rights and the etiquettes of treating parents and in the Holy Quran there are special prescriptions especially when they have got elderly [40] He also stated "*to behave well with parents is one of the most loved acts for God*" 41]. These were all to keep to unity and solidarity of the family. When a family is safe the society will be safe.

To train human resources and to promote them to human capital, the process begins at the first unit which is the family. The goals like:

- believing in God and relying upon Him
- Self-confidence and self esteem
- Moral behaviors and religiosity
- Education
- Social and economic trainings
- Physical and spiritual trainings

Will be achievable only if the family is happy and the relations are safe. Because of that God ordered "*O ye who believe! save yourselves and your families from a Fire*" [42] and this is achievable only with education and training the family members starting from the parents even before the birth of children. This needs religious authorities emphasize their trainings on young couples and parents and then on children, because educated parents train educated children and educated children will grow up with spiritual values, then faith and morality becomes part of their personality and identity and this chain will conclude in faithbased culture and civilization.

School

One of the most important social, educational and training institutes and the fundamental pillar for education in different fields of religion, ethics, science, social behavior and culture in general is school. In this place talents are discovered, guided and flourished. The value system and the identity takes place at schools. In the early Islam the schools started right after its advent and the Holy Prophet was the first teacher and trainer of people and to construct the pillars of the Islamic civilization, He never missed any possible opportunity or facility to educate them. For instance its's reported that after the Battle of "Badr", He sat reading and writing instruction to 10 children of Medina, as for the redemption and ransom for the freedom of the captives. It is also reported that one day He saw two groups of people; one engaged with prayer and worship while the other were involved with education and knowledge. He decided to join the second group and stated "... educating is the prophets' career" [43]. At the beginning education was done in the mosques and later on as reported, the first so called schools derived from the mosques established in fifth century in some large cities in the Muslim world.

School and later the university are the main serious societies that children would experience and has close interconnection with home or family. Indeed the students will influence others by the culture and behavior they bring to school and they will also be affected by the manners of the others. Teachers, professors and religious instructors also can use the opportunity and guide the minds of the new generations from schools and universities.

Places of Congregational acts of worship

As for counterpart of Family and school I believe that both the congregational acts and places that gather people for a common religious and cultural purpose, are of the same importance. Being among other people with same intensions means being in a society. Doing congregational prayers gives a solidarity to that group and the more that gathering happens the more the sense of unity grows and the more the sense of unity grows, the interactions increase and with the increasing interactions, the manners and culture transfer among the members of that society and this harmonizes the cultures and identity to some extent, and with this community being extended, the basis of a civilization will be laid. That's why in early Islam, the Holy Prophet built a place called "*Masjid*" in Medina. Later his descendant Imam Sadiq(PBUH) stated: It is obligatory to prize the mosques because they are "*God's houses*" on the earth [44]. This Masjid was not only for daily prayers. It was a place for religious sermons, teaching and learning, resolving the negotiations and disputes among people and a place for residence of homeless as Imam Sadiq(PBUH) reported [45] and more notably it was the center of the Prophets leadership where the most important decisions were made in it. This means He established his civilization in the mosques as a society of Muslims. Later on, other elements of a civilization also crystalized in the mosques such as Islamic or religious art that manifested in architecture, calligraphy, painting and drawing in the inscriptions, music in Adhan and recital of Qur'an and even literature and poems [46]. In other words basically the divine worship places which normally gather people for spiritual construction are houses of God and centers for religious culture and identity; that's why they play vital role in constructing faith based civilizations.

3.2. Constructing society

Community and society both refer to a group-form of mankind but they are different phenomenon. According to Early German sociologist Ferdinand Tönnies, community or *Gemeinschaft*, is comprised of personal social ties and in-person interactions that are defined by traditional social rules and result in an overall cooperative social organization. The values and beliefs common to a community are organized around appreciation for personal ties, and because of this, social interactions are personal in nature.

On the other hand, society or *Gesellschaft*, is comprised of impersonal and indirect social ties and interactions that are not necessarily carried out face-to-face (they can be carried out via telegram, telephone, in written form, through a chain of command, etc.). The ties and interactions that characterize a society are guided by formal values and beliefs that are directed by rationality and efficiency, as well as by economic, political, and self-interests. While social interaction is guided by sentiments, or seemingly naturally occurring emotions in a community, in a society, rational will, guides it.[47]

According to Murtadha Mutahari, late Islamic scholar, "*a society consists of groups of human beings who are linked together by means of specific systems and customs, rites and laws, and have a collective social existence. He believed that human*

life is social in the sense that it is essentially gregarious. Human needs, benefits, satisfactions, work, and activity are social in essence, and the social system cannot be maintained but through division of labor, division of profits and a shared common satisfaction of needs within a particular set of traditions and systems. On the other hand, specific ideas and ideals, temperaments and habits govern human beings in general, giving them a sense of unity and integration. In other words society represents a group of human beings, who, under the compulsion of a series of requirements and under the influence of a set of beliefs, ideals and goals, are amalgamated with one another and are immersed in a continuum of collective life." [48*]*

So it is understood that the main issue as the matter of difference between the two concepts of community and society is the rational cohesion, consciousness and wisdom behind the relation of the members of the society contrary to the relations based on the personal ties and sensations in a community.

3.2.1. *Societal view on the rules*

No doubt that religions and mainly Islam has emphasized their effort on societal aspects of the rituals. Therefore the performing the acts of worship together with other believers is a lot more recommended in various divine religions. Prayer is the Pillar of the religions and although it is a solitary act of worship, performing it together with others is highly recommended. One of the sayings quoted from the Holy Prophet of Islam(PBUH) is that " the prayer of the neighbors of the mosques at their homes [without appropriate reason] is not accepted unless they take part in congregational prayer at the mosque [49] or narrated from Imam Sadiq(PBUH) that congregational prayer in the mosque [together with other people] is two times better and higher than congregational prayer at home[with household members] [50]. The manifestation of the Muslims' gathering is the Friday prayer. In the Holy Quran God ordered "*O you who have faith! When the call is made for prayer on Friday, hurry toward the remembrance of Allah, and leave all business*" [51] this means everyone has to abandon the occupation and profession to join the gathering of performing the Friday prayer that performing it individually is not permissible.

3.2.2. *Society based on religious identity*

The first and foremost step to strengthen the foundations of a society and to make people assume they belong to a homogenous characteristics which they share with the other members of a great group-formatted community is to grant them with common identity. The job that the Holy Prophet of Islam has done perfectly is proved by Qur'anic verses.

- Faith based brotherhood

The Holy Qur'an considers the believers in faith as brothers and stated "*The faithful are indeed brothers*" [52]. With saying that it blocked the way for any conflict and disagreement based on gender, tribe, skin color, race and etc. that divide the society.

- Just society

Only if a society is just and people feel socially, economically, judicially, politically and administratively fair they will be attracted to that society and they

will absorb the identity provided by the religious, geocultural and historical factors. "*Prophet Muhammad (PBUH) Stated A state will last with faithlessness but it won't last with oppression. The reason of the unpleasantness of oppression is that it disappoints the folks from working and trying to constructing the society and from revealing what abilities and talents God has granted them in the way of serving the country, nation and the human perfection."*[53]. The Holy Qur'an has ordered in several verses to observe justice in the society especially when disagreements happen among groups of believers. For instance it says " *And if two parties of the believers quarrel, make peace between them; but if one of them acts wrongfully towards the other, fight that which acts wrongfully until it returns to Allah's command; then if it returns, make peace between them with justice and act equitably; surely Allah loves those who act equitably*" [54] or more obviously orders "*O you who believe! be maintainers of justice, bearers of witness of Allah's sake, though it may be against your own selves or (your) parents or near relatives*" [55].

- Society based on religiosity

Unlike any other societies, in a faith based society, blood, family, tribe, gender, wealth, language and any other humanistic or material type of bond is void and the only valid covenant is faith and believe in God. This is the reason that the society of Prophet Muhammad(PBUH) which is called Ummah or nation of Islam is not limited to certain time or border "*And hold fast by the covenant of Allah all together and be not disunited*" [56]. These faith based societies are built on Obedience of God and refraining from evil deeds "*Certainly We raised an apostle in every nation [to preach:] 'Worship God, and shun fake deities*" [57], and the core of religion and shari'a law is following the Prophet of God, His progeny and the religious authorities of special standards and characters as it is said "*O you who have faith! Obey Allah and obey the Apostle and those vested with authority among you*" [58]. This is one of the special features of the faith based societies that there are some predetermined plans to defend the culture, belief system, values and the identity of the society.

- Moral values as core

A faith based society is founded on moral values and ethical manners. The main principle of the Islamic society and civilization is manners. It is in the Holy Qur'an that "*and indeed you possess a great character*" [59]. This "*great character*" was an exceptional and unique expression about a person in the Holy scripture and a principal factor of his civilization and every other civilization in a way that his successors, followers and companions during the times try to imitate and copy those ethical behaviors. So that we can say his character was making an identity in the society and what gathered people around the Prophet, was nothing but his great behavior "*It is by Allah's mercy that you are gentle to them; had you been harsh and hardhearted, they would have surely scattered from around you…*" [60].

3.3. Making Civilization

After an overview on culture and society I refer to civilization. As Samuel Huntington considered civilization on the highest rank in classifications and the most extensive cultural identity [61].Toynbee believes that civilization is the result

of the innovations of the innovative and genius minorities that means this level of people in the society cause and underlie the developments and the evolution of the societies.[62].

Malik Bin Nabi while separating the concepts of culture and civilization (just as Allama Muhammad Taqi Jafari did) holds cultures as the soul and spirit of civilization. Regarding his definition, civilization consists of a number of ethical and material elements that give the society the opportunities to facilitate every member at any stage of life, and provide them with their requirements for their growth from childhood to old ages; and it also protects human life and his national and religious personality and identity [63]. He also emphasized on the moral ethics as well as religion as two vital elements beside the other triple principles of civilization and believed that the principles could be gained at any situation but a bond to make all these factors move in one direction is not always available. [64] He believed the so-called secularism was an unsuccessful policy in western world, because where the states are separated from religion, they are indeed deviated from its social and civilizational functions. So he advised Muslim society to advance themselves equal to or higher than the level of civilization and then with their genuine principles of ideology, bring the civilization to a spiritual and intellectual transcendence and believe in God and establish a modern and divine civilization [65]. So it can be said that a civilization is a fruit of a society matured in the areas of culture, rationality, knowledge and science, and has a coherent management and economy based on a firm religious ideology. So as to achieve this, the Holy Qur'an and the Prophet of Islam had planned the steps to achieve a transcendent society contemporarily entitled as civilization. His great civilization has got some factors and elements as follows;

3.3.1. *Dignifying human as God's Caliph on the earth*

The word "Khalifa", its derivatives and synonyms, which means caliph or successor has been repeated 15 times in the Holy Qur'an. Regardless of the different ideas in how and to what extent that successorship is, it is stated "And when your Lord said to the angels, I am going to place in the earth a khalif "[66]. The early Islamic scholar and theologist Shaikh Toosi took that the state of being caliph of God, only belongs to a transcendent and perfect human that firstly has to be infallible and then one must possess superior knowledge (sourced from the revelation) and just like the Holy Prophet himself was appointed to the prophethood, must be appointed for this position and only a person like Prophet can diagnose and introduce him to people. [67]. But according to Ayatolla Jawadi Amoli, a contemporary scholar and theologist, this position and rank is granted to the human essence so it has levels and steps based of the degree of perfection one attains. This perfection transcends higher based on one’s capacity and the amount of divine knowledge that one gain from the attributes of God. The more a human transcends towards God, the closer he will get to the level of perfect man and the closer he gets to this level, the more he will authorized to affect the whole universe (by divine permission).[68] According to the above mentioned verse of Holy Qur'an, human is determined as the God's successor because he attained the God attributes; the knowledge that even angels were not capable of having it.

In other words human beings are in core of value and center of cause and effect in this universe by grace of God because they are caliph of Him, so they have to surrender to Him while they manage the world and implement the rules revealed by God and make the society in the way He prefers so that man will have felicity both in this world and in the hereafter.

3.3.2. *Expanding Human relation*

Prophet of Islam builds His civilization on the pillars of peace, tolerance and collaboration. He never took sword unless He examined all other peaceful solutions and the necessity of protecting the religion and the peoples' lives made him do so. As founder of a civilization he did the following procedures:

- Expanding political relations

In the tradition of the Holy Prophet of Islam diplomacy and dialogue was the first and the foremost priority. We are not going deep in analysis of these relations but just to classify them, we can say He started relations with the leaders of the great civilizations of that time. Instead of threatening or insulting or preparing for battle, He simply sent some verses of Qur'an, the document of His new civilization in a letter -which was indeed the only media of that time- inviting them to believe in the One God and the commonalities. He also tried to sign peace treaties with the followers other religions rather unless they entered battles against the new Muslim society.

- Cultural exchanges

One of the means of cultural exchanges is traveling. Prophet Muhammad (PBUH) stated: "Travel and you will be healthy and wealthy" [69]. This shows that traveling is a multipurpose or a multidimensional issue that can both extend in the knowledge and material possessions of the individuals. In the Qur'anic tradition order to travel has got explicit and implicit reasons and philosophies. The explicit reasons are classifies as:

1. To get lessons; whether from the destiny of the predecessors [70] or the fate of those who denied God [71] or the fate of the Guilty [72].
2. To awaken the wisdom and expand knowledge as said " *Do they not travel through the land, so that their hearts (and minds) may thus learn wisdom and their ears may thus learn to hear[73]?*"
3. To learn and understand how the creation was and how will the resurrection be as in the verse said " *Say: "Travel through the earth and see how Allah did originate creation; so will Allah produce a later creation: for Allah has power over all things."* [74].

But the implicit goals can be mentioned as expanding knowledge, communication of the people with other nations, mutual knowledge from the belief systems of the both sides, strengthening the political and economic ties, financial transactions, learning the reasons of rising and falling of the kingdoms and great civilizations and many other reasons that can be said and discussed in details.

- Equality of the mankind

One of the main teachings of the Holy Prophet and the main concerns of the Holy Qur'an for human beings is unity and equality. The equality itself as relative

concept needs a profound research and definition regarding various verses about it. But as an instance for us God has said "*It is He who created you from a single soul*" [75] and also "*O mankind! Indeed, We created you from a male and a female, and made you nations and tribes that you may identify yourselves with one another. Indeed the noblest of you in the sight of Allah is the most Godwary among you*" [76]. So one of the reasons of emphasizing on this equal standards is to keep the society firm and unified and to avoid divergence and battles based on differences and discriminations.

- Unity of mankind

As I already pointed out in equality, the second golden key that Prophet of Islam held was believing in the unity of human being based on have faith in God and Justice. "*Mankind were a single community; then Allah sent the prophets as bearers of good news and warners, and He sent down with them the Book with the truth, that it may judge between the people concerning that about which they differed, and none differed in it except those who had been given it, after the manifest proofs had come to them, out of envy among themselves*" [77]. According to Allama Tabatabaiee a great contemporary philosopher and interpreter of the Holy Qur'an, believed that people were also equal in the creation so that they had the same potentials and talents to understand and accept the oneness of God and be guided or deny it and go astray so they are considered on united ummah or nation [78]. Imam Ali(PBUH) glorified the h "*the best man with regard to me is he who is on the middle course. So be with him and be with the great majority because Allah's hand (of protection) is on keeping unity. You should beware of division because the one isolated from the group is (a prey) to Satan just as the one isolated from the flock of sheep is (a prey) to the wolf*" [79]. In his decree to Malik Ashtar (His commander that he set as Governor) He stated "*Do not stand over them like greedy beasts who feel it is enough to devour them, since people are of two kinds, either your brother in religion or one like you in creation*." and he believed in equal rights of humankind based on their unity of creation and he denied any discrimination even based on religion due to a disunity and unjust situation which it may cause in the society

- Brotherhood among Muslims

Another key which was very constructive among all was the brotherhood among his followers. This brotherhood spread a sense of coherence and cohesion to all the society during the times and works far beyond the physical borders. Qur'an insists that "*The faithful are indeed brothers. Therefore, make peace between your brothers*" [80] and beside all these preparations, very realistically predicts the disagreement and conflict among groups of believers so orders other Muslims not to keep silent and interfere in order to give solution "*If two groups of the faithful fight one another, make peace between them. But if one party of them aggresses against the other, fight the one which aggresses until it returns to Allah's ordinance*." [81]. There are also festivals like Ghadir that Muslims make brotherhood contract with each other and that contract would last till the day of resurrection and they intercede one another according to the Prophetic tradition. There are numerous evidences like these, regarding the importance of maintaining brotherhood among the Muslims.

- Communication and dialogue

One of the unique aspects of Islamic civilization is its open arms towards the dialogue, mutual collaborations and academic talks. It is a general rule for the

believers to listen to others words and use their intellect in selecting the best among the good and better; "*So give good news to My servants who listen to the word [of Allah] and follow the best [interpretation] of it. They are the ones whom Allah has guided, and it is they who possess intellect*" [82]. God ordered His Prophet to invite the people of the book to the commonalities as saying "*Say, 'O People of the Book! Come to a common word between us and you: that we will worship no one but Allah, that we will not ascribe any partner to Him, and that some of us will not take some others as lords besides Allah*" [83]. Thus the most important common issue is to worship the same God and the belief system based on the monotheism, which has the concepts of obedience, surrender, submission and trust in God. Therefor the believers can come together and discuss these issues and the related matters and share the ideas to get closer and gain more knowledge of each other and remove misunderstandings and this way they try to remove atheism, fabricated anti religion identities and to achieve the supreme goal that is to build a faith based modern civilization.

- Portray the ideal civilization

Providing an ideal image of a society is one of the powerful means of giving motivation and identity to the individuals to strengthen social bonds among them to achieve the communal goals one of which is to promote them equal to or higher than the level of civilization. Therefor the concept of utopia is coined and used by sociologists. But the main difference here is that the ideal civilization is achievable with the concept of Saviorism and the promised Savior which is an accepted principle in many divine religions contrary to fictional imaginary concept of utopia which means non-existent society. In Holy Qur'an God said " *And We wished to be Gracious to those who were being oppressed on the earth, to make them leaders (in Faith) and make them heirs*"[84]. Many of the Islamic thinkers and interpreters adapt this with the apocalyptic narrations in the Holy scriptures of Torah and Bible about the last savior of mankind who will return and will co-construct the great human civilization with Jesses the Messiah. In the Prophetic statements and His progeny's sayings, this promised civilization has got detailed financial, social, cultural, political and scientific attributes that is beyond the scope of this article. But nevertheless we needed to have a glance at it because the main points are:

1. This civilization is going to turn against the cruelty and oppression in the world and is about to make a world leadership and civilization based on human dignity, friendship, equity and equality, respect of the nations and the cultures, pervasive wealth and happiness.
2. The maturity of wisdom and rationality by promoting science and knowledge in the society. It is a very important saying as quoted from Imam al-Sadiq (PBUH) that "*Knowledge is [if imagined as] twenty seven portions, all of what the Prophets provide the human beings with and what they themselves will discover won't exceed more than two portions, so when the last savior (who is from us) arises, he will provide the mankind with the twenty five left portions including two extra portion*" [85].

4. The cyberspace

As we discussed in the essentials, the cyberspace is a digital, abstract, immaterial, infinite and decentralized place made of interactive social communications of human beings with each other and also with the objects beyond the time and place barriers. So prior to distinguish the religious authorities effects in the cyberspace, I depict some relevant features and attributes of the cyberspace in the below table;

Table 1. Some attributes of the Cyberspace

	Features and Attributes	Description
1-	Interactive	Users at the same time play both roles of Producers and customers of the virtual content
2-	Multimedia	This feature increases the effectiveness and the intensity of involvement of the users. This place not only involves eyes and ears but also other five human senses in a way that human will become a part of this world.
3-	Beyond the time and place barriers	Time and place barriers were destroyed and disappeared in this world. Content produced is available any time anywhere without limitations.
4-	Mutual Impact with physical world	This is an independent but stuck to physical world, so they impact one another.
5-	Personalizing	The user can manage how to receive and send the data

Source: Educational impacts and outcomes of cyberspace in the realization of new Islamic civilization, Scientific Journal Of New Islamic Civilization Fundamental Studies(Bi-quarterly), Vol.3, No.1(Serial 5), Winter and Spring 2020

4.1. The cyberspace and civilization

The cyberspace's increasing influence and impact on every aspect of human life in the last two decades is so extended that that it turns in to one of the means of culture transfer, change and transformation. According to Castells, modern network communications contain cultures, values and various designs and ideas arising from different minds and participants. [86]. By the developments in the mass media technologies, the cultural changes become one of the main issues of human beings. The cyber world theorists and policy makers also planned for future governments in the cyberspace. Usage of internet and its influence is increasing day by day. For instance rate of internet in Iran is 88.86% and 73.16% of that belongs to connections via mobile phones. Regarding the statistics among the Western Asian countries, 66% are seriously using Internet, and countries like Indonesia, Malaysia, UAE, Egypt, Turkey and Saudi Arabia are above the global average and they have users spending more than 6 hours with internet. [87]

Therefore we cannot negate and somehow not neglect the vital role of the cyberspace in making, expanding or changing civilizations in the modern times. In other words the new civilization has got two dimensions;

- Physical or I resemble to hardware which includes the scientific inventions, economic, political and military developments and international achievements.
- Spiritual or what I resemble to software of this process which include family, culture, lifestyle, consumption pattern, clothing and fashion, belief system etc.

Based on the above classification, what is called new civilizations will take place or contemporary civilizations will change undoubtedly. This change and its facilitators are neither always desirable nor stoppable. In the Holy Quran the believers were ordered "*But why should not there a group from each of their sections go forth to become learned in religion, and to warn their people when they return to them?*" [88], So if the cultural and religious authorities neglect and hesitate to join the trend in order to guide it not to be immersed in its waves, then soon it gets late. The history shows that at any civilization especially in Islamic civilization, the scientific developments was a significant part of the culture of that time at that society, so it is obvious fallacy that we think of civilization in the contemporary time excluding the modern communication technologies and the cyberspace.

4.2. Cyberspace and social consequences

As its predictable the cyberspace can have negative consequences. One of the greatest achievements of modern world based new communication technologies is globalization. The whole world now connected point to point so a person from thousands of miles away can have stable audio-visual connection to another person on the other part of the world in a fraction of a second. Complicated political equations take place based on this but there are numerous crisis for the humanity that I point out here very briefly;

1. Isolation: although one can communicate with many, but that many is via cyber world and the impact of that in the real world is that the more one gets involved in cyber communications, the more isolated he or she will be in the physical world. This way his societal and sociable personality will damage.
2. Identity crisis: one of the consequences of damaged social ties and communal personality is changes in the identity. According to the facilities that internet provided for individuals, they can fabricate various identities there and this frequently happens for those whom their original identity harmed in the real society. [89]
3. Multiculturalism: Communication with global community, for those who do not have enough information, gradually loosen firstly their local and ethnic and secondly in a broader sense their religious and national culture and identity dependence. Finally there will be a society with culture mixture of values and beliefs of different schools many of which do not have solemn roots and basis. This will impact one's family and social behavior and culture and can change the way of a society from being a civilization to an anarchical system.

5. Findings: solutions as functions of religious authorities

According the potentials of the cyberspace, and adapted from what we get from the conduct of the Holy Prophet of Islam, the religious authorities have the mission to help and guide societies to grow to the level of civilization through the following procedures:

1. Education

The religious authorities must use the most recent facilities to educate people. Now that Online education gives the opportunities to them, they can do the following actions:

- Providing online classes for ordinary people
- Training midlevel instructors for cyberspace instructions
- Training religious web designers and game designers
- Holding webinars and online lectures
- Stablishing and developing online worship places and online schools

2. Content Production

One of the mission religious authorities and the means of spreading knowledge and media literacy, is to produce proper content. With no prejudgment about the modern facilities, a religious authority must be a pioneer in getting introduced with the new technologies and without west of time personalize it and adapt it with religious functions and provide its fruits for the masses. There should be lots of interactive modern applications based on the latest education technologies for teaching religion that for instance using the latest gamification technology in designing religious tutorial apps that even young children would eager to have them installed on their tablets or smart phones.

3. Interfaith connections

As we discussed a movement against atheism won't happen and a global faith based civilization wont form unless a harmony and rather a collaboration and coherence among the followers of the divine religions happens. If that collaboration and harmony happens even the warmonger regimes of the world would bow to it. Moreover the cyberspace paved the grounds for continuous, stable interactions between the followers of truth and justice all around the world so there is no excuse but our short comings or selfishness to continue this divergence.

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Coridor de mobilitate urbană integrată în municipiul Alexandria și proiecte complementare aflate în implementare

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Abstract

Proiectul are ca scop constituirea unui corridor de mobilitate integrat alcătuit din propuneri investiționale care, complementar cu coridorul verde inființat prin proiectul aflat în implementare " Reducerea emisiilor de carbon în municipiul Alexandria, prin adoptarea unui transport public ecologic", sprijină transportul public în comun, circulația bicicliștilor și a pietonilor, în scopul reducerii traficului rutier auto și reducerii emisiilor de CO2, dezvoltând mobilitatea urbană și răspunzând astfel direcției de dezvoltare a transportului urban" Alexandria- un oraș verde, fără poluare, cu mobilitate crescută pietonală și velo și accesibilitate ridicată a tuturor zonelor urbane" și obiectivelor strategice ale Planului de Mobilitate Urbană Durabilă, cât și a viziunii de dezvoltare a municipiului de creștere a calității vieții locuitorilor, cuprins în Strategia de Dezvoltare Locală.

Obiectivul general al proiectului *constă în creșterea numărului de utilizatori ai transportului în comun ca urmare a realizării unor măsuri destinate încurajării utilizării transportului alternativ.*

Obiectivele specifice *sunt stabilite în conformitate cu obiectivul general al proiectului propus și urmăresc dezvoltarea sistemului de transport velo prin realizarea de piste de biciclete și sistem de închiriere biciclete; creșterea gradului de siguranță prin implementarea unui sistem de monitorizare video; accesibilitate și confort pentru pietoni prin modernizarea spațiului pietonal al zonei centrale, prevăzut cu sisteme de siguranță care să împiedice accesul auto pe trotuar și cu un sistem de iluminat public pentru confortul utilizatorilor; îmbunătățirea spațiului urban prin asigurarea de spații verzi.*

Realizarea de construcții verzi, sustenabile, cu funcțiunea de parcare, constituie și ele un obiectiv, întrucât dezvoltarea infrastructurii urbane verzi în sistem clasic, sub formă de parcuri, grădini publice sau zone de recreere cu verdeață a început să devină o misiune imposibilă din lipsa efectivă a zonelor neconstruite. În aceste condiții, soluțiile care mai pot asigura, pe termen lung, habitate verzi viabile, cu toate avantajele spațiilor

vegetale, sunt cele care încorporează clădirile în ecosistemele urbane, prin amenajarea acoperişurilor vii şi/sau faţadelor verzi.
***Rezultate**. Efectele pozitive previzionate prin realizarea obiectivului de investiţii, vor fi: dezvoltarea mobilităţii urbane prin schimbarea accentului de la o mobilitate bazată în principal pe utilizarea acestora la o mobilitate bazată pe mersul pe jos, utilizarea bicicletei ca mijloc de deplasare, sisteme de transport de înaltă calitate şi eficienţă; sporirea capacităţii de circulaţie prin mărirea fluenţei traficului; scurtarea duratei medii de călătorie reducerea costurilor de călătorie cauzate de uzură şi consum de combustibil prin eliminarea staţionării nenecesare în trafic şi a utilizării excesive a motoarelor la ralanti; realizarea unui confort pentru participanţii la trafic- autovehicule şi pietoni; mărirea siguranţei circulaţiei; reducerea numărului de accidente; îmbunătăţirea mediului din municipiu prin reducerea noxelor şi a poluării sonore, reducerea insulelor de căldură umană, reducerea expunerii la radiaţia UV datorită pereţilor verzi ai parcărilor ecologice; creşterea nivelului de trai şi a confortului riveranilor;*

***Cuvinte cheie:** management trafic, mijloace de transport nemotorizate, parcări verzi, modernizare spaţiu pietonal*.

1. Introducere

1.1. Necesitatea şi oportunitatea promovării investiţiei

Majoritatea oraşelor din Romania, se confruntă cu probleme, ca urmare a unor procese de transformare, determinate de dezvoltarea economico-socială din ultimele decenii. Totodată oraşele se confruntă cu o mare fluctuaţie demografică, influenţată mult de calitatea vieţii, oamenii preferând să locuiască în oraşe care arată civilizat şi care sunt adaptate vremurilor şi cerinţelor actuale.

Proiectul "*Coridor de mobilitate urbană- strada Libertăţii- strada doctor Stâncă*" cuprinde propuneri investiţionale din *Planul de mobilitate urbană durabilă al Municipiului Alexandria* [2], completat în urma analizei situaţiei existente cu proiecte complementare, care alcătuiesc un coridor de mobilitate integrat, considerat strategic la nivelul Municipiului Alexandria.

Proiectul integrează propuneri investiţionale destinate dezvoltării mobilităţi urbane, prin crearea unei reţele de piste de biciclete, prin modernizarea unor trasee pietonale, în scopul reducerii traficului rutier cu autoturisme şi reducerii emisiilor de C02 în Municipiul Alexandria şi infiinţarea unui coridor de mobilitate integrat, complementar “coridorului verde" ce se realizează prin proiectul *Reducerea emisiilor de carbon in Municipiul Alexandria, prin adoptarea unui transport public ecologic*, cod SMlS 128167. Alegerea categoriei de importanţă a construcţiei se face în conformitate cu prevederile din Legea nr. 10/1995 actualizată cu Legea 163/2016 privind *calitatea în construcţii* şi în baza "*Metodologiei de stabilire a categoriei de importanţă a construcţiilor*" din "*Regulamentul privind stabilirea categoriei de importanţă a construcţiilor*". [4]

Luând în considerare faptul că dezvoltarea în perspectivă a Municipiului Alexandria presupune şi necesitatea îmbunătăţirii condiţiilor şi calităţii vieţii [1], cu atingerea obiectivelor de dezvoltare a transportului, prin modernizarea şi dezvoltarea infrastructurii rutiere şi prin realizarea unor căi de comunicaţie moderne, este necesară modernizarea şi reabilitarea drumurilor de interes local din municipiul Alexandria, în ceea ce priveşte circulaţia nemotorizată şi realizarea unor construcţii verzi, sustenabile, cu funcţiunea de parcări supraterane - soluţie adoptată pentru fluidizarea traficului urban.

1.2. Prezentarea contextului: politici, strategii, legislaţie, acorduri relevante, structuri instituţionale şi financiare

În vederea acordării sprijinului financiar pentru elaborarea documentaţiilor tehnico-economice, U.A.T. Municipiul Alexandria, în calitate de partener, a aplicat la finanţare în cadrul proiectului *"Sprijin la nivelul regiunii Sud-Muntenia pentru pregătirea de proiecte finanţate din perioada de programare 2021-2027 pe domeniile mobilitate urbană, regenerare urbană, centre de agrement/baze turistice (tabere şcolare), infrastructură şi servicii publice de turism, inclusiv obiectivele de patrimoniu cu potenţial turistic şi infrastructură rutieră de interes judeţean, inclusiv variante ocolitoare şi/sau drumuri de legatura- 5D1"*, în cadrul Programului Operaţional Asistenţă Tehnică 2014-2020, Axa Prioritară: 1. *Întărirea capacităţii beneficiarilor de a pregăti şi implementa proiecte finanţate din F.E.S.I. şi diseminarea informaţiilor privind aceste fonduri*. Obiectivul specific: 1.1 *Întărirea capacităţii beneficiarilor de proiecte finanţate din F.E.S.I. de a pregăti şi de a implementa proiecte mature*. [5]

Mobilitatea urbană este expresia dezvoltării unui sistem de transport solid, ecologic şi eficient, prietenos cu mediul, dar în acelaşi timp statornic şi traditional, asigurând un echilibru între valorificarea modurilor şi infrastructurii de transport tradiţionale cu necesitatea de modernizare şi asigurare a consumului eficient de resurse şi promovarea modurilor de transport nepoluante.

Proiectul cu titlul "Coridor de mobilitate urbană integrată- strada Libertăţii-strada Doctor Stâncă" este complementar cu proiectele aflate în implementare, cu finanţare din P.O.R. 2014-2020 [6], şi anume: "*Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic*"; "*Amenajare peisagistică parc fosta U.M. în Municipiul Alexandria*"; "*Îmbunătăţirea condiţiilor infrastructurale pentru comunitatea din zona blocurilor 100 din Municipiul Alexandria*"; "*Modernizare, extindere, dotare şi amenajare, curte interioară la Gradiniţa cu Program Prelungit- Ion Creangă*"; "*Achiziţie mijloace de transport public-autobuze electrice 10 m şes, Alexandria, Brăila, Constanţa, Drobeta Turnu Severin, Focşani, Slobozia*"; "*Reţea de iluminat public în incinta fostei U.M. în Municipiul Alexandria*"; "*Reabilitare termică sediu Primărie în Municipiul Alexandria*".

Propunerile investiţionale descrise mai sus, sunt cuprinse în Planul de mobilitate urbană durabilă al Municipiului Alexandria pentru perioada 2014-2020, aprobat prin HCL nr. 2801/10.10.2017 şi actualizat prin H.C.L. nr. 201/ 18.08.2021 [2], respectiv în Strategia de Dezvoltare Locală pentru perioada 2021-2027, aprobată prin H.C.L. 202/18.08.2021 [1] şi integrează intervenţiile cuprinse în

coridorul de mobilitate integrat, considerat strategic pentru municipiul Alexandria, Coridor de mobilitate urbană integrată- strada Libertății-strada Doctor Stâncă", aprobat prin H.C.L. nr. 248/17.08.2020.

1.3. Obiective preconizate a fi atinse prin realizarea investiţiei publice

Proiectul propus are ca scop constituirea unui coridor de mobilitate integrat alcătuit din propuneri investiţionale care, complementar cu coridorul verde înfiinţat prin proiectul aflat în implementare, "*Reducerea emisiilor de carbon în Municipiul Alexandria, prin adoptarea unui transport public ecologic*", sprijină transportul public în comun de călători, circulaţia bicicliştilor, circulaţia pietonilor, în scopul reducerii traficului rutier cu autoturisme şi reducerii emisiilor de C02 în Municipiul Alexandria, dezvoltând mobilitatea urbană şi răspunzând astfel direcţiei de dezvoltare a transportului urban *"Alexandria- un oraş verde, fără poluare, cu mobilitate crescută pietonală şi velo şi accesibilitate ridicată a tuturor zonelor urbane*" şi obiectivelor strategice ale Planului de Mobilitate Urbană Durabilă [2], cât şi viziunii de dezvoltare a municipiului de creştere a calităţii vieţii locuitorilor cuprins în Strategia de Dezvoltare Locală [1].

Proiectul contribuie la scăderea emisiilor de carbon cu aproximativ 2%, fără a genera o creştere a acestor emisii în alte zone din municipiu, şi a gazelor cu efect de seră prin investiţiile destinate dezvoltării mobilităţii urbane, prin crearea unei reţele de piste de biciclete, prin modernizarea unor trasee pietonale în scopul reducerii traficului rutier cu autoturisme şi reducerii emisiilor de C02 în Municipiul Alexandria, şi vizează infrastructura pentru autovehicule ecologice, prin achiziţionarea şi instalarea a 6 staţii de reîncărcare cu 12 puncte de alimentare/reîncărcare a autovehiculelor electrice ale populaţiei şi amenajarea locurilor de parcare aferente, precum şi realizarea unor construcţii verzi cu funcţiunea de parcări supraterane. Astfel obiectivul proiectului constă în reducerea ernisiilor de carbon în Municipiul Alexandria prin investiţii bazate pe Planul de Mobilitate Urbană Durabilă al Municipiului Alexandria.

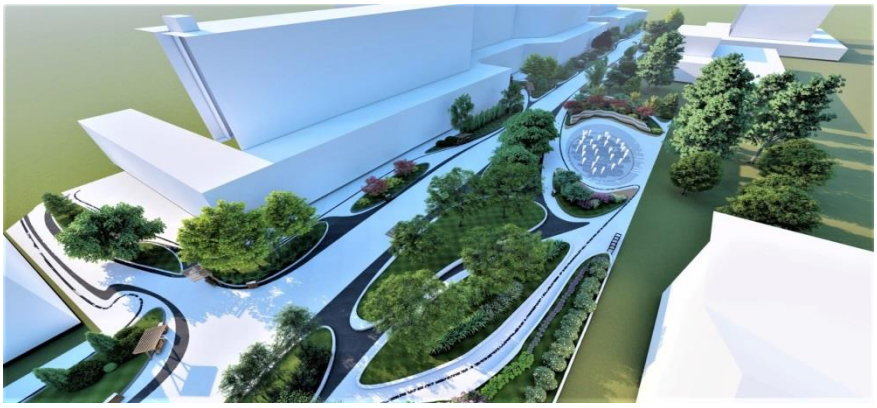

Fig. 1. Modernizare zona pietonală strada Libertății
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

Grupul ţintă vizat prin proiect este reprezentat de cetăţenii Municipiului Alexandria, cât şi cei aflaţi în tranzit, utilizatori ai infrastructurii serviciului de transport public urban, utilizatorii de mijloace de transport nemotorizate.

2. Soluţia tehnică, din punct de vedere tehnologic, constructiv, tehnic, funcţional- arhitectural şi economic

Proiectul cuprinde configurarea/reconfigurarea infrastructurii rutiere în vederea înfiinţării unui coridor de mobilitate integrat pentru circulaţia cu biciclete şi circulaţia pietonală, construirea a 6 staţii bike-sharing pe traseul coridorului de mobilitate- strada Libertăţii şi strada Doctor Stâncă, amenajarea şi modernizarea căilor de circulaţie pietonale, pe traseul coridorului de mobilitate şi amenajarea pistelor pentru ciclişti, reabilitarea infrastructurii urbane de utilităţi publice (iluminat public, apă şi canalizare, puncte de colectare deşeuri urbane, wifi, monitorizare video), mobilier stradal urban, achiziţionarea şi instalarea staţiilor de încărcare cu 12 puncte de alimentare/reîncărcare a autovehiculelor electrice ale populaţiei şi amenajarea locurilor de parcare aferente în zonele: str. Libertăţii cu strada Bucureşti, str. Ion Creangă cu str. Libertăţii, str. Doctor Stâncă, descongestionarea traficului în zona centrală în vederea creşterii capacităţii de circulaţie a străzilor prin amenajarea pe traseul coridorului de mobilitate a unor construcţii verzi, sustenabile cu funcţiunea de parcări supraterane- în zonele str. Libertăţii cu strada Bucureşti, str. Ion Creanga cu str. Libertăţii, str. Doctor Stâncă zona bloc M9 şi implementarea unui sistem de bike-sharing şi a unui sistem smart-city(inclusiv un sistem pentru gestionarea parcărilor) pe traseul străzilor Libertăţii, şi Doctor Stâncă.

Zona pietonală a străzii Libertăţii va fi tratată unitar şi va fi ridicată la standardele moderne, astfel, ca soluţie de reabilitare se va asigura o îmbrăcăminte pietonală modernă, având o suprafaţă de rulare fără denivelări, pantele transversale şi longitudinale fiind astfel amenajate încât să permite scurgerea apelor de pe suprafaţa pietonală. La nivelul reţelelor edilitare acestea vor fi aduse la parametrii optimi de funcţionare şi performanţă, iar acolo unde este cazul se vor aduce în plus îmbunătăţiri.

Alveolele pentru spaţii verzi vor fi delimitate cu parapeţi din beton armat şi cu borduri din bazalt. Prin proiect se va urmări realizarea unor declivităţi în profil longitudinal şi transversal care să asigure scurgerea şi evacuarea rapidă a apelor pluviale de pe suprafaţa pietonală. Din punct de vedere architectural se va face reconfigurarea alveolelor ce delimitează spaţiile verzi într-o nouă manieră în vederea accentuării şi conturării unui traseu de parcurs pe toată lungimea pietonalului şi amenajării pe parcursul întregului traseu a unor zone de interes. Se va dota spaţiul pietonal cu mobilier urban smart.

Fig. 2. Modernizare zona pietonală strada Libertății
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

Pe locul fântânii arteziene existente se va construi o nouă fântână arteziană muzicală cu jocuri de lumini şi culori. Se vor realiza alte doua fântâni pe tronsoanele de la extremităţi ale pietonalului. Fântânile arteziene vor fi încastrate în pardoseală, respectiv cu bazin de apă, suprafaţă perfect integrată în peisajul architectural gândit. Acestea vor fi prevăzute cu sisteme individuale de pompare şi iluminare.

În ceea ce priveşte sistemul de iluminat public acesta va fi refăcut şi adus la standardele actuale. Astfel, iluminatul public ornamental se va realiza cu coloane luminoase cu iluminat la 360 grade, unele dintre ele având opţiunea pentru supraveghere video, boxe şi WlFI. Din punct de vedere architectural, iluminatul se va face cu corpuri de iluminat încastrate în paviment şi în spaţiile verzi pentru o mai bună punere în valoare a diverselor obiective din zonă (statui, ornamente florare, etc), cu globuri luminoase şi cu corpuri de iluminat ascunse în scafe de lemn.

Fig. 3. Modernizare zona pietonală strada Libertății
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

Proiectul va conduce, pe lângă îmbunătăţirea parametrilor de stare tehnică, la creşterea capacităţii de circulaţie şi a fluenţei traficului cat si la creşterea atractivităţii şi competitivităţii transportului public, cu obiectivul operaţional final de creştere a cotei sale de piaţă.

2.1. Infrastructura urbană de utilităţi publice

În urma derulării proiectului privind dezvoltarea urbană, amenajarea trotuarelor şi crearea unor piste dedicate pentru biciclete, acestea se vor echipa cu instalaţie de iluminat public, conform planurilor de instalaţii electrice.

Tema proiectului cuprinde identificarea posibilităţilor, mijloacelor, echipamentelor şi tehnologiilor care să ducă la implementarea municipalităţii privind realizarea sistemului de iluminat public dedicat pietonilor şi bicicliştilor şi a parametrilor tehnico-financiari ai infrastructurii sistemului de iluminat aparţinând obiectivului „*Coridor de mobilitate integrată- str. Libertăţii- str. Doctor Stâncă*", administrat de Municipiul Alexandria.

Soluţia tehnică va consta în asigurarea nivelului minim de iluminare coroborat cu optimizarea consumurilor de energie electrică; pretabilitatea elementelor infrastructurii sistemului de iluminat public la upgarade şi îmbunătăţirea performanţelor în utilizare; pretabilitatea elementelor la telemanagement: telegestiune, monitorizare şi control.

Proiectul tratează şi punctele de colectare a deşeurilor urbane- ansamblul de platforme supraterane de colectare a deşeurilor va dispune de un sistem de monitorizare. Sistemele vor fi dotate cu un soft care ajută firma care se ocupă de colectarea gunoiului. Softul oferă informaţii în timp real referitoare la gradul de umplere al fiecarui container de gunoi, la poziţionarea camioanelor de colectare- cărora le şi optimizeaza ruta în funcţie de tipul de gunoi pe care îl colectează. Acest lucru vine în beneficiul colectării selective şi scade într-o proporţie foarte mare cheltuielile firmelor de colectare, timpul investit, dar şi poluarea cauzată de vehicule şi nu numai.

Elementele de mobilier urban integrat în cadrul proiectului vor conţine dispozitive hardware şi software care să permită funcţionarea reţelei de wifi zonal/local în jurul mobilierului (bănci smart). Sistemele de monitorizare video vor fi de tip compacte şi modulare, integrate în sistemul de stâlpi pentru iluminat pietonal şi velo. Aceste sisteme de monitoarizare video au ca scop supravegherea şi monitorizarea traseelor modernizate din cadrul proiectului, iar poziţionarea lor se va face în punctele de interes, intersecţii, deschideri către piaţete, parcări, etc.

2.2. Statii de încărcare vehicule electrice

În cadrul proiectului, vor fi montate staţii de încărcare rapidă pentru autovehicule electrice în parcările existente, puterea necesară pentru o staţie fiind de aproximativ 150 kW. Pentru asigurarea funcţionalităţilor din cadrul parcărilor şi dezvoltarea infrastructurii de alimentare, vor fi instalate puncte de alimentare pentru parcări ecologice.

2.3. Mobilier stradal urban

În urma analizei situaţiei existente din punct de vedere al vegetaţiei şi al mobilierului urban au fost identificate spaţii verzi inaccesibile, arbori insuficienţi, nivel scăzut al iluminatului public, cabluri aeriene; mobilier urban aproape inexistent, învechit, care nu corespunde cerinţelor funcţionale, tehnice şi estetice a unui concept unitar modern, absenţa traseelor dedicate pentru biciclişti. Prin proiect se urmăreşte crearea unor spaţii optim rezolvate, funcţional şi estetic, cu impact pozitiv deosebit asupra mediului natural şi social, mărirea confortului urban şi îmbunătăţirea calităţii mediului.

Prin traseul de biciclete propus se va realiza o conexiune mult mai favorabilă între cele două părţi ale oraşului. Coridorul propus pentru deplasări nemotorizate are rolul să unifice spaţiul şi să îl structureze, în contextul mai larg al oraşului. Dacă la nivel local ele acţionează ca punct de atracţie şi ca dominantă în spaţiul respectiv, la nivelul oraşului, ele reprezintă un element unificator.

Amenajarea peisagistică a spaţiilor situate de-a lungul pistei de biciclete, acolo unde este posibil, cuprinde amplasarea de mobilier urban atractiv, cu design minimalist, plantarea de arbori, şi mobilier specific utilizării bicicletelor. Design-ul propus al mobilierului este de tip minimalist, tocmai pentru a se integra mai bine în textura urbană existentă. Compoziţia amenajării are la bază contextul urban cu funcţiunile existente, direcţiile de parcurgere, relaţionarea cu staţiile de transport urban, controlarea perspectivelor şi nu în ultimul rând raportarea la vegetaţia existentă. Elementele de mobilare sunt astfel alese şi poziţionate încât configurează zone diferenţiate în funcţie de forma şi particularităţile spaţiului în care sunt prevăzute, de direcţii vizuale, însorire respectiv umbrire. Alte zone sunt, dimpotrivă, păstrate libere de mobilier, pentru a face loc circulaţiei. Se propune o linie de mobilier urban contemporană, modernă, simplă, fără ornamente. Materialele, tratările şi culorile constituie factorii unei amenajări coerente, unitare în relaţia cu suprafaţa de călcare şi corpurile de iluminat. Condiţiile tehnice de calitate pentru reperele din lemn, metal, alte materiale utilizate, vor fi cele prevăzute de către standardele europene pentru dotările din spaţiul public.

Pentru realizarea traseului pentru deplasări nemotorizate, se propun câteva dotări, care să deservească spaţiul public. Dintre dotările de bază, clasice cele mai importante sunt cele care fac parte din mobilierul urban, respectiv băncile, coşurile de gunoi, rastele pentru biciclete etc. Elementele propuse sunt concentrate de-a lungul pistei de biciclete, pentru a „îmbracă" traseul propus. Cromatica mobilierului urban propus va fi din paleta gri spre crem-maro, în relaţie cu peisajul urban.

2.4. Realizarea unor construcţii verzi cu funcţiunea de parcări supraterane

În cadrul proiectului vor fi prevăzute trei zone în care sunt propuse trei parcări etajate supraterane care vor deservi atât locatarilor din zona respectivă, cat şi ocazional persoanelor aflate în tranzit. S-a optat pentru soluţia realizării unor construţii verzi, sustenabile, cu funcţiunea de parcare supraetajată, tocmai pentru a

aplica la nivelul municipiului Alexandria conceptul de dezvoltare durabilă [3], prin implementarea celor mai bune practici şi procese ce permit accesibilitatea pe termen lung, cu impact minim asupra mediului; o construcţie proiectată într-o manieră sustenabilă, ce va avea ca scop reducerea impactului asupra mediului pe întreaga durată de viaţă a acesteia, favorizând un mediu sănătos şi mult mai productive.

Aceste construcţii vor îmbina funcţionalitatea de parcare supraterană cu amenajarea spaţiilor dintre blocuri, foste garaje modulare din beton, locuri de depozitare a gunoaielor, etc., cu construcţii noi, moderne ce vor asigura un confort vizual/estetic plăcut prin amenajarea lor la ultimul nivel cu spaţii de joacă, spaţii verzi, terenuri de sport, etc.

Fig. 4. Construire Autobază şi parcare Parck&Ride
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

Parcările vor deveni astfel un mic centru multifuncţional şi nu doar destinat parcării autoturismelor. În jurul parcărilor se vor amenaja spaţiile libere din punct de vedere peisagistic şi a dotărilor cu mobilier urban. Parcările vor fi dotate cu staţii de încărcare a autovehiculelor electrice, instalaţii electrice de iluminat şi siguranţă, etc.

Parcările vor avea un regim de înălţime P+2E+Terasă (4 nivele), urmând ca ultimul etaj să fie amenajat ca terasă, loc de joacă pentru copii, zone cu spaţii verzi, parcări sau alte funcţionalităţi dorite de către beneficiar.

Fig. 5. Construire Autobază și parcare Parck&Ride(ob.1- Parcare de tip „Park&Ride", ob.2- Cladire administrativa, ob.3- Service auto si Spalatorie, ob.4- Parcare pentru autobuze- platforma betonata, ob.5- Amenajare exterioara)
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

Fig. 6. Construire Autobază și parcare Parck&Ride
Sursa: Reducerea ernisiilor de carbon în Municipiul Alexandria prin adoptarea unui transport public ecologic- proiect aflat în implementare

2.5. Sistem de bike-sharing

Pe raza U.A.T. Alexandria, se vor instala 6 staţii de bike-sharing pe traseul coridorului de mobilitate- strada Libertăţii şi strada Doctor Stâncă. Sistemele de bike-sharing vor fi complementare şi în corelare cu celelalte sisteme deja prevăzute în alte proiecte de dezvoltare ale oraşului, pentru o funcţionalitate unitară.

2.6. Sistem smart-city

Pentru gestionarea locurilor de parcare din parcările noi propuse în cele trei zone descrise mai sus, supravegherea şi administrarea lor din punct de vedere financiar, aceste parcări vor fi prevazute cu sistem de control şi monitorizare acces, pentru a stabili câte locuri de parcare libere sunt disponibile, durata şederii, etc. Pentru accesul în aceste parcări se vor prevedea sisteme de taxare conform hotărârilor de consiliu local.

3. Sustenabilitatea realizării investiţiei

Prin executarea lucrărilor proiectate vor apărea unele influenţe favorabile atât asupra factorilor de mediu cât şi din punct de vedere economic şi social. Beneficiile socio-economice ce vor fi înregistrate ca urmare a implementării proiectului sunt: de îmbunătăţirea condiţiilor de circulatie pentru populatia din zona; îmbunătăţirea calităţii şi aspectului infastructurii publice; îmbunătăţirea calităţii aerului.

Estimări privind forţa de muncă ocupată prin realizarea investiţiei: în faza de realizare şi în faza de operare. Obiectul acestor estimări constă în evidenţierea efectelor economice directe, indirecte şi induse asupra locurilor de muncă. Toate persoanele care vor lucra pentru proiect (specialişti, ingineri, operatori echipamente, muncitori proiectanţi, consultanţi, asistenţi tehnici, etc) reprezintă angajarea directă a forţei de muncă.

Persoanele care sunt incluse în circuitul economic al proiectului fără a avea o implicare directă, beneficiază de efecte indirecte asupra locurilor de muncă prin efectul multiplicator (ex. fabrici de materiale, transportatori, personal administrative, etc).

Efectele induse ale locurilor de muncă sunt determinate de sporirea consumului angajaţilor direcţi şi indirecţi pe seama salariilor primite ceea ce duce la sporirea veniturilor agenţilor economici şi implicit a activităţii acestora.

Personalul angajat atât în faza de execuţie cât şi în faza de operare va fi în principal din zonă şi se va da atenţie deosebită principiului egalităţii de şanse în sensul că se va angaja personal şi din rândul altor etnii precum şi de gen feminin.

Odată cu terminarea lucrărilor de construire a investiţiei, în vederea păstrării în condiţii normale de circulaţie a lucrărilor este necesară infiinţarea unei formaţii permanente pentru asigurarea întreţinerii curente şi periodice, precum şi a unui personal auxiliar (temporar) pentru transport şi manipulări.

4. Scenariul/opţiunea tehnico-economic(ă) optim(ă), recomandat(ă)

Soluţia tehnică adoptată a fost concepută pornindu-se de la premisele celui mai bun grad de adecvare/eficienţă economică a soluţiei de proiectare/ materialelor/locaţiei alese în condiţiile unor constrângeri de ordin bugetar firești. În ceea ce priveşte infrastructura, întrucât pistele şi trotuarele nu se amplasează pe carosabilul existent, scenariul 2 nu va fi aplicat, astfel se vor evalua variantele propuse în scenariul 1 când pistele şi trotuarele se amplasează în spaţiul de trotuar.

Pentru selectarea opţiunilor propuse s-au luat în calcul criterii de tipul: social şi de mediu, tehnic, financiar. Fiecare din variantele propuse au fost evaluate comparativ ţinând cont de parametrii sociali şi de mediu, tehnici şi financiari.

Pentru fiecare din criteriile de evaluare s-a realizat clasificarea alternativelor prin punctarea acestora de la 1 la 2 puncte (1- opţiune recomandată; 2- opţiune funcţională); s-a folosit o medie ponderată între ponderea individuală a fiecărui criteriu şi subcriteriu de evaluare şi valoarea dată pentru cotarea variantelor.

Tabel 1. Comparaţia scenariilor/opţiunilor propus(e), din punct de vedere tehnic, economic, financiar, al sustenabilităţii şi riscurilor

Criteriu	**Propunere pondere individuală**	**Variante sisteme rutiere propuse Scenariu 1**	
		Variante 1.1. şi 2.1.	**Variante 1.1. şi 2.1.**
Mediul social			
Impactul asupra populaţiei	13%	1	1
Impactul asupra mediului	18%	1	1
Durata de exploatare	12%	1	2
Tehnic			
Dare în exploatare (în funcţie de atingerea rezistenţelor mecanice corespunzătoare)	17%	1	2
Tehnologii de execuţie	5%	1	2
Confortul circulaţiei	15%	1	1
Repararea degradărilor şi defecţiunilor	10%	1	2
Financiar			
Cost de investiţie	10%	1	2
Total	100%	1,00	1,63
Variante recomandate		**Variante 1.1. şi 2.1.**	

Sursa: Coridor de mobilitate urbană integrată-str. Libertăţii-str. Doctor Stâncă- proiect în implementare

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Nonformal learning – a key concept for smart education

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Abstract

The Romanian schooling system needs to be reviewed in the context of sustainable development, considering the issue of general urbanization and urban growth. The concept of sustainable development and the concept of smart city are two synergic concepts that, if implemented by large metropolitan areas could be a recipe for general urban progress and wellbeing.

My objective for this paper is to argue that nonformal education, is a key sector for the implementation of Smart Education. I will answer the research question; "How digitalization in the nonformal education sector is the keypath to sustainable development". Another objective is to prove that decentralization in education is a model that needs to be applied in the Bucharest schooling system, in order for competencies developed through nonformal education to be taken into account in formal school.

Prior concepts that present the importance of nonformal education are first, the European Nordic Model that explains the good practice of decentralized education. Also, this paper is presenting a different perspective starting from the paper I wrote and is published in the 7th Academos Conference Proceedings from 2020.

Moreover, my approach to the paper is built on the case study of Bucharest and the existence of a nonformal education institution that develops projects for children. My findings show that there is a need for policy improvement at the local level in order to facilitate more access to nonformal education through digitalization. The topic of the paper will be a contribution to the international non-formal education field because I am going to present practices that worked in Bucharest and could be taken into consideration at the European level. Moreover, I argue that nonformal education research is yet to be developed because there aren't studies regarding this field either at the regional, national, or international level, regarding the topic of smart education and quality education through nonformal practices.

Keywords: *Public Projects, Public Funds, Descentralization, Experiential Methods*.

1. Introduction

The Bucharest schooling system is an area that needs attention regarding its development, also by taking into account the general urban growth, which is subsumed by the concept of "smart development", which connects economic development with innovation, new technologies and especially people. A Smart City can only become truly „SMART" if its people(citizens and decidents) and also its institutions are understanding the concept and its needs, implement and apply it accordingly.

In order for citizens to better understand and apply and use newer technologies that sum up the concept of a Smart City, decidents and institutions need to develop educational policies that will help a better transition from a highly inefficient and difficult life to a more sustainable one. In this paper I am going to argue that nonformal education is a successful model for applying the SMART concepts and technology in the educational field.

The "intelligence" of a city is given by its community, both as a goal (urban development aims to increase the quality of life for all inhabitants), as well as resources - education and professional development, civic involvement and volunteering for the community.

The Smart City concept [1] aims at sustainable urban development through innovative solutions, through which traditional networks and services (eg: urban transport, water supply, waste disposal, lighting and heating of buildings, public administration - more interactive and responsive, etc.) are streamlined through the use of technologies digital and telecommunications, for the benefit of the inhabitants, through a sustainable economic development, by increasing the standard of living and the quality of life of the inhabitants.

In order to achieve the goals of building a Smart City or Smart Community, individuals must develop new skills, by learning and accepting the technological means that facilitate the construction of sustainable communities.

The guidelines encountered in the concept of Smart City (Smart Governance, Smart Economy, Smart Mobility, Smart People, Smart Living, Smart Education), will also be based on its citizens and their path and willingness for development. Some examples are found by using technological means to check the hours when public buses arrive near their house, using technological means to rent sustainable transport (eg: electric scooters), and so on.

Considering what I have mentioned, it is absolutely necessary to link education and learning to urban development regarding the concept of Smart City, the economy and the labor market, and to increase through education the degree of civil involvement in the urban environment, including creating greater opportunities for the harmonious relation between work and private life.

2. SMART education

In order to better understand the importance of experiential learning through non-formal education activities, I will make a brief mapping of the concept, as well as the exposure of some models of experiential education that I consider to be effective in Bucharest, ensuring the concept of education for all.

Firstly, although we could assume that nonformal education is a modern term, it was developed in 1970 under the name of nonformal education and has been the subject of several debates that we will address in the following. At the same time, the issue of its effectiveness or the need for non-formal education has been debated for many years, given the existence of formal education. To clarify this, it should be noted that non-formal education is not an opposite concept to formal education, nonformal education has been defined over time as a learning mechanism similar to that of formal education, but lacking constraints like formad forms of addressing, formal lectures and courses and so on [2].

Some authors point out that non-formal education offers more flexibility to beneficiaries, as they can participate in this "learning system" from all backgrounds and all age groups, bridging people with different backgrounds that want to develop together sets of skills in a common topic. So why is non-formal learning or experiential learning a necessity for society? I consider that this question will be answered in the following, being a question that has been debated since the nineteenth century [3].

The first aplicability of nonformal education that we can see in history are closely related to the apprenticeship practiced since the nineteenth century by every child /young person who needed to learn a proffesion to serve them in the future [4]. Thus, a utility that we identify in terms of this classic model of nonformal education is the focus on structuring the skills that help the individual in the development of career/profession.

Moreover, nonformal education at that time can be geared towards learning practical skills that serve to the development of essential skills for economic and social requirements. Consequently, non-formal education supports the preservation of cultural identity.

At the same time, the authors say that non-formal learning through experiential practices supports the accumulation and retention of information to a greater extent than formal education. Thus, in order to develop the young generation and transmit information and culture through experiences (stories/games/art,etc.), non-formal education has more complex components than strictly the acquisition of practical skills, each being necessary.

A leading author who developed the concept of nonformal education before the 1970's is John Dewey, an American philosopher, psychologist, and pedagogue. He speaks in his writings about nonformal education as experiential education, explaining the ways in which education can be developed. Dewey can be considered a pioneer of non-formal education, first discussing in 1916 the principle of experiential education for the coagulation of democratic society. It provides insight into the relationship between experiential learning in the community and problem solving. He believes that experiential education contributes to the coagulation of the community through volunteering, while developing a civic sense in citizens. One perspective is that in order to coagulate democratic citizenship, it is to practice democratic principles through education [5]. At the same time, Dewey sees experiential education as the center of the community, forming whole generations to make it easier to solve problems in the community. In his view, experiential

education contributes to the intellectual and moral development of children and young people [6].

A definition of nonformal education is seen by authors Amanda Neill and Edward Taylor as *any organized, intentional and explicit effort to promote learning to improve the quality of life through the non-school environment* [7].

In their paper, non-formal education is seen as being in a continuous relationship with other forms of education:

from formal education>to non-formal education> to participatory education>to informal education.

Any educational program can be placed in this continuous relationship, determined by the degree of its fit in a certain category. At the same time, the authors talk about three specific features in order to better understand the educational categories mentioned above:

Flexibility (programs meet local needs)

Participation (decision making together - between trainers and beneficiaries)

Contextualization (degree of standardization).[8]

Nonformal education is characterized by flexibility and participation, but less standardized, but more receptive to the needs of the local community. Thus, the authors talk about nonformal education as an important factor focused on the needs of the community. At the same time, they argue the importance of experiential learning through nonformal education in educational centers, museums or in open spaces such as archeological sites. By its very nature, the concept of nonformal education reminds practicing trainers, that most of the learning process takes place outside of class hours. Learning is more effectively practiced in nonformal settings, such as museums or experiential learning centers [9]. It is important to note that these spaces facilitate learning for both children and students, as well as for adults.

Another concept of nonformal education is experiential outdoor education. According to author Craig Von Behren, *an effective space for students to better understand certain topics or lessons and to develop their attention to the environment* [10]. This way of implementing nonformal education activities through experiential outdoor learning also contributes to group cohesion.

Another misinterpretation of nonformal education is that it provides support only to people who can no longer be integrated into school or who have reached the optimal age for school, being called lifelong learning programs such as adult literacy. This misinterpretation has long conflicted with formal education and nonformal education. Lifelong learning or continuous improvement is a beneficial concept for every individual in society, regardless of the education obtained during the school years or the environment to which he belongs.

As mentioned earlier, a beneficial factor of nonformal education is that it is flexible and allows access to a diverse target group in activities that are carried out. At the same time, studies show that adult development is not yet considered a priority, which contributes to the stigmatization of individuals who want to take training courses, especially for teachers whose lifelong development is necessary to facilitate quality education for all. Although steps have been taken over time in

Bucharest to facilitate projects that stimulate lifelong learning and courses accredited by the Ministry of National Education, for teachers constant efforts being needed for all those involved in education.

An example is the need for specialized training courses for areas such as science, IT. To sum up, it refers to areas whose subjects are constantly innovating and require new perspectives of learning and teaching.

Another perspective for understanding nonformal education is that it does not conflict with formal education but works in partnership to facilitate all the skills a child needs for quality educational development.

More clearly, this model of implementing nonformal educational activities for the development new skills among citizens, cities could involve institutions that are decentralized from formal education and offer open access to activities and projects that involve the use of technology for developing skills in children and adults.

Another important point to take into account is that there has been a direct relationship between countries and communities with a tradition in terms of voluntary organizations and openness to nonformal education [11], which I generally refer to as Anglophone or Francophone countries. Thus, there are two structures for implementing nonformal education, either community-oriented, where the needs of a small group of beneficiaries are met, or goal-oriented, through which government organizations or local institutions build nonformal education programs to facilitate an objective or need. identified at the city level.

Given the fact that I have discussed the concept of nonformal education and previously presented some myths that have made nonformal education considered either ineffective or a competitor to formal education, but the reality is that developed countries use much more nonformal education than developing countries that do not receive the same formal education as developed countries.

A relevant example is that "*in the United States, millions of specialists such as doctors, dentists, engineers and other professionals rely on nonformal education to stay connected to new trends in the field or to learn new skills*" [12].

At the same time, we can observe the importance of improving or learning different skills from those in the classical education system through the behavior that companies have in relation to the young people they hire. They invest in training courses for young recruits to facilitate a broader understanding of the field in which they work.

However, through my reasearch I have identified a common point and a key issue in nonformal education, namely the lack of a clear plan for cooperation with relevant actors of interest to the target group chosen by the institution that implements nonformal education projects. Thus, many actors involved in nonformal education fail to achieve the proposed objectives due to the lack of a clear structure. However, implementing a plan similar to the existing curriculum in the formal education would not be effective for non-formal education because by its volatile nature. Thus, it is more efficient to carry out a general project plan that includes objectives focused on the needs of the beneficiary. At the same time, the difference between formal and nonformal education is decentralization, which has proven to be much more effective through the Nordic model that I will analyze in the following.

The Nordic education model encompasses the education systems of Iceland, Denmark, Sweden, Finland and Norway. Although systems and curricula differ from country to country, a number of similarities have been identified that make them examples of good practice among countries on the European continent:

A. Education for all is one of the educational principles applicable in the Nordic model. This means first and foremost facilitating access to quality education for all, as well as providing opportunities for all children and students to an inclusive education. This principle is achieved by providing free access to education as well as providing opportunities for all children, regardless of the environment to participate in the same education system.
B. Experiential education is another principle applied in the Nordic educational model, with teachers combining formal education with nonformal education methods and techniques, to facilitate comprehensive learning built through experience and hands-on learning.
C. Decentralization is another principle that is part of the Nordic education system. Through this system, each local administration can implement its own learning program and structure, being necessary to respect some general directions established at the country level. For this decentralized system to be successful, periodic tests have been implemented to verify the skills acquired by each student.

The decentralized system proved to be functional because it facilitated the flexibility of the education system and provided an opportunity for local authorities to establish programs in line with the needs of the community.

At the same time, decentralization was also favorable for skills acquired in a non-formal setting, with the administration being interested in the results of students in terms of tests measuring competencies and less in the circumstances under which skills were acquired (either formal or nonformal).

3. Organization's involvement in SMART education

It has already become a certainty that we cannot talk about economic, social or human development in the absence of quality education: education should no longer be seen as an "unproductive sector" but, on the contrary. Learning gaps cost the world's economies more than the economic crisis, and reducing these gaps would increase overall economic growth and at the same time shorten the recovery time after periods of crisis [13].

As a result, the development of education has become a priority target for sustainability not only at the national level, but also for the most important international organizations (the UN and UNESCO, OECD and the World Bank, the European Union and the Council of Europe being the most significant). In this part I will summarize the main priorities identified by the listed international bodies.

Quality education is one of the global goals for sustainable development, adopted at the 70th Session of the United Nations General Assembly (September 2015): "*ensuring an inclusive, equitable and equitable education. quality, as well as the promotion of lifelong learning opportunities for all*" [14].

The specific targets for education are as follows:

- Universal access to fair quality education in formal or nonformal settings
- Access to the opportunity for early educational development
- Access to vocational education and training for boys and girls as well as for disadvantaged groups
- Development of skills relevant to the job
- Equality and inclusion
- Developing primary / key competencies for everyone
- Developing education for sustainable development and for global citizenship.

In addition to these priority targets, three preferred ways of implementing them have been identified, all of which are relevant from the perspective of the shared responsibilities of local public authorities in the field of education:

- Efficient learning environment, building and/or renovating educational facilities, "friendly" to all children, regardless of gender and skills
- Direct financial aid (scholarships) - pigs for enrollment in dual education
- Carrying out projects of an educational nature that develop a whole range of skills that support educational development for all
- Qualified teachers - including through international cooperation programs.

The strategic targets and approaches set at the the United Nations level (and of the organizations part of this system - UNICEF, UNDP, etc.) are supported by international evaluations and diagnostic studies conducted by the Organization for Economic Co-operation and Development (OECD), IEA and the World Bank.

OECD - through the PISA programs [15] which assesses key reading, math and science skills for 15 year olds, and PIAAC on essential skills needed for adult life (reading and math, as well as, problem-solving in a high-tech environment) provides a comparative look at the development of these key competencies, for all participating education systems and, implicitly, system-wide development directions.

In the case of PISA, Romania is on one of the last places in the European Union, for all the sets of key competences assessed. In other words, the Romanian educational system does less than the schools in other countries from the EU, in order to overcome/compensate the barriers related to poverty, lack of education, ethnicity, etc.

This demonstrates the need for projects and programs that support quality education for all and the development of key competencies. According to the Nordic educational model, competencies can be acquired in both formal and nonformal contexts. This helped increase the PISA rankings in countries that implement the Nordic educational model.

Although the City of Bucharest does not have a decentralized education system like the Nordic system, I consider the Nordic Model as an example in terms of developing quality education and facilitating opportunities for all. Thus, considering the implementation of nonformal education projects to increase skills and increase PISA rankings as a step towards achieving the goal of sustainable development on quality education. Moreover, nonformal education, as presented earlier, is a key path to Smart education in terms of developing skills that help future and current generations to cope with rapid changes in the field of emergent technologies, but also as a tool for developing new skills using technology.

4. The case study of Bucharest

Continuing the paper I am going to present the case study of a decentralized institution in Bucharest that is part of the City Hall of Bucharest. I chose to present this case study firstly because it is a left initiative from an ideological perspective, most of this type of initiatives around Europe are from a right ideological perspective, carried out by local NGOs.

But, against this background, in Bucharest there is not a wide range of institutions, non-governmental organizations or private units dedicated to nonformal learning or to providing an inclusive quality education for all. The offer for nonformal education that facilitates equal opportunities for all, aiming to support students with activities that contribute to the personal, social and human development of students is carried out only by a few institutions and organizations.

The Center for Educational and Sports Projects Bucharest-PROEDUS, is a public institution that develops nonformal projects for children and youngsters from preschool to tertiary education.

Thus, there are three types of actors that support nonformal education through projects: Bucharest City Hall through its substructures, respectively through PROEDUS and other state institutions, Non-Governmental Organizations operating in small fields or with small groups of beneficiaries and Private Units such as clubs offering nonformal education services.

Thus, the offer of nonformal education that supports students through free projects and activities or that involves low costs for the beneficiary is an area that needs to be developed in order to meet European and UN recommendations on facilitating quality inclusive education for all.

PROEDUS is an institution that has been developing projects in the field of nonformal education since 2009 when it was founded through council decision of City Hall. Since then it developed many projects in different fields such as sports, language, arts, but in since pandemic of Sars-CoV-2 started, as many industries, it had to transfer its activity online. Thus, the pandemic started to become part of our lives, PROEDUS used more and more technology in order to develop new nonformal activities for its beneficiaries.

Prior to the pandemic situation, the approach to the previously identified problems related to the education system was quite simple, considering the usual strategies that could be solved in schools or in informal meetings. Thus, we can say that the standard approach in the realization of projects and programs that support education had more of a physical type of nature. More clearly, most of the meetings, at least during quarantine [16], took place remotely, using relatively recent methods and techniques. Given that at the time of writing this paper no studies have been published in Romania on the situation of adaptability of teachers and students to technological means in education, can still be analyzed some existing studies both nationally and internationally that predict an educational deficit with which we will face in the future if no action is taken on support and help teachers and students.

OECD conducted a study in September 2020 which outlined the situation of lost school days in several countries around the world. It is important to note that the sampling did not only show developing countries, but also showed the status of

the school around the globe. Interestingly, a high-tech country like Estonia could not keep up with online teaching, and Colombia being the country with the fewest missed hours according to the study [17].

At the same time, the analysis carried out by OECD warns of an educational deficit that will have a severe impact on the economy in the years to come. However, like the situation in Romania, most schools had an occasional physical school program, with most courses taking place online [18].

In order to address the educational shortage in pandemics or online schooling to prevent the spread of Sars-CoV-2 or other possible future epidemics, OECD proposes 2 scenarios. OECD acknowledge that there is a discrepancy between teachers mainly in the use of multimedia methods in their lessons, and propose that the most talented teachers take on a larger number of students during online learning. The second proposed option is for the teacher to observe the evolution of a student to understand a certain subject, conducting separate lessons and homework with each student in the class to determine the level. Other possible scenarios that could lead to a better use and understanding of technological means in classrooms (online and offline) refere to training teachers in a nonformal setting to use the computer and some other interactive programs on the computer in order to make interactive classes. This action has been implemented by PROEDUS in 2019 during a nonformal training camp for teachers [19]

Another example of good practice refers to the existence of e-Learning educational platforms (EdX; PBS Kids, Self Learning Hub, Time4Learning, etc.) that provide access to both the student and the teacher to perform simple lessons, having both an attractive and interactive character. These platforms help both teachers and students use nonformal techniques and technological means to prepare a class and help students better understand the curriculum.

As the study from OECD also mentions, students perform much better when lessons have integrated multimedia components and interactive activities in digital scool. I reiterate that this proposal for the existence of educational platforms is a necessary factor in pandemic situations, but they can be taken further into classrooms to facilitate more relaxing classes for teachers and interactive for students.

Equally, an example of good practice is the educational platform www.hubproedus.ro which was implemented in 2020 to support students taking online courses. The platform was originally designed to support language course sessions, later becoming a support for students to learn through interactive digital lessons skills that are correlated to the curriculum.

Indeed, in the context of a pandemic, online schooling is the only solution, but later an alternative to online learning is the possibility for students and teachers or other cathegory of people to carry out nonformal learning activities in dedicated spaces such as educational hubs, thematic museums or international learning centers. A well-known example is the Copernicus Science Center. Other examples of educational centers are: Technopolis, Science Museum, International Center for Life, etc. The same initiative has been identified in Bucharest by the Children's Museum, which initiated a learning space for students and children in the fields of science, astronomy, chemistry and physics, biology, geography and history, multimedia and technology, nutrition and health.

5. Conclusions

Concluding this paper I strongly believe that the pandemic showed much discrepancies in the field of education, but also opened new possibilities for learning.

Learning through technological means such as interactive Augumented Reality lessons, such as history classes presented by historical figures, and other multimedia facilitators set in nonformal educational centers could become in the next years a trend for developing skills through gamification. Other alternatives are nonformal robotics classes, nonformal online platforms and so on.

Thus, one suggestion I can make at this time for a post-pandemic world is to analyze the benefits of pandemic projects and programs and adapt them to a non-pandemic context. To be more specific, technological use was higher in education and especially by using nonformal techniques. This means that a mix between technology and nonformal activities in learning can provide a succesfull setting for learning new skills in a more interactive way.

To sum up, technology is here to stay and the initiatives at local level through City Halls could make Education Smart for its future generations.

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Factori cheie şi provocări privind guvernanţa inteligentă şi rolul autorităţilor publice în dezvoltarea ecosistemelor de inovare urbană în cadrul modelului Cvadruplu Helix

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Abstract

Studiile recente au acordat o atenţie crescândă oraşelor smart şi guvernanţei inteligente, care împreună cu politicile de inovare conduc la ecosisteme de inovare urbană şi, de asemenea, au analizat colaborarea existentă între actorii din cadrul ecosistemele urbane de inovare, în special datorită cererii tot mai mari de oraşe inteligente, guvernanţă inteligentă, inovaţii şi implementarea acestora în cadrul ecosistemului urban inteligent. În plus, schimbarea paradigmei de la modelul Triplu Helix la modelul Cvadruplu Helix a determinat necesitatea unor cercetări mai aprofundate asupra colaborării dintre actori, a factorilor de succes şi, de asemenea, a provocărilor întâlnite pentru asigurarea unei guvernanţe urbane inteligente. Un cadru pentru guvernanţa urbană inteligentă este propus pe baza celor trei componente cheie împletite, şi anume: componente teritoriale, instituţionale şi tehnologice. Această cercetare şi-a propus să analizeze percepţiile actorilor implicaţi printr-un studiu calitativ, concentrându-se în principal pe rolul autorităţile publice şi colaborarea acestora cu ceilalţi actori, pentru a ilustra modul în care funcţionează acest cadru în practică. Atât analiza literaturii de specialitate, cât şi cercetarea calitativă au recunoscut necesitatea unor investigaţii aprofundate pentru a întreprinde colaborări eficiente pentru dezvoltarea ecosistemelor urbane smart de inovare şi pentru a depăşi eventualele probleme emergente. Totodată, s-a observat că guvernanţa urbană inteligentă promovează o modalitate de guvernanţă a oraşelor deopotrivă incluzivă dar şi inovatoare în era „inteligentă", pornind de la problema urbană/ necesitatea de inovare, promovând moduri de

guvernare bazate pe cerere și modelând ecosistemele urbane inovatoare astfel încât să fie orientate către societate. În plus, colaborarea dintre actori trebuie îmbunătățită. Contribuțiile articolului sunt: (1) îmbunătățirea conexiunii dintre mediul universitar, mediul privat, autorități/instituții publice și societate civilă (actorii în cadrul abordării Cvadruplu Helix); (2) stabilirea percepției reale a părților implicate în Cvadruplu Helix, cu accent pe punctele forte, punctele slabe și tensiunile care decurg din colaborarea lor.

Cuvinte cheie: *orașe inteligente; guvernanță urbană inteligentă; inovare; inovare urbană; colaborare actori cheie.*

1. Introducere

Se așteaptă din ce în ce mai mult ca orașele să reunească actorii interesați din mediul urban pentru a implementa soluții inteligente care să răspundă provocărilor urbane și să producă efecte pozitive pe termen lung. Cu toate acestea, teoria și practica explică modul în care un astfel de impact poate fi atins, măsurat sau dovedit. Încă din deceniile trecute, dar în special ca urmare a pandemiei actuale, conceptul de „inteligență" înregistrează tendințe în creștere în literatura de specialitate ca o soluție promițătoare pentru orașele moderne de a face față fenomenelor complexe. Ecosistemele inovatoare facilitează „inteligența" și promovează angajamentul cetățenilor pentru realizarea acesteia prin utilizarea pe scară largă a tehnologiilor informației și comunicațiilor [1,2].

Oamenii de știință [1] au dezvoltat o schemă analitică a „inteligenței" bazată pe șase piloni: 1) deschidere urbană, 2) inovare, 3) parteneriate, 4) proactivitate, 5) integrare și 6) guvernanță, ca pârghii care permit creșterea și dezvoltarea orașului inteligent [3]. De aici, importanța guvernanței urbane în cadrul orașelor inteligente.

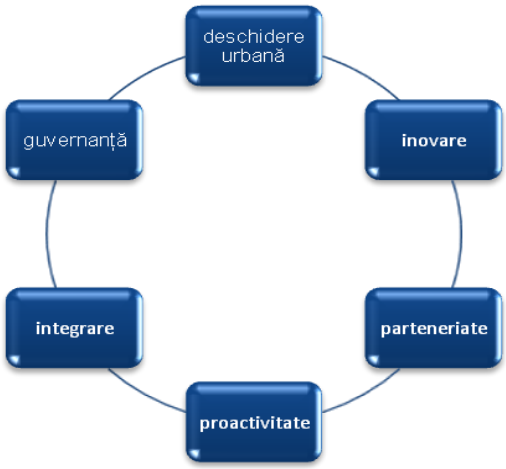

Fig. 1. Pârghii pentru permit creșterea și dezvoltarea orașului inteligent
Sursa: Lee, J. H., Hancock, M. G., & Hu, M. C. (2014). Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. Technological Forecasting and Social Change, 89, pp. 80-99.

Coroborând toate aceste aspecte, importanţa acestei lucrări rezidă în analiza modelului „cvadruplu-helix" construit pe iniţiative inovatoare care vizează accelerarea aşa-numitelor „cunoştinţe emergente" şi aplicarea acestora în cadrul oraşelor *smart*. Ca abordare analitică, fiecare elice prezintă un aspect distinct al modului în care oraşele inteligente (în cazul nostru) produc, dispersează şi promovează „cunoaşterea", respectiv inovarea. Ca instrumente de standardizare, ele sunt utilizate pentru a îngloba politicile şi factorii de decizie într-o metodă transdisciplinară, incluzând toate sinergiile posibile din mediul academic, industrie, autorităţi publice şi societate (cetăţeni). Din perspectivă tehnică, oraşul inteligent reprezintă un ecosistem unic de acomodare a sistemelor inovatoare şi „inteligente", percepute drept „comunităţi inteligente", în care sinergiile şi colaborarea promovează inovarea socială şi tehnologică prin stabilirea de angajamente solide între părţile implicate [4,5]: cercetători, mediul privat, mediul public şi comunitatea. Mulţi autori [6-8] subliniază importanţa colaborării actorilor în cadrul oraşelor inteligente dincolo de procesele tradiţionale.

Interacţiunile dintre guvern, instituţiile de învăţământ superior, mediul de afaceri şi societatea civilă sunt percepute ca fiind de o importanţă critică în ecosistemele de inovare datorită impactului major asupra creşterii economice [9,10], creşterii competivităţii oraşelor [11,12] şi, de asemenea, datorită capacităţii sale de a genera valoare socială şi publică [13,14]. În plus, criza pandemică a forţat autorităţile publice centrale şi locale, instituţiile de învăţământ superior, întreprinderile şi cetăţenii să descopere noi căi pentru a stimula inovarea tehnologică şi socială [15] în cadrul oraşelor inteligente, întrucât inovarea tehnologică şi cea socială constituie o parte cheie a ecosistemelor urbane inteligente. În practica actuală a oraşelor inteligente, inovaţia tehnologică, realizată în general de tehnicieni, oameni de ştiinţă, programatori şi ingineri, este centrată pe TIC. Totodată, tehnologia face parte din relaţiile sociale, iar deciziile sociale ghidează utilizarea şi dezvoltarea tehnologiei. O cheie în construirea unui oraş inteligent este crearea unor medii care se auto-susţin: inovarea tehnologică prin inovarea socială şi invers. Lucrarea de faţă se axează pe factorii cheie şi barierele întâlnite de colaboratorii din cadrul Cvadruplu Helix în dezvoltarea unui ecosistem urban inteligent.

Această lucrare aduce două contribuţii majore. În primul rând, lucrarea aprofundează modul în care modelul Cvadruplu Helix (QH) poate fi utilizat ca bază pentru co-producerea proiectelor de oraşe inteligente. Accentul se pune pe guvernanţa urbană inteligentă pentru a surprinde mai bine factorii cheie şi provocările pe care autorităţile publice le întâmpină, scopul final fiind îmbunătăţirea conexiunii dintre mediul universitar, mediul privat, autorităţi/instituţii publice şi societatea civilă (actorii în cadrul abordării Cvadruplu Helix). Făcând acest lucru, prezentăm o sinteză a literaturii actuale despre guvernanţa urbană inteligentă, inovare şi modelul QH pentru a argumenta faptul că, actorii principali ai oraşului inteligent trebuie să conclucreze eficient în co-crearea unui ecosistem inovativ pentru a asigura relevanţa inovaţiilor pentru contextul şi nevoile cetăţenilor. În al doilea rând, prin prezenta cercetare expunem percepţia reală a părţilor implicate în modelul Cvadruplu Helix, cu accent pe punctele forte, punctele slabe şi tensiunile care decurg din colaborarea lor.

Studiul începe cu contextualizarea temei de cercetare şi identificarea factorilor cheie ai acesteia (secţiunea 1). În continuare se pune accent pe noţiunea de „ecosistem" de inovare şi pe „guvernanţă" ca forţă motrică pentru a permite motivaţii şi planuri de acţiune pentru oraşul inteligent (secţiunea 2). Secţiunea a treia prezintă metodologia folosită în cadrul cercetării calitative. Secţiunea 4 pune accent pe rezultatele cercetării calitative, în timp ce, în acest scop, secţiunea cinci discută principalele constatări ale acestui studiu limitele şi perspectivele pentru lucrările viitoare.

2. Revizuirea literaturii de specialitate

2.1. Definirea conceptului de ecosistem de inovare prin prisma oraşelor inteligente

Termenul „ecosistem" este de obicei asociat cu „inteligent" [16] ca şi concept, reflectând informaţia, comunicarea, colaborarea şi tehnologia, dar include în fapt diferite tipuri de alte componente (Figura 2), aşa cum au propus anumiţi autori [17]. Acestea necesită abordări universale asupra modului în care ecosistemele reunesc tehnologia, guvernanţa inteligentă şi societatea pentru a atinge obiectivele „inteligente" ale inovării urbane [18].

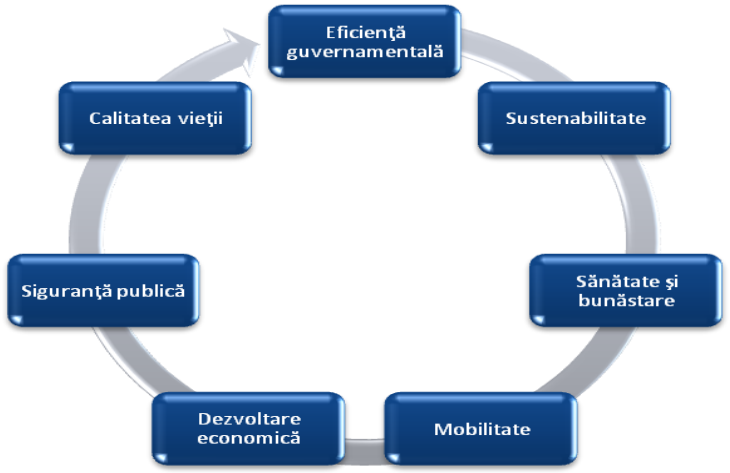

Fig. 2. Rezultate ale oraşului inteligent
Sursa: IioT World https://www.iiot-world.com/smart-cities-buildings-infrastructure/smart-cities/the-smart-city-ecosystem-framework-a-model-for-planning-smart-cities/, date: 22.10.2021.

În revizuirea literaturii de specialitate există autori [1] care identifică trei aspecte diferite ale unui ecosistem pe care savanţii s-au concentrat: ecosistemul de afaceri, care se concentrează pe o firmă şi pe mediul acesteia; ecosistemul de platformă, care ia în considerare modul în care actorii se organizează în jurul unei platforme şi ecosistemul de inovare care se concentrează pe o anumită inovaţie sau o nouă propunere de valoare şi pe grupul de actori care o susţin. Ca şi în cazul

ecosistemelor de inovare, inițiativele orașelor inteligente necesită adesea ca mai mulți actori (atât existenți, cât și noi) să se reunească și să colaboreze pentru ca o nouă propunere de inovare valoroasă să prindă contur [4]. În consecință, aceasta este perspectiva pe care o adoptăm în acest studiu.

Un ecosistem de inovare poate fi definit ca o structură de aliniere a setului multilateral de parteneri care trebuie să interacționeze pentru ca o propunere valoroasă să se materializeze [19]. Această perspectivă ia în considerare interdependența dintre actorii ecosistemului pe măsură ce se creează valoare; începe cu o propunere și urmărește să identifice activitățile și setul de actori care trebuie să interacționeze pentru ca să se materializeze.

Scopul inițiativelor orașelor inteligente poate fi văzut ca „îmbunătățirea performanței urbane prin utilizarea datelor, informațiilor și tehnologiilor informaționale (IT) pentru a oferi servicii mai eficiente cetățenilor, pentru a monitoriza și optimiza infrastructura existentă, pentru a crește colaborarea între diferiți actori economici și pentru a încuraja modele de afaceri inovatoare atât în sectorul privat, cât și în cel public" [20, p. 618]. Este important că inițiativele orașelor inteligente să implice activități semnificative de inovare a ecosistemeloru urbane, deoarece diverși actori colaborează pentru a crea propuneri de valoare noi, astfel încât sustenabilitatea orașelor să fie îmbunătățită [1]. În cele din urmă, orașele inteligente se străduiesc să crească competitivitatea comunităților locale prin inovare, crescând în același timp durabilitatea și calitatea vieții pentru cetățenii săi prin servicii publice mai bune și un mediu mai curat [19, 21]. Pentru a realiza acest lucru, orașele inteligente se bazează pe ecosisteme de inovare care folosesc tehnologia informațională de ultimă generație (de exemplu, senzori și dispozitive conectate, analiză de date deschise și rețele de fibră optică), precum și capitalul uman (de exemplu, universități, cercetători, companii, și instituții publice) [22]. Pentru a conduce inițiativele în cadrul orașelor inteligente este nevoie ca actorii centrali să abordeze oportunitățile și amenințările și să mobilizeze eforturile ecosistemului în jurul acelor oportunități prin reconfigurarea resurselor [23].

Implicarea cetățenilor, colaborarea și co-crearea sunt cruciale pentru inovare în general și inovare socială, în particular, în contextul urban al orașelor inteligente [24]. În acest sens, literatura de specialitate a dezvoltat noi modalități de colaborare între actorii ecosistemului de inovare, pe care le vom aborda în continuare.

2.2. Modelul Cvadruplu Helix

Autorii [25-27] care au introdus și studiat pentru prima dată modelul Cvadruplu Helix l-au descris ca un model care leagă (1) Industria, (2) Guvernul, (3) Universitățile și (4) Societate civilă [28], cu precizarea că primele trei elice erau deja prezente într-un alt model, Triplu Helix [29]. Colaborarea dintre aceste patru sfere organizaționale reprezintă esențialul modelului cu patru helix bine stabilit (Figura 3).

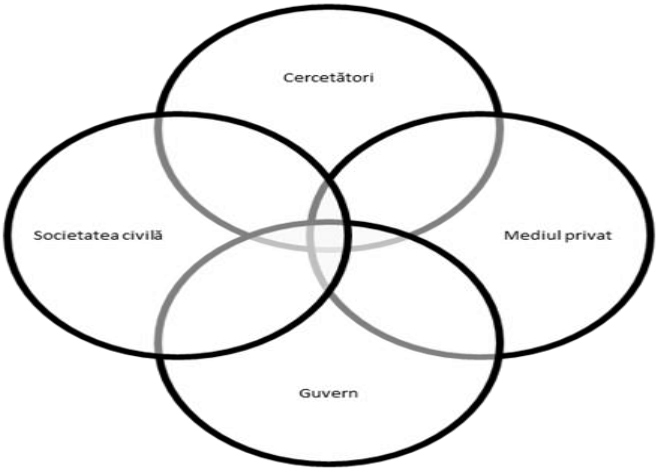

Fig. 3. Modelul Cvadruplu Helix
Sursa: Carayannis, E. G., & Campbell, D. F. (2009). 'Mode 3'and'Quadruple Helix': toward a 21st century fractal innovation ecosystem. International journal of technology management, 46(3-4), pp. 201-234.

Ei şi-au explicat inovaţia afirmând că atât creşterea economică, cât şi inovarea pot fi obţinute doar prin colaborarea eficientă a pilonilor menţionaţi mai sus. În consecinţă, principalele roluri ale acestor entităţi sunt:

- instituţiile de învăţământ superior – generarea şi transferul de cunoştinţe universitare, precum şi cercetarea şi comercializarea inovaţiilor în economia reală;
- sectorul industrial – investiţii în cercetare şi dezvoltare, obţinerea rezultatelor din cercetare şi dezvoltare, implementarea acestor rezultate în producţie;
- pilonul guvernamental – deţine un rol de reglementare fiind antreprenor public şi, prin urmare, oferă suport de reglementare în comercializarea inovaţiilor; există diferite niveluri de guvernare, de la naţional la local; rolul guvernului este de a facilita relaţia dintre universitate şi industrie cu scopul principal de a maximiza satisfacţia societăţii civile;
- societatea civilă – este un participant şi coproprietar al produselor de inovare rezultate, cunoscut şi ca utilizator final [30].

În prezent „nu există un consens cu privire la al patrulea helix, dar majoritatea cercetătorilor tind să abordeze cel de-al patrulea helix în termeni de societate civilă, consumator şi utilizator final" [30, p. 526].

O altă problemă care trebuie analizată cu atenţie se referă la valorile particulare care sunt co-create în fiecare helix (Figura 4). Aceste valori de rezultate sunt: (1) valoarea cercetării (cum ar fi publicaţii, brevete, cărţi, premii, citări, reputaţie academică şi altele), (2) valoare politică (de exemplu, politică democratică şi eficientă pentru drepturile oamenilor, sprijinul politic şi puterea), (3) valoarea afacerii (de exemplu, conştientizarea mărcii, cota de piaţă, profit, capital de cunoştinţe, active) şi (4) valoarea socio-etică (siguranţa cetăţenilor, justiţie, bunăstare publică, participare).

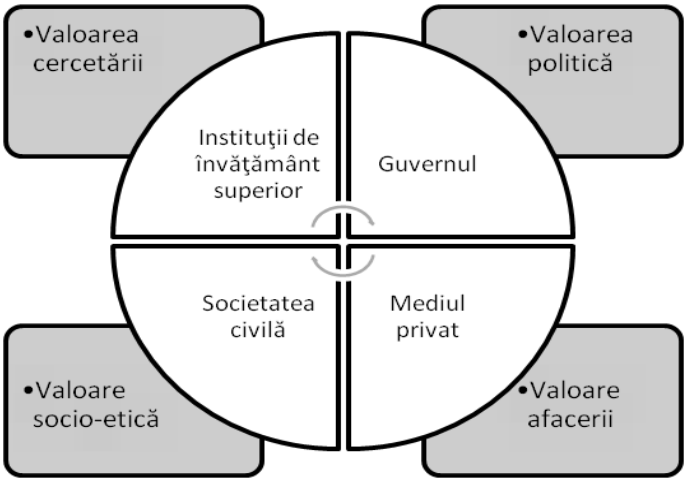

Fig. 4. Un model procesual al modelului cu patru elice
Sursa: Popa, E. O., Blok, V., & Wesselink, R. (2020). A processual approach to friction in quadruple helix collaborations. Science and Public Policy, 47(6),pp. 876-889.

Rezumând, instituţiile de învăţământ superior se referă la co-crearea valorii cercetării prin realizările academice aprofundate [31]; Mediul privat co-creează valoarea afacerii sub forma unor active monetare, financiare, economice şi sociale direcţionate către clienţi [32]. Diferenţa dintre mediul academic şi industrie în acest caz este că, dacă, în cazul instituţiilor de învăţământ superior, studenţii nu sunt plătiţi direct pentru rezultatele lor academice, în industrie, produsele au un preţ [33]. Valorile politice se traduc prin realizarea voinţei oamenilor, rezultatul reprezentând nu numai îndeplinirea voinţei lor, ci şi slujirea interesului lor. În sfârşit, societatea civilă co-produce valoare socială. Potrivit anumitor cercetători pentru a răspunde marilor provocări din societate, firmele au nevoie să producă inovaţii care să respecte definiţia dinamică şi complexă a ceea ce este de dorit din punct de vedere societal şi acceptabil din punct de vedere etic şi, astfel, să absoarbă continuu cunoştinţe despre valorile societale de la un set larg de părţi interesate [34].

Întrucât al patrulea helix îi poziţionează pe toţi partenerii pe picior de egalitate [35], considerăm că poate oferi o structură de guvernanţă strategică pentru oraşul inteligent. În plus, Cvadruplu Helix pune cetăţenii pe primul loc în evaluarea inovaţiei tehnologice, în condiţiile în care aceştia beneficiază de pe urma acţiunilor luate în cadrul oraşului inteligent, deoarece ei pot fi primii care definesc calitatea vieţii şi oportunităţile urbane, iar participarea lor permite incluziunea socială şi învăţarea.

Cvadruplu Helix permite, de asemenea, administrarea seturilor de date guvernamentale, care pot sprijini implicarea cetăţenilor şi co-crearea în Smart City 5.0 [36]. În prezent, inteligenţa artificială nu numai că devine o parte integrantă a serviciilor urbane inteligente, ci influenţează şi modelează viitorul vieţii şi al oraşelor [34,37]. Cu toate acestea, nu trebuie uitat că revoluţia 5.0 conţine o măsură egală de şanse şi provocări [38]. Potrivit anumitor autori [39], provocările etice pe care le ridică inteligenţa artificială –de exemplu, corectitudinea, transparenţa,

încrederea, protecţia vieţii private şi multe alte drepturi fundamentale – sunt cele mai mari probleme şi trebuie abordate cu cea mai mare atenţie de guvenanţa urbană. Este important ca acţiunile pentru a aborda aceste provocări să fie adoptate înainte ca sistemele de inteligenţa artificială sau platformele de date deschise ale guvernului să fie efectiv utilizate în cadrul oraşelor inteligente [40-41].

Implementarea modelului Cvadruplu Helix şi succesul său potenţial în proiectele oraşelor inteligente depind de capacitatea şi dorinţa părţilor interesate de a-şi asuma un rol în formarea şi urmărirea beneficiilor comune. De exemplu, un număr tot mai mare de lucrări sugerează că administraţia publică joacă un rol din ce în ce mai central în promovarea şi monitorizarea iniţiativelor de sustenabilitate în oraşele inteligente [42]. La polul opus, dovezile sugerează că rolurile şi contribuţiile cetăţenilor şi ale altor actori în întregul ciclu de viaţă al coproducţiei şi coevaluării în oraşele inteligente sunt slab raportate [43].

În acest studiu, conceptul de cvadruplu helix reprezintă baza teoretică şi metodologică împreună cu ecosistemul de inovare, guvernaţă inteligentă şi guvernanţă urbană inteligentă, cu scopul principal de a stabili percepţia reală a actorilor implicaţi, factorii cheie şi barierele întâlnite de colaboratorii din cadrul Cvadruplu Helix în dezvoltarea unui ecosistem urban inteligent.

2.3.Provocările guvernanţei/guvernării inteligente

În prezent, nu există o definiţie general acceptată a guvernării inteligente. Pe baza unei analize extinse a literaturii, guvernanţa inteligentă poate: (1) dezvolta structuri de guvernanţă inovatoare prin intermediul TIC[44], (2) guverna prin concentrarea pe rezultat, adică prin abordarea provocărilor urbane substanţiale [45] sau (3) o formă de alocare a puterii de luare a deciziilor partenerului potrivit (părţile interesate) şi de a-i motiva să participe eficient şi să ia decizii eficiente pentru a îmbunătăţi calitatea vieţii în oraş [46]. În consecinţă, colaborarea, participarea cetăţenilor şi dovezile bazate pe date sunt indicatori importanţi ai guvernării urbane inteligente [44,47]. Autorii de specialitate sintetizează patru conceptualizări tipice ideale ale guvernării oraşului inteligent, inclusiv guvernare inteligentă (politică), luarea deciziilor inteligente, administrarea inteligentă (organizaţie) şi colaborarea urbană inteligentă [44].

Deşi conceptul de oraş inteligent este considerat a avea un potenţial mare, provocările asociate guvernanţei au împiedicat oraşele să atingă rezultatele aşteptate [48]. După cum comentează anumiţi autori [49], idealul oraşului inteligent care încearcă să beneficieze de serviciile digitale necesită o reinventare a guvernării. Creşterea recentă a cercetărilor asupra conceptului de guvernare inteligentă este un astfel de efort care urmăreşte să obţină o mai bună guvernare a oraşului inteligent. Guvernarea inteligentă apare în principal datorită rolului tot mai mare al tehnologiei în funcţionarea oraşelor, ceea ce a făcut ca administraţiile publice centrale şi locale să-şi regândească rolurile în astfel de oraşe bogate în date [40-41]. Guvernarea inteligentă poate utiliza diverse tehnologii inteligente (de exemplu, big data, Internet of Things (IoT) şi Inteligenţa Artificială (AI)) pentru a actualiza sistemele

administrative tradiţionale (de exemplu, e-guvernare) la nivelul oraşului prin eficientizarea operaţiunilor oraşului, îmbunătăţind decizii şi asigurând calitatea crescută a vieţii [40-41].

Cu toate acestea, guvernanţa inteligentă în practică este puternic caracterizată de un mod tehnocratic de a guverna oraşele, orientat spre ofertă [50]. În acest proces, se pune mult accent pe rolul tehnologiei în colectarea datelor şi producerea de cunoştinţe pentru a îmbunătăţi operaţiunile guvernanţei centrale sau locale şi a automatiza funcţiile sistemului urban [51,52]. O astfel de abordare care se concentrează pe inovare digitală, bazată pe tehnologie este adesea considerată o soluţie universală la diverse probleme urbane din diferite oraşe [52]. Potrivit unor autori, guvernarea „inteligentă" tehnocratică ascunde acele probleme urbane, conflicte şi controverse care nu pot fi reprezentate de instrumente digitale şi de analiză a datelor, cum ar fi discriminarea socială [53,54]. Prin urmare, mulţi autori afirmă faptul că sunt necesare abordări de guvernanţă inovatoare şi socio-tehnice pentru a transforma forma actuală de guvernare inteligentă [55-57]. De exemplu, anumiţi autori [44] susţin că guvernarea inteligentă ar trebui să promoveze noi forme de colaborare umană prin utilizarea TIC pentru a obţine rezultate mai bune şi procese de guvernanţă mai deschise. Astfel, ar trebui să se pună mai mult accent pe incluziune socială, capital social şi sustenabilitate; ulterior, ar trebui să studiem guvernanţa inteligentă ca un proces complex de schimbare instituţională şi să recunoaştem natura politică a viziunilor atrăgătoare ale guvernării socio-tehnice. Ca răspuns la apelurile pentru o guvernanţă „inteligentă" transformatoare, unii autori susţin că trebuie să punem accentul pe „urban" şi nu pe „inteligent", trecând de la o guvernare bazată pe tehnologie la o guvernare bazată pe aplicaţii, abordare şi modelare a tehnologiilor din punct de vedere social [55,58].

2.4. De la guvernanţă smart la guvernanţă urbană inteligentă

Guvernarea urbană inteligentă este alcătuită din trei componente cheie - şi anume spaţiale, instituţionale şi tehnologice - şi interrelaţiile dintre acestea (Figura 5).

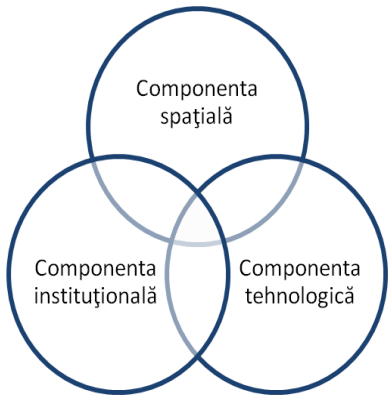

Fig. 5. Componentele guvernanţei urbane inteligente
Sursa: Jiang, H., Geertman, S., & Witte, P. (2020). Smart urban governance: an alternative to technocratic "smartness". GeoJournal, pp. 1-17.

Componenta spaţială se referă la provocări urbane [45]. Cu toate acestea, dintr-o perspectivă a guvernării urbane inteligente, spaţiul urban constituie diversitatea provocărilor care solicită acţiuni de guvernare. În consecinţă, în guvernanţa urbană inteligentă, naraţiunile şi practicile în jurul noţiunii de inteligenţă ar trebui să se concentreze nu doar pe puterile de rezolvare a problemelor privind open data, senzorii şi infrastructura inteligentă, ci şi pe rolul provocărilor urbane în stipularea suportului funcţional al inovaţiilor tehnologice [59]. Prin urmare, un accent primordial pe provocările urbane presante poate spori capacităţile digitale de a contribui la natura de rezolvare a problemelor cu sprijinul autorităţilor publice şi guvernării urbane inteligente.

Componenta instituţională face referire la moduri de guvernare. Guvernarea urbană inteligentă are nevoie, prin urmare, de contribuţii din partea diferitelor grupuri şi organizaţii [60]. Pentru a face faţă cu succes provocărilor urbane presante, actorii din sistemul public, privat şi/sau societatea civilă trebuie să colaboreze în moduri inovatoare sau „moduri de guvernare". Literatura de specialitate discută structuri distincte de guvernare. Totuşi, fiecare mod de guvernare implică într-o anumită formă, cele trei tipuri de actori menţionate, la care, prin cercetarea de faţă, vom adăuga şi mediul academic, conform modelului cvadruplu helix. Pe baza gradului de împărţire a puterii între aceşti actori în procesul de luare a deciziilor, structura guvernării poate fi clasificată ca autoritară, competitivă sau cooperativă [61]. Ideea de bază a acestei colaborări este că această componentă instituţională din cadrul guvernării urbane inteligente este compusă din interacţiunile dintre actori publici, privaţi, cercetători şi/sau societatea civilă pentru a ajunge la soluţii bine intenţionate.

Componenta tehnologică se referă la inteligenţa funcţională. Conform acesteia, guvernarea urbană inteligentă ar trebui să plece de la provocările urbane şi să fie adaptată la grupul mai larg de actori urbani implicaţi. În ceea ce priveşte rolul tehnologiei în guvernarea urbană inteligentă, acesta presupune că inovarea tehnologică ar trebui să satisfacă nevoile reale ale actorilor pentru a putea face faţă provocărilor urbane presante [62] prin cele trei funcţii ale sale: informare, comunicare şi analiză şi proiectare.

Sunt autori [58] care propun trei componente de guvernare:

- Organizaţia guvernamentală: oferă angajamentul părţilor interesate locale faţă de dezvoltarea şi desfăşurarea de iniţiative „inteligente" cu utilizarea TIC şi managementul operaţional al acestora proiectate corespunzător;
- Participarea cetăţenilor: asigură implicarea şi împuternicirea cetăţenilor în procesele de luare a deciziilor de politică şi în diferite etape ale realizării proiectului;
- Utilizarea tehnologiei: ar putea fi exploatate diverse tehnologii digitale pentru a maximiza impactul proceselor participative (de exemplu, platforme de comunicare şi management, site-uri web de diseminare a proiectelor, forumuri de discuţii şi întâlniri).

3. Metodologie

3.1. Design-ul cercetării

Din punct de vedere metodologic, colectarea datelor primare s-a realizat prin intermediul a 46 de interviuri semi-structurate cu cei patru actori reprezentaţi în modelul cvadruplu helix: cercetători din universităţi, reprezentanţi ai mediului privat, reprezentanţi ai autorităţilor publice şi ai asociaţiilor. Din cauza pandemiei, interviurile s-au desfăşurat virtual, prin WhatsApp, în perioada aprilie – iulie 2021. S-a primit permisiunea respondenţilor pentru înregistrarea interviurilor. Au fost eliminaţi participanţii care nu au fost implicaţi în proiecte de cercetare sau clustere care implicau modelul de colaborare cvadruplu helix, rămânând astfel doar 39 de interviuri valabile, care au fost analizate după cum urmează:

3.2. Lotul de subiecţi

Cercetătorii au fost selectaţi din trei universităţi, de asemenea au fost implicate în cercetare patru companii, patru autorităţi publice centrale şi locale din municipiul Bucureşti şi trei asociaţii. Toţi participanţii au fost implicaţi în proiecte de cercetare şi clustere care au au avut în vedere modelul cvadruplu helix de colaborare.

Tabel 1. Distribuţia respondenţilor

Helix cvadruplu	Frecvenţe absolute	Frecvenţe relative
Instituţii de învăţământ superior (Univ.) (3)	7	18%
Mediul privat (Ind.) (4)	13	33%
Mediul public (Guv.) (4)	12	31%
Comunitatea socială (3)	7	18%
TOTAL (N)	39	100%

Sursa: Cercetare calitativă

4. Analiza

Rezultatele au fost analizate şi sintetizate tematic pentru a oferi perspective şi a învăţa despre impactul proiectelor de oraşe inteligente. O concluzie cheie a cercetării a relevat faptul că interacţiunea dintre părţile implicate este limitată în principal pentru că „cetăţenii, autorităţile publice, firmele şi oamenii de ştiinţă nu sunt parteneri naturali" (Univ. 1, A.M.) în cadrul helixului cvadruplu şi acest lucru a avut un impact negativ asupra dezvoltării inovaţiei, comercializării ulterioare a acesteia şi provomării spre societatea civilă. Acelaşi aspect a fost subliniat şi de participantul din industrie, care a afirmat că în proiectele sale „a existat o foarte mică colaborare cu mediul academic, consumatorul final şi autorităţile" (Ind. 2, M.C.). În plus, un alt participant a declarat că „există o lipsă îngrijorătoare de organizare între diverşi parteneri. Ar trebui să existe viziuni mult mai coordonate (Ind. 1, M. C.). Constatăm că există un fel de tensiune între actorii principali, poate din cauza lipsei unui scop comun sau a unei viziuni comune, dar adevărul este că acest lucru afectează procesul de guvernanţă urbană inteligentă. Singura colaborare pozitivă

pare să existe între societatea civilă şi autorităţi, cei dintâi acceptând ideile de inovare ale autorităţilor publice urbane. Membrii autorităţilor publice confirmă că există un „eşec în integrarea diferitelor interese ale participanţilor într-o viziune comună" (Guv. 1, N.D.). O altă slăbiciune observată a fost „lipsa unor procese bine definite şi detaliate" (Guv. 2, C.S.). Structurarea clară, monitorizarea şi evaluarea reprezintă un act de echilibrare între ceea ce au nevoie şi doresc partenerii, ce inovaţii pot fi de fapt generate astfel încât toţi actorii implicaţi să fie mulţumiţi. Adoptarea unei abordări holistice care se ridică deasupra agendelor individuale ale partenerilor/părţilor interesate trebuie să includă atât impacturi tangibile, cât şi intangibile. Acest proces este inevitabil politic în sensul că tipurile de rezultate considerate utile pot diferi substanţial între diferitele tipuri de parteneri şi oraşe. Inovarea şi implicit guvernarea urbană smart ar trebui să fie aliniată cu interesele tuturor partenerilor.

Mai mulţi specialişti au sugerat că autorităţile publice înţeleg cu greu provocările atunci când este vorba despre inovaţii pentru oraşele inteligente: „inovaţiile care vin din laboratoarele noastre, nu pot fi luate pur şi simplu, iar în mai puţin de jumătate de an nu poţi angaja 30 de persoane. Nu acesta este mersul lucrurilor" (Univ. 3, A.M.) De asemenea, atât cadrele universitare, cât şi participanţii din industrie au afişat sentimente negative privind birocraţia, care a încetinit proiectele urbane. Totodată, percepţia generală este că guvernul reprezintă cel mai puternic actor dintre cei implicaţi pentru că „îşi pot retrage oricând fondurile" (Ind. 2, A.E.).

Au fost şi voci care au criticat lipsa corelaţiei dintre politicile publice, care încurajează pe hârtie colaborările dintre cei patru actori dar, în realitate, obiectivele şi termenele limită împiedică dezvoltarea inovaţiilor de succes în cadrul proiectelor urbane smart. S-au remarcat însă şi aspecte pozitive: angajamentul politic prezent în strategiile naţionale pe termen mediu şi lung şi existenţa politicilor publice, în ciuda eficienţei lor scăzute.

Prin urmare, relaţia de putere este o povară atât pentru mediul academic, cât şi pentru industrie. Implicarea comunităţii civile este foarte importantă, aspect asupra căruia au convenit toate celelalte părţi.

O altă problemă menţionată de mai mulţi participanţi din toate cele patru părţi interesate a fost potenţialul conflict de interese ale actorilor în ecosistemele urbane de inovare. Acest lucru reprezintă o ameninţare pentru ecosistem, deoarece fiecare parte interesată ar putea prezenta propriul interes în loc de un interes comun, o viziune comună. Încrederea în celelalte părţi a fost considerată esenţială nu numai pentru cultivarea viitoarelor parteneriate, ci şi pentru transformarea cunoştinţelor în inovaţii, pentru comercializarea şi promovarea lor către comunitate. O provocare practică constă în aceea că este dificil de monitorizat lucrurile pentru care nu există date. Acestea se referă adesea la impacturi sociale mai puţin tangibile. Lipsa de acceptare a noilor tehnologii de către public este o altă problemă semnalată (Guv. 2, V.B.).

În cele ce urmează vor fi evidenţiate o serie de puncte cheie, alături de provocările care apar împreună cu acestea. Ca un prim factor cheie menţionăm participarea societăţii civile şi comunicarea adecvată şi aprofundată între participanţii la proiect şi public pentru a creşte gradul de conştientizare şi implicare.

Aici a fost subliniată ca și problemă faptul că, de obicei, este de așteptat ca o schimbare de comportament să nu se întâmple cu ușurință, lucru care se aplică în implementarea noilor tehnologii și servicii. Cu toate acestea, această slăbiciune ar putea fi eliminată prin realizarea unor campanii de consiliere relevante pentru public. Este recomandat ca diseminarea cunoștințelor și a informațiilor să fie făcută într-un mod simplist pentru ca toată lumea să înțeleagă. Aceste campanii au potențialul de a conduce la schimbări mai ușoare ale comportamentului utilizatorilor finali. Mai mult, prin implicarea activă a cetățenilor educați în luarea deciziilor, ei vor câștiga încredere în proiectul propus și vor face alegeri conștiente și nu intuitive. Lipsa de acceptare a noilor tehnologii de către public ar putea fi cauzată de lipsa de informații adecvate cu privire la costurile și beneficiile tehnologiilor, ceea ce duce ulterior la lipsa de încredere că deciziile viitoare vor fi beneficiare pentru toate părțile interesate implicate. Prin implicarea activă a publicului în discuții cu restul părților interesate, cunoștințele celor dintâi cu privire la costuri și beneficii vor crește și, prin urmare, se așteaptă ca concepțiile greșite să se diminueze. Complementar, prin educarea cuprinzătoare (adică, consiliere sau campanii educaționale) a publicului cu privire la noile tehnologii și implicarea transparentă a acestuia în luarea deciziilor privind activitățile tehnologice, sentimentul de suspiciune este de așteptat să scadă semnificativ.

Un alt factor cheie descoperit constă în existența expertizei, conștientizării și într-o oarecare măsură a metodelor de proiectare și implementare a noilor tehnologii și soluții. Printre probleme observate în acest caz ar fi potențialele conflicte de interese ale părților implicate în ecosistemele urbane. Chiar dacă diferite proiecte pot aplica soluții similare de guvernanță inteligentă în timpul realizării proiectelor orașelor inteligente, este evident că fiecare proiect se referă la un oraș diferit, cu contexte și echilibre ecosistemice diferite. Aceasta înseamnă că mecanismele de guvernanță inteligentă nu pot fi generalizate pentru alte orașe sau chiar pentru proiecte din același oraș, necesitățile modificându-se de la caz la caz. Cu toate acestea, această problemă ar putea fi abordată prin integrarea expertizei, conștientizării și metodelor de proiectare și implementare a proiectelor. Echipe multidisciplinare de experți ar putea analiza condițiile sociale, economice, politice, de mediu și juridice ale proiectului și ar putea concepe și orchestra mecanisme de guvernanță locale, care să răspundă nevoilor specifice ale proiectului. În acest caz, un plus ar fi existența angajamentelor politice și strategiilor pe termen lung și mediu. Un punct slab în acest caz este lipsa comunicării și transparenței adecvate între participanții la proiect. După cum s-a constat uneori comunicarea și încrederea dintre partenerii de proiect sunt insuficiente.

Acestea sunt modalitățile cheie și provocările identificate prin care ecosistemele urbane de inovare pot orchestra mecanisme robuste de guvernanță colaborativă pentru a proiecta tranziții inteligente și durabile pe termen lung, prin consolidarea atât a exploatării factorilor cheie, cât și a minimizării barierelor întâlnite.

5. Concluzii

Prezenta cercetare și-a propus să analizeze percepțiile actorilor implicați printr-un studiu calitativ, concentrându-se în principal pe rolul autoritățile publice și colaborarea acestora cu ceilalți actori, pentru a ilustra modul în care funcționează

acest cadru în practică. Atât analiza literaturii de specialitate, cât şi cercetarea calitativă au recunoscut necesitatea unor investigaţii aprofundate pentru a întreprinde colaborări eficiente pentru dezvoltarea ecosistemelor urbane smart de inovare şi pentru a depăşi eventualele probleme emergente. Totodată, s-a observat că guvernanţa urbană inteligentă promovează o modalitate de guvernanţă a oraşelor deopotrivă incluzivă dar şi inovatoare în era „inteligentă", pornind de la problema urbană/ necesitatea de inovare, promovând moduri de guvernare bazate pe cerere şi modelând ecosistemele urbane inovatoare astfel încât să fie orientate către societate. În plus, colaborarea dintre actori trebuie îmbunătăţită.

Evoluţia modelelor ecosistemelor de inovare (de la Triplu Helix la Cvintuplu Helix) are implicaţii pentru evoluţia paralelă a abordărilor inteligente de guvernare urbană. Analiza de faţă arată că sunt deja iniţiate cercetări în această direcţie, dar complexitatea impusă de ecosistemele de inovare emergente necesită consolidare continuă a mecanismelor de guvernare şi definirea/conceptualizarea celor mai adecvate perspective, deopotrivă dinamice şi personalizate pentru oraşul inteligent sau, după caz, proiectul specific.

Cercetarea a evidenţiat: pentru început s-a observat că participarea publicului este necesară pentru a asigura succesul proiectului, conform celorlate trei părţi implicate. Subliniem că participarea publică este recomandată fiind esenţial să se implice încă din etapa de planificare a proiectului pentru a creşte gradul de conştientizare şi pentru a asigura continuitatea. Totodată, s-a observat o cooperare limitată între cele patru părţi implicate care au dus la interacţiuni scăzute ale participanţilor, o lipsă de transparenţă între actori şi un impact negativ asupra proiectelor urbane inteligente în general. Ca o soluţie la această problemă, părţile interesate trebuie să se implice în mod conştient în proiectele urbane, să depună eforturi pentru a-şi implica restul partenerilor în activităţile lor pentru a construi astfel încrederea între parteneri, a creşte gradul de conştientizare şi credibilitatea. Ca abordări viitoare, se pot face cercetări ample asupra proiectelor de succes şi eşec în ceea ce priveşte modelul cvadruplu helix cu scopul de a evalua cele mai bune practici şi practici de evitat.

Contribuţiile articolului sunt: (1) îmbunătăţirea conexiunii dintre mediul universitar, mediul privat, autorităţi/instituţii publice şi societate civilă (actorii în cadrul abordării Cvadruplu Helix); (2) stabilirea percepţiei reale a părţilor implicate în Cvadruplu Helix, cu accent pe punctele forte, punctele slabe şi tensiunile care decurg din colaborarea lor.

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Intelligent cities dealing with technology for sustainability

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Abstract

As drivers of economic and social growth, and engines of innovation, cities are developing urban intelligence as a key source to advance future development and to ensure high quality of life, and to improve processes and services by using the potential of information and communication technology (ICT), promoting practices of sustainable consumption for urban development. Smart cities and smart communities help to build urban intelligence within cities which aim to proceed towards urban sustainability and knowledge creation. Cities identify smart and intelligent solutions to facing and solving urban problems in order to drive innovative processes and proceed towards sustainable urban growth and consumption too. The use of information technology helps cities to rediscover the meaning of collaboration within urban spaces in order to transform the community in a significant way. Intelligent cities as communities promote technological innovation and encourage people to work for achieving urban sustainability, and rediscovering a pathway for growth and knowledge, innovation and value creation.

1. Introduction

Sustainable urban development relies on cities which are evolving as communities by rediscovering the importance of urban intelligence as a key source to advance processes that enable value creation, innovation and sustainable

consumption in order to improve the wellbeing of people and ensure high quality of life to citizens living within urban environments. Intelligent cities identify a virtuous pathway for advancing sustainability within urban environments, by developing social, organizational, community and technological capabilities. Intelligent cities emerge as interactive environments where information and communication technology (ICT) contributes to creating interactive spaces, bringing together digital, technological, physical and human entities [1].

The aim of this study is to elucidate how cities rediscover the urban intelligence and identify a pathway to drive the city to proceed towards sustainable urban future, promoting social and economic growth. The study relies on literature analysis regarding the main articles concerning the smart city vision as a source for urban development and the smart community as drivers of urban growth and innovation. Cities of tomorrow are using the potential of information technology in order to promote urban economic growth and development, sustaining value creation and innovation within society, and improving the quality of life. Cities follow a smart city view for driving social and economic development of urban areas in order to achieve successful issues by sustaining processes of innovation and knowledge creation over time [2] [3].

Rethinking cities as smart communities helps to shape the city as a better place for wellbeing of people living within urban spaces. Smart cities and communities are promoting sustainable wellbeing for people within the city as a better place for life and work [4]. They design digital platforms and services in order to support business and facilitate public life [5].

Reinventing the city as a sustainable city is the key to a sustainable, renewable resource-based economies [6]. Cities contribute to urban sustainability transitions that refer to changes in production and consumption patterns. [7].

Cities are considered as engines of innovation and technology-enabled communities. An intelligent city is both a territorial innovation system [8] and a thinking community designing frameworks to achieve solutions [9], developing cooperative processes [10]. Today, intelligent cities drive the city as smart and sustainable community promoting collaboration as a source for growth [11].

The paper is organized as follows. After introduction, the literature review about intelligent cities is presented. In the third paragraph, driving urban intelligence within cities dealing with technology relies on promoting smart cities for urban services and innovation, and developing communities developing processes for urban sustainability. Finally, discussion and conclusions are outlined.

2. Intelligent cities

City is an intelligent organism which is able to provide adequate inputs to people, groups and businesses, promoting sustainable consumption and production of services and benefits for users and consumers. The intelligent city is able to provide high-quality services, support urban competitiveness and sustainability, promoting a social and cultural milieu within urban spaces. An intelligent city develops a territorial innovation system, combining knowledge, cooperation and

digital communication [8]. Intelligent cities contribute to building a shared governance relying on participation, dialogue and open debate among all the stakeholders for urban policy options [11]. Intelligent cities embed information and communication technologies within urban environments, bringing together technology and people for innovation, learning, knowledge and problem solving [12]. The city's intelligence develops through collaborative frameworks that enable citizens, companies and public authorities to work for innovation through digital spaces [1]. An intelligent city develops organizational capacity, institutional leadership and creativity to drive competitiveness and increase urban sustainability. Intelligent cities use the potential of information technology, promoting economic development, social and territorial cohesion, people's involvement and mobilization [13]. The intelligent city is a connected and long-term horizon-oriented community which develops a sustainable vision to urban development [1]. Information and digital technology helps to reinvent the city as a community constructing opportunities for developing innovation and collective intelligence [14]. An intelligent city is able to provide high quality of services to citizens and business, employing the potential offered by technological innovation. Intelligent cities provide digital collaborative spaces and support the community or promote a network of organizations and companies [15]. In particular, the use of information technology helps to empower the citizen for more intelligent and informed behavior [16].

Cities contribute to improving the quality of life by driving urban innovation and sustainability, identifying a smart vision to strengthen local capacity and development [17]. Intelligent cities contribute to developing urban sustainability [10] and building environments for innovation as a source for urban development, value creation and generation of knowledge [15]. Today, intelligent cities are becoming smart and sustainable communities, developing collaboration among organisations within community, promoting innovative solutions to make both more efficient cities and more competitive urban innovation ecosystems [11]. Cities promote a smart vision dealing with intelligence as a source for future urban growth [18]. Cities empower communities driving human, social, collective and technological sources, following a long-term horizon [19].

3. Cities and urban intelligence between information technology and sustainability

Technology enables cities to become smart urban communities, going sustainable by bringing together technological, human, organizational, knowledge and social aspects. The use of information technology helps to rediscover the city as a smart and intelligent community and co-producer of value by involving all the relevant stakeholders for participatory, interactive and information-based urban environments. In particular, the smart city view is emerging as a vision to ensure high urban quality of life and innovation. The smart community concept helps to shape the city as a community promoting sustainable urban development and consumption. Smartness and sustainability are drivers of new forms of urban intelligence.

3.1. Promoting smart cities to ensure high urban quality of life and innovation

Smart cities perform better than normal cities. Smart cities contribute to advancing urban sustainability. Cities are developing as intelligent, smart, sustainable and inclusive communities, improving cognitive skills for continuous change, learning and innovation [11]. Cities of the future will be smart communities, adopting a smart urban development strategy in order to improve urban managerial efficiency and ensure high quality of life [2]. Smart cities contribute to open innovation in terms of co-production and co-delivery of services and policies as well [3]. A smart city is a place where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business. A smart city refers to a community which uses technology to ensure service for high quality of life and wellbeing of it citizens [20]. The use of information technology helps the city to support the development of an urban community in a significant way. The city is a smart community in which local government, business, education and citizens understand the potential of information technology as a source to transform the community in significant ways through collaboration [21]. Smart city initiatives contribute to fostering the aspects that reinforce the urban community [22]. Sustaining smart growth relies on smart cities and communities encouraging multi-level and sector interactions for co-design and co-implementation of innovative solutions [23]. Cities invest in smart solutions in order to achieve sustainable development in urban spaces, by managing efficient use of resources [24]. As a smart community the city enables public and private organizations, and citizens to connect each other and advance collective skills [25], by involving the civil society, industry, universities and local government to collaborate and develop expertise in urban planning, participation and development. Smart city initiatives enable cities to improve citizen-oriented services and support the community development, ensuring high quality of life and improving city's performances and quality of services to citizens [26]. Smarter cities facilitate collaborative processes, strengthening the capacities and needs of communities [27].

3.2. Developing smart urban communities for sustainable development and consumption

In an information age, cities evolve as smart and sustainable communities, by developing urban intelligent growth. Smart and livable cities shape a productive and accessible community which is able to advance towards sustainable urban development and extend the wealth of citizens [28].The future of sustainable urban development is about change within urban areas and requires that cities evolve as sustainable communities which promote conditions for enabling value creation processes, by mobilizing the urban community as an organizational framework that develops organizational, social and technological capabilities. Cities are the main drivers and *influencers* of responsible behaviors that open up to sustainable consumption and high quality of life [29].

A smart city supports both job growth and increased quality of life. A smart city goes beyond the use of digital technologies for better resource use and less emissions. It means a more interactive and responsive city administration, safer public spaces, meeting the needs of an ageing population. Cities are in transitioning to be smart, inclusive and sustainable communities for life, work and business [11].

Cities become smart and intelligent communities which encourage behavior changes in urban consumption, mobilizing citizens to behave as aware and responsible consumers who pay attention to common wealth and help to spread sustainability patterns. Cities are engines of economic and social development. Cities play a key role in planning urban development as related to industrial and sustainable development of businesses and economic activities. Today, the challenge is to make the city as a driver of sustainable development. As sustainable communities, cities have to meet human needs, considering development's environmental and ecological implications. The city as an organization space has been built to be a healthy place for life and work which is able to avoid disproportionate populations' consumption and enterprises' production on local and global resourceInformation [30]. Today, the role of cities is central about advancing sustainable urban transformation on consumption. Sustainable urban transformation implies that cities have to plan a long-term horizon for urban development Cities re-engineer the urban spaces to become more sustainable and resilient communities where citizens act as energy producers as well as consumers. Analyzing different consumption patterns helps to identify possibilities for developing sustainable consumption patterns [31].

4. Discussion and conclusions

Cities of tomorrow are becoming smart communities advancing towards sustainable consumption and development, engendering new forms of urban intelligence. In the knowledge-driven and technology-enabled societies, cities are engines of social and economic growth, and contribute to shaping collective and social intelligence. Intelligent cities contribute to developing knowledge, sustainability and innovation as assets that lead cities as communities living in the future and promoting urban development. Cities rediscover and enhance the concept of community, by using information technology. Information technology helps cities to modernize processes and services in order to achieve urban sustainability over time. Information technology helps support urban intelligence creation within cities and communities. *Smart* is a label, both a vision and means to drive the city into the future. Cities are proceeding in order to invest in innovation processes, knowledge sources and new advanced technology in order to identify new forms of intelligence that enhance the urban development.Intelligent cities are redesigning the city as smart and sustainable community in order to shape urban intelligence and support sustainable urban development. Technology enables cities to develop urban intelligence. While technology in itself contributes to improving and creating services for users and consumers, intelligence serves as a driver for innovation in processes, behaviours and culture. Smart cities use the potential of

information technology to enable the citizens as users and consumers of new services. Smart communities use information technology in order to promote cooperative processes among all urban stakeholders for urban value creation and engendering sustainable consumption and behaviours. As engines of innovation, cities as smart communities proceed towards urban intelligence by developing the intelligent urban community which rediscovers sources for inclusive and sustainable development and growth, and creates knowledge for innovation and value creation. Cities are investing in collaborative processes, employing human and technological resources to support sustainable urban development and achieve urban value creation by. Urban social sustainability helps cities developing a collaborative framework for intelligent solutions to urban development and inclusion. There are some limitations. The study provides only a theoretical analysis. No case studies and empirical research are presented. Further research implies to investigate how Italian cities are developing urban intelligence for long-term sustainability within urban spaces.

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Smart city - a solution for dealing with climate change in European cities

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Abstract

Smart City – a concept for which there is no valid general definition, but has been defined by the Organization for Economic Cooperation and Development as " initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process". This broad area has six pillars, including Smart Environment, which is the one that approaches the fight against climate change. Therefore, the objective of this article is to present the positive externalities of the implementation of policies regarding Smart Cities at central level in order to reduce the negative effects caused by climate change. Smart cities create a clean and healthy environment for the development of its citizens, promoting alternative solutions to combat the disastrous impact of industrialization in modern times. Research results show that using technology in various forms can significantly reduce environmental problems and improve quality of life.

Keywords: *environment, climate change, digitalisation, sustainability, pollution*.

1. Introduction

1.1. Smart environment – a concept

To develop a smart city, more technology deployment sources are needed from a variety of areas of activity. In this respect, the environment and sustainable lifestyles are presented as basic elements of smart cities [2]. These aspects are part of the smart environment, which leads to a sustainable development of the quality of human life.

In order to attain a permanent human settlement, the natural environment it's being transformed and shaped by cities, using physical elements. Extensive and invasive infrastructures and buildings are the main reasons through which conversion is obtained and conclude a significant impact on the environment [3]. Consumption of natural resources and energy, atmospheric emissions and waste discharge are a few examples of what urban development processes causes inside the environment. Due to the fact that cities are growing even larger year by year, the percentage of CO_2 emissions and world's energy are expected to continue rising more than 70% as it has been estimated currently [4]. The major sustainability challenges the cities face today are exemplifications such as the increasing intensity of urban metabolism and its effects on climate change.

"Research and academic view -where primary focus is given to achieving sustainability (mainly environmental sustainability) reflecting quality of life and the economy emerge as second-level priority factors. Corporate sector's view (mainly technology companies) where ICT as a panacea is the primary agenda in the sense that the required outcomes such as city efficiency, management, infrastructure, environment, and quality of life follow automatically." [5]

The sustainability of the urban environment is analysed from two approaches: one from the point of view of energy and the prevention of consumption; involving renewable energy, technological grids, pollution control and management, green buildings, green urban management, efficiency, reutilization and so on; and the other linked to the urban grid and the management of resources: waste, street lighting, waste management, drainage systems, monitoring water resources, reducing contamination and improving water quality [6][7].

When talking about environmental sustainability we should turn our attention towards the concept of smart mobility which promotes the goal of decreasing emissions, by encouraging the use of public transportation and alternative vehicles [7].

1.2. Climate change

Studies show that the temperature of earth and water has increased significantly in recent years. Starting with 1880, the temperature threshold is constantly exceeded from year to year. With these worrying figures, to be specific, 0.5 degrees Celsius and 62 % annual CO_2 emissions, several negative environmental impacts were found. With the excessive population growth, at the opposite pole, the

number of mammals, reptiles, amphibians, birds and fish is decreasing, which could lead to natural imbalances. Also, because of deforestation, almost 300 million acres forests were turned into agricultural land. As an immediate result of this process, the increase in carbon emissions and thus in global temperatures can be noted [8].

Human activities are the main source of greenhouse gas emissions (GHG), which include simple tasks, from mismanaging household waste to industrial activities and combustion of fossil fuels. The main producers of greenhouse gas emissions are fossil fuels utilized to generate electricity and heat, produce goods, construct buildings and infrastructures and in transport. To a lesser extent, greenhouse gas emissions come from other activities that do not involve fuel combustion such as agricultural activities and waste management. In the figure below, it can be see how much every sector contributes to the emission of GHG.

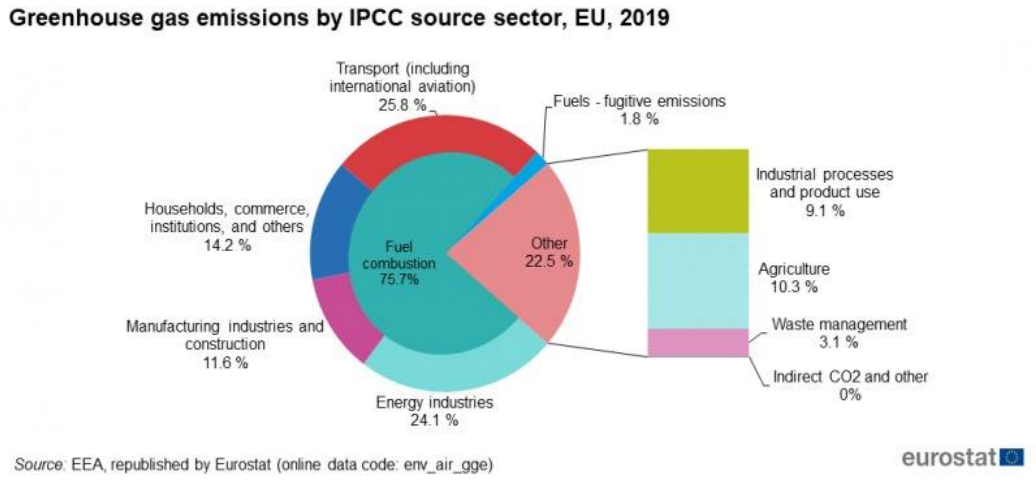

Fig. 1.

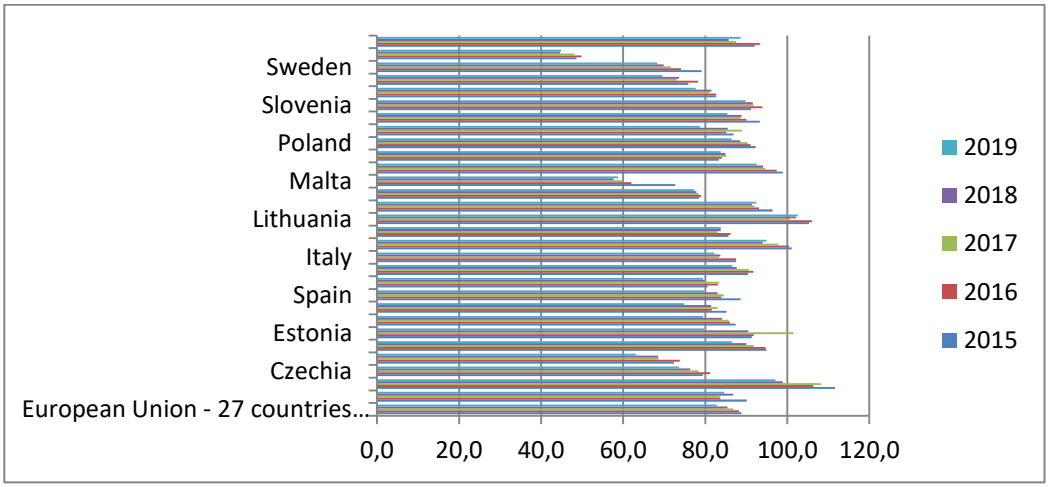

Fig. 2. Greenhouse gas emissions intensity of energy consumption (source: EEA and Eurostat), 2015-2019

The indicator is part of the EU Sustainable Development Goals (SDG) indicator set. It is used to monitor progress towards SDG 13 on climate action and SDG 7 on affordable and clean energy; which are embedded in the European Commission's Priorities under the European Green Deal. The energy sector plays a key role in the fight against climate change. The EU, based on its European Green Deal and the 2030 Climate and Energy Policy Framework, works to implement efficient sustainable energy policies that meet the greenhouse gas emission reduction objectives by increasing energy production from low-carbon energy resources, in particular renewables while improving energy efficiency, managing energy demand, increasing the stability and transparency of energy markets, developing and transferring clean energy technologies and intelligent solutions [9].

2. Materials and methods

Even though the idea of a greenhouse effect has been theoreticized about for a century or so, societies had a hard time believing this was actually a threat [10]. Human expansion of the "greenhouse effect" is attributed to the global warming trend. There are certain gases categorised as ”forcing” climate change which do not respond physically or chemically to changes in temperature and there are also gases categorised as ”feedbacks” which respond physically or chemically to changes in temperature [11].

”In a Smart environment, the pollution is carefully managed in order to reduce the emissions. A careful management of water resources is carried out and abetter waste management is sought in order to achieve a zero impact on the whole territory of the cities.” [12]

Three main causes of climate change had been identified by scientists, namely: a) humanity's increased use of fossil fuels; b) deforestation; c) increasingly intensive agriculture.

a) Humanity's increased use of fossil fuels

”Since the beginning of the Industrial Revolution, the increasing use of fossil fuels (coal, petroleum, natural gas) has added to the atmospheric burden of carbon dioxide.” [13] The carbon dioxide is a gas that absorbs part of the infrared radiation that Earth's surface emits, the consequence being the unusual rise in the temperature of the lower atmosphere. This is what scientists call the greenhouse gas effect and the more carbon dioxide is emitted, the warmer the earth's atmosphere will be. The experts in the international climatological community warn that if we don't do something to decrease the carbon dioxide in the atmosphere, in the next 50 years mankind will cause a significant global warming [13].

In order to transition to low-carbon economies, country producers, fossil energy companies and their investors need to redesign their portfolios and change their focus from the current industries that emit significant volumes of carbon dioxide through the combustion of fossil fuels. Regions where the main source of fiscal revenue is dependent on fossil fuels will likely face a risk in the upcoming future, unless they concentrate their efforts on diversifying their economies [14].

”Without the influence of humans burning these fossil fuels for energy, this carbon would be unlikely to reach the atmosphere” [18].

b) Deforestation

The climate system includes the land surface and its vegetation; given the statement above, natural changes and manmade in the land can affect either positive or negative the climate [15]. During the last decades, Europe has experienced substantial deforestation, accordingly, it was noticed a reduction of almost 70% of the forest fraction in most parts of continental Europe [16][17]. The carbon dioxide is absorbed by trees and other plant and the stored in the plant’s branches, leaves, trunks, roots and in the soil. While forests draw down carbon dioxide from the atmosphere, the carbon remains stored as long as the trees are standing. Once the trees die or decay, the carbon is released back into the atmosphere.

”Burning fossil fuels, in combination with destruction of carbon sinks due to deforestation and other activities, has contributed to more and more carbon dioxide building up in the atmosphere – more than can be absorbed from existing carbon sinks such as forests. The build-up of carbon dioxide in the atmosphere is driving global warming, as it traps heat in the lower atmosphere. Carbon dioxide levels are now at their highest in human history.” [18]

c) Increasingly intensive agriculture

Greenhouse gas (GHG) is posing serious risks for ecosystem health. After carbon dioxide (CO_2) there are two most important GHGs, Methane (CH_4) and nitrous oxide (N_2O). Methane (CH_4) and nitrous oxide (N_2O) are receiving more and more attention because of their contribution to climate warming [19][20][21][22]. While upland soils are the major CH_4 sink, the dominant sources of CH_4 are natural wetlands, anthropogenic activities, and biomass burning [23][24]. Reactive nitrogen inputs from synthetic nitrogen fertilizer and animal manure applications, cropland expansion, and processes associated with fossil-fuel combustion and biomass burning have seemingly increased the atmospheric N_2O concentration. Both biotic and abiotic processes are included in the production and consumption of N_2O in soils [25].

Elevated atmospheric CO_2 could significantly increase N_2O emission due to the increase of soil moisture and soil labile carbon only under the condition of high nitrogen supply [26][27][28]. ”Meanwhile, the increasing effect could be small or even negative in nitrogen-limited ecosystems since increased plant growth may result in less nitrogen availability for nitrifiers and denitrifiers” [29].

People tend to misunderstand the ideas revolving around climate change and its causes and that leads to creating an obstacle in the way of developing and implementing effective solutions [30]. ” Much climate change communication research has focused on understanding public beliefs and attitudes and their drivers, which include cognitive, experiential, sociocultural, and other factors.” [31] A small portion of the studies was actually based on empirical contributions used as an efficacious instrument for shaping climate opinions. However, there is a lot of evidence to prove that there is a connection between how the public perceives the causes of climate change and the rise in risk perceptions and the backing for solutions to deal with it [32][33][34][35][36].

It is known from previous climate change communication studies that notifying people about the high percentage (97%) of climate scientists concur that human activities lead to climate change can have a major impact on individuals' belief and cause a greater concern about the subject [31][37][38][39][40]. Public opinions about considering that the causes of climate change are human related have clearly increased (from 46% to 56% between 2008 and 2020) to the detriment of attributing climate change to attribution of climate change to human industrial activities, concern about the issue, and support for climate policy. Therefore, it is useful to encourage the comprehension of the scientific senses of the climate change, but it is not enough to make the people grasp the genuine causes of climate change, to cause distress about it or implement policies to address it [30].

When comparing the impact of delivering information about the human causes versus the impact of delivering information in a more solution-oriented way, people are more likely to stand for policies when they trust that those are efficient in solving their concern. It creates a greater influence for them to see the cause and effect relation and a way to solve it. In order to affect the concern about climate change, it would be better to talk about the causes along with the impacts or solutions, or both [30].

"The European Union's environment and climate policies aim to protect the environment and minimise risks to climate, human health and biodiversity." For it to be a success it is needed to combine both economic and social initiatives with environment and climate policies [41].

There are several collaborations between EU states, such as European Green Deal and the 2030 agenda for sustainable development, the 7th Environmental Action Programme 'Living well, within the limits of our planet' and the most recent Climate change summit COP26.

Ursula von der Leyen (European Commission president-designate) has assured the european citizens that the EU climate policy would be broaden and strengthen and for it to be achieved, she aims to create a European Climate Law with the purpose of making the EU climate neutral by 2050 [42].

The European's Green Deal purpose is to improve the well-planed usage of resources by choosing a more clean and circular economy, regress biodiversity deprivation and cut pollution. It highlights the need for investment and provides the already available financing tools, in order to have a smooth transition to a green economy. The European Green Deal makes it clear that it is important to enact change in all sectors of the economy, notably transport, energy, agriculture, buildings, and industries such as steel, cement, ICT, textiles and chemicals [43].

The European Green Deal should be formulated as a redistribution instrument, promoting investment shifts and labour substitution in key economic sectors and, at the same time, the most vulnerable segments of society being supported in the decarbonisation process. The deal would be focused on these four pillars carbon pricing, sustainable investment, industrial policy and a just transition [44].

The UN 2030 agenda for sustainable development is one of the most ambitious agreements negotiated at a global scale on the subject of sustainability. It

is structured on 17 sustainable development goals (SDGs), some of which talk about conserving life on land and below water; combating climate change; and promoting productive employment, quality education, gender equity, clean energy, and sustainable agriculture (United Nations 2015) [45].

”This new Agenda enshrines the expectations, aspirations and priorities of the international community for the next 15 years. It is a transformative Agenda that places equality and dignity front and centre and calls for a change in our development pattern while respecting the environment. It is a universal commitment, undertaken by developed and developing countries alike, in the framework of a strengthened global partnership that takes account of the means of implementation to achieve this change, the prevention of natural disasters, and climate change mitigation and adaptation.” [46]

One of the specific environmental policies is the the 7th Environmental Action Programme ‘Living well, within the limits of our planet’, which has three main strategic initiatives, like the resource efficiency roadmap, the biodiversity strategy and the low carbon economy roadmap [41].

The programme promotes the concept of a healthy environment reached by having in place a circular economy that means no waste and ”where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society’s resilience” [47].

”Significant progress was made at the United Nations climate conference in Glasgow which came to a close on 13 November after two weeks of negotiations between the parties to the United Nations convention on climate change (UNFCCC).

Among the key initiatives were: increased commitments to provide funds to help developing countries tackle climate change, the adoption of the global methane pledge and the finalisation of the Paris rulebook.” [48]

Competent consumption, a high culture of relationships between individuals and a healthy lifestyle are the main approaches in order to achieve a smart lifestyle for smart people. This healthy characteristics encourage people towards self-enhancement, to be interested and evolved in the issues of the society and to nurture the development of the ICT skills. The main problems that can occur in the environment that people need to be careful about are sustainable consumption of energy, making use of the renewable energy sources, protecting the environment starting from the soil to natural habitats and animals and keeping at a minimum the consumption of the non-renewable resources [49].

”Environmental protection and the efficient use of resources is usually an essential factor of motivation for the implementation of smart city strategies. In this sense, fostering the use of ICT tools is a way of promoting more efficient solutions, which will improve the state of economic activities and, simultaneously, make better use of the resources within the territory of the city.” [50]

There are several elements of a smart city such as IoT systems and sensors which can help design and sustain a smart environment. One of the main problems of the environment is the pollution, characterized by the presence of substances which can cause harm to the living organism [51].

The wireless sensors networks (WSNs) are autonomous nodes that combine the benefits of being small, efficient and cheap [51]. In order to collect data on the factors that cause air pollution (smoke, dust and other gases), mobile nodes can be installed on public transport with the purpose of covering a wider range, connecting to nodes nearby and transmitting data to the cloud. The network of notes is designed in such a way that a cluster is formed in key areas [52].

Another smart solution for the environment is a waste monitoring system such as the one developed by SENSONEO, which uses smart sensors that have an ultrasound technology for measuring the fill levels in bins and containers several times a day and send the data to a powerful cloud base platform via the IoT. This system optimizes the waste collection routes frequencies and vehicle loads, bin distribution resulting in overall waste collection cost reduction by at least 30% and carbon emission reduction up to 60% in cities [53].

Another key aspect of a smart environment is efficient urban planning with regard to resource management as to reduce future sources of greenhouse gas emissions and create a more livable urban space. Smart buildings would be powered by a low carbon electricity ecosystem that has a low carbon footprint with a much positive impact on energy consumption. By making use of this system, the pressure on natural habitats and biodiversity and the risks of natural disasters would be considerably reduced [54].

3. The conclusions of the case study

An important pillar of a smart city is a sustainable environment in which production efficiency is maximized, all the while preventing the degradation of environment's components by minimizing the use of natural resources and having a well-organized household and industrial waste management system [55].

"In 2020, the United Nations Development Programme estimated that cities account for 70% of the world's greenhouse gas emissions and are facing natural disasters such as flooding and heat stress because of climate change. The proportion of the global population living in cities and towns is expected to rise from 54% in 2015 to 66% by 2050. " [1] Because of overpopulation and urban migration which have a considerable impact on the environment, researchers have designed the concept of smart cities as a solution for enhancing the quality of life [1].

Technology has also been identified as a cause for pollution and so professionals came together and created the field of sustainable of AI which uses ecofriendly technology to reduce climate change effects. Certain aspects of technology have been assessed, such as energy use, emissions and waste for categorizing whether that technology is ecofriendly or not. Lately, there has been a surge of awareness in the field of technology related to how AI affects the environment [56].

The recognized benefits of using AI in landfills and community waste processing machines are considerably reducing micro-plastic pollution and managing a nation's recyclable waste internally [56].

In the state we are today, dealing with the effects of climate change is an absolute emergency which requires viable solutions of mitigating there impact [57].

There is no perfect solution for completely resolving climate change, but, at the same time, all technologies and methods discussed in our study are feasible and if implemented could significantly reduce the harmful effects of climate change.

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Smart toilet cleanliness detection system using IoT

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Abstract

Significant technological developments and improvements have emerged during the last decade, propelling us forward in this era of technological discovery. Regardless of the field of activity, this rapid evolution phenomenon has produced significant changes and improved human life,

acting as an incentive in developing solutions that improve the quality of life and well-being of all groups of people. Thus, this paper aims to present the implementation of a state-of-the-art system for detecting the cleanliness level of toilets. Used in the Toilet4Me2 project, this system addresses the adjacent problems concerning the cleanliness level of the toilets, such as different kinds of infections and bacteria. Health risks associated with this present a major concern, countries such as India being one of the most affected by this lack of toilet sanitation. Over the last years, the Indian government has made huge investments in the search for solutions, opening the door for implementing IoT technology in this aspect of our lives. Increased awareness has even spread to Europe. Many such projects focus on the quality of life and well-being of elderly and disadvantaged people, who are often overlooked in our society. Therefore the monitoring of a toilet's cleanliness represents an important factor in the ordinary lives of elderly and young people alike, results of its use showing an abrupt reduction in health risks and an increase in usage and accessibility. The scope of this project is to achieve these milestones and spread awareness of this silent problem in our society and all the risks related to it.

Keywords: *Toilet cleanliness, IoT, health risks*.

1. Introduction

In day-to-day life, toilet use plays a very important factor, whether at home or outside and regardless of age. Playing such a quiet and important part became a basic need for most of the population, finding its place in every household. Unfortunately, not every aspect of it is treated as such. The cleanliness of toilets has become a recurring problem more and more people have to face every day, including its inherent risks. The toilet room is a vulnerable spot, closely related to our health and well-being. One's feeling of repulsion at the thought of sitting on an unclean toilet is the instinctive, natural response as it can lead to serious health risks [1]. These risks stem from the presence of different kinds of viruses and bacteria, such as Salmonella, that can be found in an unclean toilet bowl and from the spread of disease associated with its perpetual manner of use. Unfortunately, the SARS-CoV-2 Pandemic has turned toilet rooms into a hotspot for its transmission, aggravating the already serious problems related to their everyday use. [2]

India's struggle with toilet sanitation is becoming a subject of more importance as the associated inherent risks can no longer be ignored by the population. In [3], the authors present a visible problem in India, where diarrhea kills one child per minute. The cause is found in the improper sanitization of toilets, standing as a testament to the importance of this factor in people's lives from all around the world.

The Internet of Things (IoT) is a relatively new and evolving technique influencing the internet and communications technologies [4]. IoT enables individuals and things to be connected using any path, network, and service. Daily,

modern people expect new devices and technologies to make their lives more manageable. Using smart devices, IoT is of great value in monitoring the level of cleanliness in toilet rooms. Smart homes, with smart speakers, toilets, refrigerators, ovens, and thermostats, offer assistance in our day-to-day lives using collecting and presenting information in an accessible way. Through enhancing adaptability and ease of access, IoT offers a platform that enables the improvement of certain aspects of life, including its application in toilet cleanliness.

The article will be presented as follows: Section II presents similar concepts of a smart toilet monitoring system used to enhance the quality of life of the experience, while in Section III, we propose and describe a smart monitoring system prototype that can be used in individual's homes or in public spaces. Section IV presents the devices and sensors used by the system, while section V focuses on the experiments carried out and their final results. Section V relates the results from the conducted experiments. Finally, Section VI completes the work and describes the new directions of future development.

2. Related work

As this technology evolves, people begin to find appliances in different areas of activity. In [5], the authors propose a toilet cleanliness monitoring system using IoT. This smart toilet uses intelligent sensors (MQ-137) that communicate with a microcontroller (NodeMCU). The gathered data is sent to be visualized in a dashboard made using ReactJS. A mobile application is also developed to allow the toilet's cleanliness status in real time. If the measured values go above a set threshold, an alarm signal is sent through the mobile application to the janitor, announcing that the toilet needs cleaning.

In [6] a variation of the first proposed system is presented using different components in implementing the IoT platform. Instead of using a MQ-137 sensor, this system utilizes an infrared sensor (HC-SR501), a flow meter (YF-S201) installed between the tap and the pipe and an ultrasonic sensor (HC-SR04) under the lid. All the sensors are interfaced with the Raspberry Pi (Model 3B+). As soon as a person enters the toilet room, the infrared sensor detects him, which sends a signal to the Raspberry Pi. It, in turn, activates the water flow meter, which starts to measure the amount of water flowing through the pipe. The water meter stops the measurement as soon as the person exits the room, the PIR (Passive infrared sensor) switching to idle due to the lack of movement. Suppose the amount of water is above or below a certain threshold. In that case, an SMS is sent to the respective janitor signalling a need for intervention, cleaning the toilet or tending to other issues.

The system proposed in [7] is, again, similar in architectural design, using a water conservation sensor fixed in the septic tank to measure the quantity of water used by the user, an RFID reader for detecting the sweeper's activity and a user detection system. Striving to solve India's long overdue problem with toilet sanitation, this implementation adds a Dirt Detection system by using an IR sensor and a smell sensing module using a Figaro Sensor. The dirt detection system works by comparing the image provided by the sensor with the default image sorted within

(no presence of dirt). Similar to the other instances, the data gathered from the sensors is sent by a GSM message to the person in charge, with the help of a microcontroller.

A study [8] proposes a model for monitoring the indoor air quality monitoring system using various sensors (MQ135, MQ7, DHT11) to detect carbon dioxide, carbon monoxide, temperature, humidity and dust particles present in the environment. They are connected to a Raspberry Pi 3B+ micro-controller with an incorporated Bluetooth and Wi-Fi module. The gathered data is then displayed on the Thing Speak Website.

Another system is proposed [9] in which an 8-bit microcontroller is used for the sensor connection together with a modem connected to the Internet using the HTTP model. Sensor for carbon monoxide (CO), methane (CH4), ozone (O3) detection are used for air quality measurements, with a sampling period of 1 minute for each gas and programmed using the C programming language. In addition, the system is equipped with an antenna, an activation button and an 6600 mAh researchable battery. Everything is then visualized in an online dashboard (http://comcoman.com/qlog/).

3. Architecture

In the context of toilet cleanliness detection a reliable, scalable and easy to implement architecture was developed. This new prototype utilizes IoT technologies, thus requiring a stable Internet connection in order to achieve communication between devices. The prototype is fitted with a Wi-Fi module in order to facilitate communication with the MQTT Broker, which itself is connected to an open source database called InfluxDB. This database was chosen for its ability to easily integrate with Grafana, a web platform which allows data visualization through graphics, tables and diagrams.

Fig. 1. System architecture

Also, this visualization platform allows the use of formulas on the received data, making the interpretation easier. Another advantage consists in the ability to generate alerts through many different ways such as E-mail or Telegram.

The MQTT protocol [10] is used for its energy efficiency. It uses less energy than the HTTP protocol, which plays an important role in IoT applications with many user devices.

The general architecture of the toilet cleanliness system will be based on Big Data and will include communication protocols between server and platform (MQTT and HTTPS). The general "data" is translated into the numerical information of the

sensors. The cleanliness detections sensors then turn physical parameters (such as the number of pollutants in a space) into electrical parameters (such as electric potential), which are shown either analogical or digital depending on the sensors.

The data is then processed and improved by keeping in mind the specific rules of the sensors and the specific algorithms. Next, it is sent through specific protocols in the storage space (InfluxDB) in order to be accessed for its visualization in the dashboard (Grafana).

4. Used devices

The air quality monitoring equipment in the toilet consists of a hardware unit consisting of a Raspberry Pi 3B+ development board, 3 gas sensors (MQ137, MQ136 and MQ135) and a sensor for temperature and humidity detection, which are integrated into the system via the already mentioned MQTT communication. Monitored parameters include:

- Ammonia (NH3)

The range of this sensor is between 0 and 500 ppm. The sensor used is dedicated to the detection of ammonia variation in the breathing air. It operates at a supply voltage of 5V and the estimated service life is more than 2 years.

- Hydrogen sulphide (H2S)

The range of this sensor is between 0 and 200 ppm. The sensor used is dedicated to detecting the variation of hydrogen sulphide in breathing air. It operates at a supply voltage of 5V and the estimated service life is more than 2 years.

- Temperature (TC)

The temperature sensor works between -40 and 85 ºC with an accuracy of ±1 ºC. It detects the temperature of the breathing air in the toilet room.

- Humidity (HUM)

The humidity sensor takes values between 0 and 100%, with an accuracy of ±3%. It operates at a supply voltage of 3,3V and the estimated service life is more than 1 years.

As well as less important parameters related to the air quality such as: Sulphur (S), Benzene (C6H6), CO2 and smoke (yellow)

Fig. 2. Used sensors

Fig. 3. Libelium sensors
Source: https://www.libelium.com/

The main difference between MQ sensors and Libelium sensors is the sensitivity with which they detect the presence of the measured gases. Libelium sensors are much more rigid when it comes to small amounts of gas. Because of this, their use in a toilet is not efficient. Another disadvantage of these sensors is the much higher price compared to the solution given by MQ sensors.

Fig. 4. Monitoring station

5. Experiments

The system was tested in the toilet room from the BEIA offices. The sensors monitored the toilet during its use on an average working day. The graphic below presents the recorded values of each respective measured parameter.

MQ135 - Ammonia (NH3), Sulphur (S), Benzene (C6H6), CO2 and smoke (yellow)

MQ136 - H2S (blue)

MQ137 - NH3 (orange)

Fig. 5. Experimental results

The first event (1) translates in the use of the toilet by a person. The toilet bowl was cleaned immediately and it can be observed that the values recorded adhere to the norm. The second (2) and third event (3) conveys the use of the toilet by a second and a third person respectively. The toilet bowl wasn't cleaned afterwards and a rise in the levels of Ammonia and Hydrogen sulphide is immediately noticeable. This informs us that the toilet is unclean and needs immediate rectification action. The fourth event (4) consists of the second cleaning of the toilet. It can be easily seen that the levels of NH3 and H2S drop significantly to their original value. This experiment is meant to attest the hazardous nature of an unclean toilet and the importance and necessity of regular cleaning and maintenance. Further experiments will be conducted in order to achieve better and clearer results.

6. Conclusions

Toilet cleanliness has become a large problem for countries like India, where a lot of resources and time is spent on tackling the sanitization of toilet rooms. This solution presents a low-cost, easy and reliable system in hopes of reducing the risks associated with the dirtiness of the toilet room and improving the overall experience. As for future research directions, the integration in a smart toilet system is followed, as well as the addition and implementation of an air quality monitoring system.

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Study on state of the art in reusing recyclable waste materials in orange, circular and green economy

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Abstract

Nowadays, there is an increased interest by both authorities and citizens in recycling waste, especially plastic-based waste. The negative impact of over-used landfills and incineration of waste on the environment is very

high and affects everyone. It is necessary to find ways to reuse, reduce and recycle waste to clean the environment. Several studies and projects have been investigated to find the most suited way to treat this situation. Education of citizens, the connection between waste management stakeholders and orange economy, circular economy and green economy have been found as successful solutions to manage the problem of waste. Our solution to mitigate the problem of waste and to fulfil the necessity of artists for materials in the orange economy is the RRREMAKER project that aims to develop an artificial intelligence-based maker platform that has multiple purposes. First and foremost, the platform wants to create a bridge between those who collect recyclables and eco-friendly designers/producers. Then, using information taken from knowledge communities, green design, and democratization invention, and integrating orange, sharing and circular economy, the platform will be able through artificial intelligence algorithms to redefine the purpose of an old product, providing data about the new shape of the product, whether it could be combined with another material, new uses, etc. Transfer of knowledge between experts in design, materials, manufacturing, supply management, economy and distribution on the one hand, and computational experts, on the other hand, will focus on several research layers (green and circular economy, machine learning, data management, cloud environment). The project will have a significant impact on both societal and environmental challenges of the world.

Keywords: *Artificial Intelligence platform, reuse, waste, data management, cloud*.

1. Introduction

The baseline of circular economy of waste in Europe was supported by Council Directive 1999/31/EC of 26 April 1999 [1] on the landfill of waste, which established a common hierarchy of waste to further motivate the recovery of goods and materials.

As a solution to mitigate the negative impacts upon the planet, such as pollution, climate change or biodiversity loss, the circular economy is desired. A circular economy is an economic system that aims to extend the life cycle of products by re-sharing, refurbishing, repairing, recycling and reusing the waste products for the most prolonged period.

According to UNESCO [2], the Orange Economy, also known as the Creative Economy, role is to connect the sectors of the economy "whose main purpose is the production or reproduction, promotion, dissemination and/or the marketing of goods, services and activities that have cultural, artistic or patrimonial content".

The main goals of a Green Economy are to reduce environmental risks and ecological scarcity. This economic activity is based on sustainable development, the use of renewable natural resources and the reduction of hydrocarbon consumption. The six strategic pillars of the Green Economy are climate change, resource-saving and management, circular economy, environmental protection, ecosystem protection and recovery, water conservation and natural disaster prevention [3]. In a green economy, public or private investments made to increase income and

employment are expected to reduce carbon emissions and pollution and prevent the loss of biodiversity and ecosystem services.

In the interest of providing suitable materials and tools for artisans, considering the reduction of waste and the reuse of materials by adapting production costs, favouring the "3R–Reduce, Reuse, Recycle" principle, the RRREMAKER project aims to develop an Artificial Intelligence (AI) based maker platform for the design and production of handcrafted, rapid prototyped and reconditioned products. The platform is based on the availability of used goods and recyclable waste that is collected, acquiring entries from and joining together digital manufacturers and traditional crafts, designers /creative corporations, and green corporations. Furthermore, the program will provide a new hybrid managing model based on the communities of knowledge, eco-design and democratization invention, where orange, sharing and circular economy will be incorporated [4].

This paper includes the following sections: Section 2 consists of state of the art about methods of collecting, sorting, reusing and recycling waste, Section 3 is dedicated to a description of the main objectives that the RRREMAKER project aims to implement and the impact of this project, and Section 4 present the conclusions and the future work of RRREMAKER.

2. State of the art

In the last years many studies [5-8] have been conducted in the field of circular economy and waste management, and most of them are concluding that governments need to take more responsibility and initiative in order to meet the goals of energy efficiency, water and waste management. It is important to reduce plastic production and increase plastic recyclability, and this study focuses on finding ideas and opportunities to increase the amount of waste that is recycled and use these existing resources to develop a closed-loop economy.

2.1. Orange / Maker culture

In his thesis [9] Mustafa İlhan explores the idea of transforming rubbish into art objects. This research explains how artworks created from discarded materials play an essential academic and cultural role. Several methods of reusing unconventional materials are explored, such as their use in paintings, sculptures, collages, and assemblages of three-dimensional objects. The author has developed a method of reusing packaging to produce notebooks. Notebook covers are created from Starbucks packaging and modshifters papers. The pages of these notebooks are made from Varuna Gezgin papers and the banner used in the Middle East Technical University ceremony in 2011.

The future of the textile and clothing industry is focused on a circular economy and closed-loop production. The study [10] approaches the development of emerging technologies for fabric processing, collection, classification, and use into a new recyclable product. The paper details further the efforts done by popular

fashion companies (H&M, Adidas, Patagonia, etc.) to develop the circular economy around recycled clothing items. For this proposal to succeed, the idea of recycling and reuse needs to be promoted, which will lead to increased demand for these products.

In [11], the IWWG Art Gallery is described regarding the collaboration between waste management and social sciences and how this can lead to a launchpad for new businesses or charities ("Bread Tag for Wheelchairs" [12]). The people involved in the IWWG Art Gallery that are turning waste into artworks are usually young and beginner designers, students and children. Examples of such transformations are: creating handbags from car tires, plastic or newspapers, jewellery from caps or furniture from refurbished wood.

In [13], the authors carried out an interview-based study with 25 stakeholders from the areas of waste management and design. Large metropolitan areas, such as Cairo, Berlin, Pune, Santiago and Gothenburg, had been investigated from the point of view of waste management and the amount of waste generated. Gothenburg has the smallest population of all, but it has the highest amount of waste generated per capita. The study also revealed that in non-EU countries, the disadvantaged part of the population tend to be more involved in recycling as it can be a representative part of their income.

The authors also detailed a scale for waste recovery into design, starting from Design for Durability to Design for End-of-Life, Waste as input Material, Packaging for improved Recyclability and ending to Waste System interface.

2.2. Green / Circular economy

According to the European Parliament [14], 50% of the collected plastic for recycling is exported outside the EU borders, mainly due to the shortage in terms of capacity, technological development in some areas or even financial resources. The same report highlights the severe environmental effects that the absence of recycling generated through the production of new plastic materials and incineration of one-time used plastics by pumping more than 850 mil. tons of greenhouse gases in the atmosphere in 2019. Therefore, a solution to not only support but also to enable and help all the actors involved is required in order to diminish to the lowest the waste of recyclable materials.

The natural ecosystem is a complex system in continuous development, which, as it grows, consumes much more energy, thus producing more waste. The CE aims to eliminate waste and generate a super-efficient system. The circular economy wants to create 'circular' material flows that reform the linear economic rationale of producing, buying, and disposing, therefore generating economic value for its actors. The CE is aiming to rebalance human-nature interactions by redesigning economic and social relations radically. Inspired by the cradle-to-cradle design approach, the CE aims to build waste-free technical loops that imitate biological circles and make waste diminish simultaneously, being both restorative and regenerative. A broad range of economic and political entities, such as inter-governmental organizations

(OECD), influential forums (World Economic Forum), corporations (CISCO, Dell, IKEA), regions (Region Skåne, Sweden) and cities (Amsterdam and Glasgow), offered to support the purposes of the circular economy [15].

The authors in [16] analysed how the circular economy can lead a waste management revolution in cities, with a case study in Amsterdam, Netherlands. The circular economy can be the solution to economies based on individual production-consumption market chains that result in a significant amount of unvalued waste. The focus of the paper is on three topics of waste in the context of circular economy: waste recovery, reuse of materials and incineration. Incineration is highly used in the city of Amsterdam as a solution to a fossil-free future, even though, the incinerated wastes are fossil-based, therefore the other two methods need to be intensified as well. For this, significant changes need to happen in the infrastructure, policy and economic areas to develop the circular economy for better waste management and to not develop an economy based on waste production, but one complementary with the goal of reducing the amount of waste and capitalizing the existing one.

Most of the plastic waste contains a sizeable amount of Polyvinyl Chloride (PVC), which is perceived to have a negative impact on the subsequent mechanical recycling of any mixed plastic waste. The paper [17] focuses on the sink fraction of waste from packaging that was highly analysed about its composition and properties and treated to get rid of PVC and non-ferrous metals. To reduce plastic residues streams and incineration incidents, sorting actions have been taken to eliminate these problematic contaminations, followed by implementing the Design from Recycling strategy, called Greentile, which is a robust element used in the construction of slanted green roofs, aims to provide a product suitable for manufacture in the sink fraction. After conducting a FEM analysis to ensure the project's sustainability, a small green roof was successfully constructed. However, due to the complex composition as well as the PVC content remaining in the mixture, there is a possibility of discouraging the widespread use of this material.

In [18] two studies were conducted, focusing on the disposal conditions and economising fossil resources while giving less importance to CO_2 proportion. And in the second study, the impact on health and risks lowered the acceptance of CCU (Carbon Capture & Utilisation) based products. The authors applied the conjoint analysis for individual preferences. The characteristics used in the analysis were: disposal conditions, health complaints, CO_2 proportion in the plastic products and fossil resources savings. The questionnaire had topics about demographic data, technology and environmental expertise and risk awareness, and it took place in Germany in 2015 on 145 people. The results showed an acceptance of participants regarding the use of CCU technology, reuse of CO_2 and fewer emissions during disposal were appreciated as well.

In the paper [19], it is described the use of waste materials to produce lightweight aggregates, in this way reducing the costs for disposal and valorising the waste. Several waste materials are investigated, such as fly-ash from the incineration of solid waste, which is very common in the pelletization process, and there are significant amounts of it available. This can lead to a circular economy in

which modern world legislation is respected, the methods are environmentally positive and can have cost-reducing benefits.

The RECICLARM project aims to become a cutting-edge modular and robotic system that will improve the recovery rate of waste and reduce the environmental impact. The project is relevant in the context of construction companies, where it can support sorting of construction and demolition waste into separated fractions of high-purity and small size waste with use in high-grade applications in the building industry [20].

In Emilia-Romagna, Italy, the LOWaste project wants to develop a recycled materials local market to achieve the goal of reducing urban waste and preserve natural resources. The project had a citizens awareness part where waste prevention and the usage of recovered materials was promoted. At the same time, the project had the support of the municipality to develop a green public procurement programme to connect the buying procedures with the products eco-design. The hot part of the project was a contest in which over 70 participants (start-ups, designers, etc.) collaborated to propose new products from waste. All the "re-products" resulted had an impact on the environment of reducing by 11400 tons per year the amount of waste, and as secondary, 11200 tons of raw materials as savings [21].

The REPURPOSE LIFE project aims to support the development of "reuse hubs" in local enterprises for a better collection, repairing and transportation to a proper destination facility of waste items suitable for reuse or recycling, thus decreasing the illegal disposal of waste [22].

2.3. Design / prototyping

To address the problem of material costs and the large quantities of plastic produced by FFF3D printers, study [23] evaluates through a series of physical characterisation tests the benefits of using recycled high-density polyethylene (HDPE) in both pellet and flake forms as 3D printing material for in-house. Tests proved that the HDPE granule filament, with diameters in the range of 2.93–3.17 mm, with a tolerance of 0.22–0.30 mm, had positive water repellence, extrusion speed, and thermal resistance comparable to ABS granule filament. The only limitations of using HDPE that are intended to be overcome in the future are the problems of deformation and adhesion of this recycled material.

The materials sector could be developed by replacing metals and plastics with lighter composite materials such as carbon fibre reinforced polymer (CFRP), which has a smaller carbon footprint. However, this implementation is slowed by high production costs and recycling difficulties. The CRESIM project supports the implementation by creating an innovative production of CFPR from recycled carbon fibres, using lightweight composites recycled from automotive and aerospace parts, which have applications for public transport vehicles, automobiles, and leisure equipment [24].

ECO DESIGN promotes durable product design for Flemish enterprises by producing an eco-design handbook that contains all life stages of the product, from the eradication of organic matter to manufacture, product usage until the waste removal process [25].

ECO-PULPLAST project oversees the synergism among the paper and plastic industries. It aims to demonstrate the feasibility of an innovative technology to recycle waste into new plastic compounds and products, with the goal of reducing to zero the amount of waste going to landfills or incineration. In the project's pilot factory, eco-sustainable plastic pallets will be produced for use in the same paper sector, resulting in a local circular economy [26].

2.4. Data collection

In order to develop urban management and the circular economy, we must achieve efficient and sustainable solid waste management in metropolises, resulting in a reduction of the environmental and human health impacts of solid waste from households. This study [27] follows the dynamics of a Norwegian municipality, introducing a sustainable social enterprise model, with the key points being optimal waste collection and observing the effects of optimal route planning to achieve sustainable development goals. Regarding the amount of waste, data was collected in certain areas to optimally size waste bins. Optimal route planning, using algorithms such as Vehicle Routing Problem (VRP) and Capacitated Vehicle Routing Problem (CVRP), reduces costs, fuel consumption, CO_2 and other toxic gas emissions, and time used for waste collection, making it a profitable solution for the circular economy.

Due to the lack of relevant information about quality, availability or suitability of recyclable plastic materials, many producers are shifting their attention towards virgin polymers, therefore avoiding the recyclable plastics. The authors in [28] obtained promising results by testing the use of smart contracts based on blockchain technology together with multi-sensor data-fusion algorithms and AI to obtain important parameters about the plastic waste to get a reliable segregation and to provide the actors in this area a method to share data, calculate in advance the supply chain, execute orders and enlarge the usage of recycled plastics.

The Mo.re & Mo.re project designed a tool for matching the supply and demand of secondary raw materials for Italy's Lazio region. First, there were identified all the supply chains for the recovered and collected wastes derived from the municipal collection and segregation schemes. The developed online platform promotes the use of secondary materials by the interested companies and provides an economic incentive for the seller to recycle. The database lists include over 1500 contacts and following the calculation of the local waste absorption capacity, 40 different waste supply chains were found [29].

In order to close the carpet production loop, the ClosedLoopCarpet project aims to reduce the use of virgin raw materials in carpet production by using an innovative and economically feasible technology that separates discarded carpet material into high-quality primary resources used in the manufacture of other carpets. The implemented pilot line can provide data on the separation of carpet waste into homogeneous polymers, with a separation and purification capacity of 92 tons/year of carpet waste. The market is foreseen to flourish due to falling prices driven by increasing recovered materials [30].

The CitiSim project has developed a mobile application that is based on citizen input and a modular platform for an enhanced smart city management and monitoring. The application provides an user-friendly 3D visualisation interface with augmented and virtual reality features. All these aspects can boost the management of waste and help economic actors, policy makers and NGOs with interest in waste reuse to connect and co-operate to reduce costs regarding waste disposal, support the valorisation of waste, reduce its ecological impact and take knowledge-based decisions [31].

2.5. Programs / Software / AI

For EU countries to meet the European Circular Economy Action plan and the EU's 2050 climate neutrality goal, concrete measures are needed to optimise and improve the efficiency of the national waste management components by increasing the recycling capacity, implementing robotic technology / automated waste sorting for specific materials. For this to happen implementation of digitalisation and development of other technologies (such as material detection by sensors) is critical. Waste management being one of the less digitised industry nowadays [32].

Due to the significant increase in customers buying and using various goods, and the poor management of the amount of waste, a huge volume of residues has been created, requiring enormous waste management policies. In [33] it was proposed to develop an Artificial Intelligence based Hybridized Intelligent Framework that uses machine learning and graph theory to optimize the waste management process, collecting debris over short distances, and also improving the efficiency of environmental planning and urban management. Thus, reducing, reusing, recycling and recovering reduces the negative environmental impacts generated by companies.

For the last 18 months, the SARS-CoV2 pandemic has led to a significant amount of medical or infected waste being mixed with all the other waste types. In [34] it proposes an automated method for sorting waste related to COVID that is based on AI. Several types of waste are considered, such as metal, glass, paper, polyethylene terephthalate, that are further classified based on image-texture-dependent features for a higher accuracy before the recycling process. Support vector machine classifiers are used and obtained very good results of 96.5% accuracy, 95.9% specificity and 95.5% sensitivity.

LIFE M3P project identifies and profiles at least 500 industrial waste streams, facilitating their transformation into secondary raw materials for other SMEs in the local area, using an online platform called M3P (Material Match Making Platform). This project, finalized in 2019, brings together clusters of SMEs to promote alternatives to waste use. Over 200 SMEs are expected to get involved in the project, of which in 100 in the region of Flanders, Belgium, 100 in Lombardy, Italy, 25 in West Macedonia, Greece and 10 in Asturias, Spain [35].

3. Waste reuse in artisanal products – The RRREMAKER project

The RRREMAKER project aims to build an Artificial Intelligence (AI) based maker platform for designing and producing handcrafted, rapid prototyped and reconditioned products, based on the availability of used goods and recyclable waste collected. Based on the communities of knowledge, eco-design and democratization invention, a hybrid managing model will be implemented, where orange, sharing and circular economy will be integrated. The platform integrates cutting-edge algorithms of generative design, as genetic and super quadric-based algorithms, machine learning classifiers, algorithms for big data, cloud computing, and experimental data that will predict materials, ornaments, structures, colours, forms, etc., based on traditional artisan and innovative design parameters, and recycling materials.

Another platform's role is to be a "sorting point", offering the opportunity to connect the waste collectors with green manufactures/eco designers. Furthermore, based on the collected sales data, the platform will create a marketplace with available goods and automatically give suggestions to make them more attractive.

The project wants to implement sustainable co-production throughout the production chain by developing options that consider waste reduction and reuse of materials by adjusting production costs, which reduces the impact on the environment as much as possible.

The AI-based platform, when the digital design process occurs, will be capable of managing the prototyping process based on handcrafted production disciplines, providing automated design solutions based on object function, affecting shape prediction, recommendations, self-build, and materials.

The most significant goal of this project is to apply artificial intelligence and machine learning to improve circular economy principles and actions in design, crafts, rapid prototyping and intelligent manufacturing sectors, with significant overall economic benefit for European society by promoting the protection and development of the natural environment, also favouring the "Reduce, Reuse, Recycle" principle.

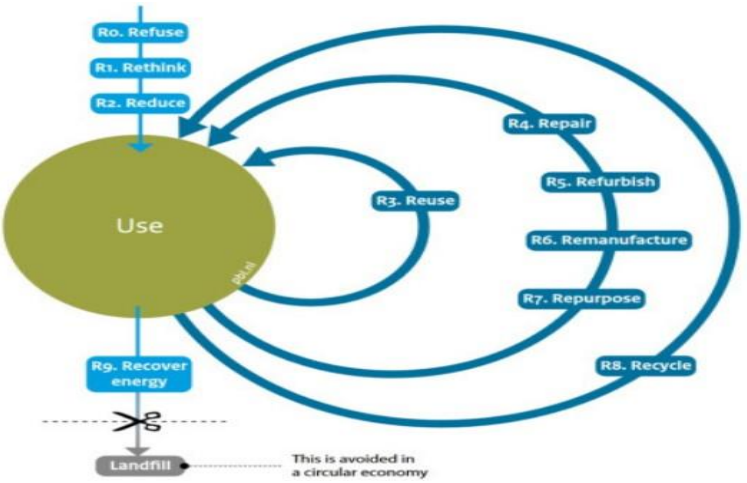

Fig. 1. The different R's [36]

3.1. Specific objectives of the RRREMAKER project

3.1.1. Identification and collection of data of parameters in design, industrial manufacturing, traditional artisanship and recycled material

The RRREMAKER project plan is to explore the fashion, jewellery, furniture, industrial and craft production typical parameters in the interest of evaluating their ability to receive and implement new forms and materials. Each object, depending on its function, is assigned a specific shape, design and material. The newly redesigned material will respect the original function, plus innovative properties in terms of shape and the use of durable materials. Further investigation and redefinition of the limits and possibilities of new recycled materials will be carried out, comparing them with traditional ones and whether they can replace and/or blend with the original ones. Machine learning will be employed to predict main characteristics of a specific complex material in textile, plastic and ceramics. Parameters to measure the transition towards a circular economy model, made up of indicators related to renewable energy, water, reuse, recycling, reduction, use of resources and negative externalities, will be identified.

The platform will contain a database that will include a classification of traditional craft styles, which will be used in the context of designing new products. Among these are Andalucia´s traditional craft styles, covering a vast spectrum of techniques - from Tartessians, the Phoenicians, Romans and Arabs culture - which has more than 100 master credited craftsmen; Araucania region, recognized with Excellence diploma by World Crafts Council, combines different indigenous cultures -Mapuche, Aymara and Rapa Nui-, and Romania, which has a rich ceramic culture - e.g. Horezu- and wall carpets inscribed on UNESCO Intangible Cultural Heritage lists.

3.1.2. Building AI-based modules to train the platform on orange/maker economy and green/circular economy

Based on the information collected and classified in the first phase, this objective aims at a modular approach on the two main independent economy areas involved, namely orange/maker and green/circular economy, before making them talk to each other in the whole platform.

An orange/maker culture (OMC) module will be developed first. This module will contain all the information on the design strategies that can be collected and will be open for the feeds coming from the outer world. In this framework, the concept of technological nutrient will be introduced (which converts a resource already used into food for another process) to define the single design information unit. Once identified the design and product categories to focus on, opportune manufacturing techniques will be selected by the OMC module, specifically tailored to the “maker” level.

The second module will be called green/circular economy module (GCE). One of its main purposes will be material selection. Cross-database search involving the most reliable compound databases (e.g., Matweb, Material connexion, ASM International, MatNavi NIMS Material Database) and waste databases (e.g. Eurostat) and national Recycling material database by country or geographic area will allow to

screen and classify materials predicting their affinity to each given design proposal elaborated by the platform in the OMC module.

Similarly to what was done with the concept of technological nutrient for the OMC module, the concept of industrial symbiosis will be investigated, mandating that the "waste" of a process might be the "raw material" of another process, and offering liaisons between different domains that break the line economy model and contribute to the circular-economy one. Material-based, structure-based, generative design algorithms together with circular economy relevant in sustainable production processes will be used. The models of the products will be realized by different parts or ingredients in an innovative mix and match so that design enables higher possibilities in reuse and recycling. Moreover, engagement in a collaborative-design paradigm involving several collaborating actors could be pursued, enabling sharing of tooling and other resources and viewing products as composite items.

All the acquired information in both modules will be processed by advanced machine learning algorithms trained on a large set of profile tests and literature data. The algorithms will be based on different strategies, but mainly on a semi-supervised approach, using genetic techniques and Bayesian networks that will also give the possibility to choose among different possible sets of materials.

3.1.3. Integration of the single-level modules of the AI platform and development of a user-friendly interface

From the complex AI modules produced, an easy-to-use platform will be generated, to be available for all the potential actors of the economies involved. The most relevant challenge in this objective lies in the integration of different methodologies, implementations and economic requirements, because data coming from human-centred activities, like art, design and fashion and circular economy, will be elaborated and integrated with machine-centred algorithms based on cost-effectiveness, scalability, material availability and manufacturing techniques. Machine learning techniques will be used to mix all that data, employing a continuous flow of information from one compartment to another, which will improve the efficiency of each single-level module while finding its way of integrating them.

Regarding the innovative economic models involved, an important aspect will be to assess how the integration of those models can be done in a cost-effective and sustainable fashion. The collaborative design paradigm involving more actors in the process guided by a unifying modelling approach, as well as with the industrial symbiosis concepts utilizing "waste" as "raw material" among different domains will be implemented. The project will exploit high performance computing (HPC) capabilities to tackle the complexity of the models and afford calculations. Concerning data integration, a major problem for modellers at present is the lack of specific standards for the integration of such different requirements in AI-techniques.

The final platform will be designed to interface with other web platforms (either maker, craft, industrial or circular economy ones) that operate in the fields of design, handmade production, industrial production, material transportation,

collection and recycling. Using the premises of the partners, two hubs to receive and sort used material and to host the manufacturing facility will be created. All the areas of the hubs will be interfaced with the AI-based platform, real-time revealing the amount and category of the goods in input, of the manufactured goods and of the goods in output, with the aim to train the platform to optimize the maker activities, minimizing production waste and shortening storage time of the goods.

3.1.4. Transfer of Knowledge and Multidisciplinary Integration of Competences

Transfer of Knowledge (ToK) between experts in design, materials, manufacturing, supply management, economy and distribution, on the one hand, and computational experts on the other hand, will focus on several research layers:

- orange economy and maker culture;
- green and circular economy;
- machine learning;
- data management;
- cloud environment.

The strength of RRREMAKER is the multidisciplinary integration. ToK and multidisciplinary integration of competences will depend both on the possibility to integrate modelling approaches in the computational platform, and on the definition of web-interface shape tested throughout the project by the end-users, which will provide continuous feedback on its usability.

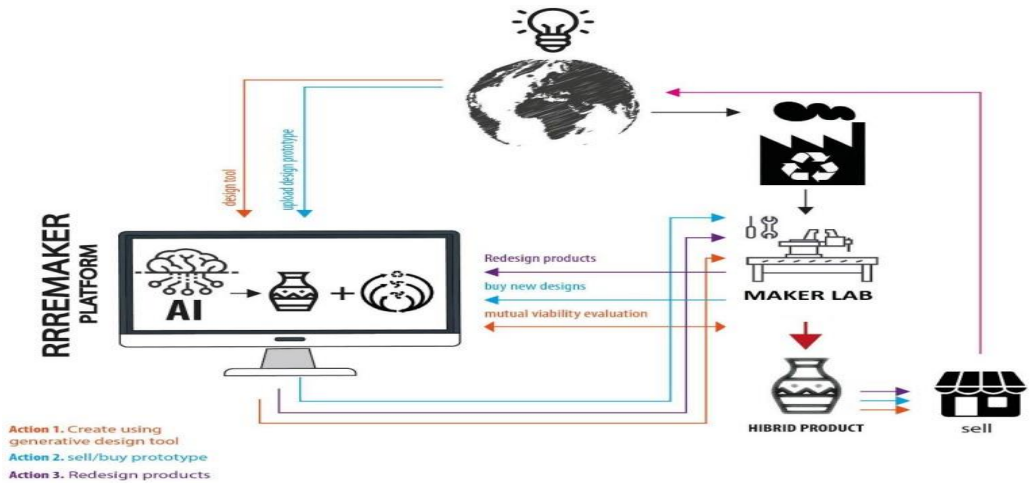

Fig. 2. General scheme of the RRREMAKER AI platform

3.2. Impact of RRREMAKER

The project RRREMAKER is consistent with the "Societal Challenges'' of the Horizon 2020 framework, particularly the challenges: 1. Climate action, environment, resource efficiency and raw materials; and 2. Europe in a changing world - inclusive, innovative and reflective societies. In fact, RRREMAKER is an outstanding occasion, since it couples the ideas of environment management,

circular economy and saving of raw materials and the diffusion of innovativeness and reflectiveness over the society, directly involved in the Maker activities, stimulating a user-centred innovation process against a manufacturer-centric model. All this through an AI driven Maker platform that is the main actor in the creative process.

Artisan activity is included in cultural and Creative Industries (CCIs), that generate around €509 billion per year, representing 5.3% of the EU's total GDP and employ 12 million full-time jobs constituting 7.5% of the EU's employment and the third largest employer sector in the EU [37].

The European economy is surprisingly wasteful in its model of value creation and, for all practical purposes, continues to operate a take-make-dispose system. Resource productivity remains hugely underexploited as a source of wealth, competitiveness and renewal. Circular economy, enabled by the technology revolution, allows Europe to grow resource productivity by up to 3 percent annually. This would generate a primary resource benefit of as much as €0.6 trillion per year by 2030 to Europe's economies. In addition, it would generate €1.2 trillion in non-resource and externality benefits, bringing the annual total benefits to around €1.8 trillion versus today. This would translate into a GDP increase of as much as 7 percentage points relative to the current development scenario, with additional positive impacts on employment [38]. Furthermore, digitisation of products and services can add more than EUR 110 billion of annual revenue to the European economy in the next five years [39]. RRREMAKER provides unique training opportunities for the researchers and staff involved, encouraging cooperation, transfer of know-how and inputs from best practices among participants.

Researchers will benefit already in the short run from being involved in-depth exchange of knowledge among widely different disciplines and from acquiring hands-on experience in the platform development, analysed from points of views that are rarely combined in research. These skills will directly improve their career prospects in growing number of companies, universities and institutes involved in this sector. In the long-term the researchers and staff will benefit from boosting and nurturing their career, from fully exploiting the know-how acquired owing to RRREMAKER multi-disciplinary scope, and its supradisciplinary nature.

4. Conclusions

In this study the most recent studies and projects in the area of reusing recyclable waste materials in Orange, Circular and Green Economy were analysed from the point of view of methods and results. The majority of the selected studies conclude that responsibility and initiative need to be taken by governments to support the goals of energy efficiency, water and waste management proposed by the European Union. Circular economy can influence the European GDP by up to 7% through resource productivity.

RRREMAKER's platform integrates AI techniques side by side with artisan production, rapid prototyping, innovative manufacturing technologies and machine learning applied to the raw material search among the recyclable ones.

RRREMAKER will develop an AI-based platform that exchanges information between waste collectors and artisans/buying companies, creating marketplace opportunities in the areas related to innovation, green economy and culture industry, and to the improvement of more logical waste management, transforming resources into technological nutrients.

The RRREMAKER project will enable unique training opportunities for the researchers and staff involved, supporting partnerships, transfer of know-how and inputs from best practices among the stakeholders involved and researchers.

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Digitalizarea educaţiei din România, planul pentru 2021-2027

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Abstract

Această lucrare porneşte de la ideea că transformările de ordin digital au produs schimbări semnificative în societate şi pe plan economic, fiind resimţite din ce în ce mai mult în activităţile curente ale cetăţenilor, iar educaţia rămâne un subiect de interes în cadrul unei comunităţi orientate spre evoluţie, fiind mecanismul prin care aceasta se poate dezvolta pe termen lung. Scopul lucrării este de a analiza parcursul României în ceea ce priveşte digitalizarea educaţiei, iar în această direcţie vor fi supuse atenţiei tendinţele europene şi influenţa pe care au avut-o asupra situaţiei naţionale. Digitalizarea educaţiei a stârnit interes prin prisma noilor tehnologii care pot fi transpuse în sistemul educaţional astfel încât să conducă la o îmbunătăţire a calităţii acestuia, însă acest subiect a fost privit drept o necesitate odată cu situaţia epidemiologică provocată prin prisma pandemiei cu virusul SARS-COV-2. Indiferent de gradul de digitalizare existent anterior acestei situaţii, anul 2020 a presupus transpunerea în format 100% online a învăţământului pentru mai multe ţări din Uniunea Europeană, printre care şi România. Chiar dacă acest context a adus în lumina reflectoarelor necesitatea de a întreprinde demersurile pentru o mai bună pregătire în raport cu era digitală, în ţări precum România a scos în evidenţă inegalităţile în ceea ce priveşte accesul elevilor la tehnologie şi resurse digitale, cât şi anumite impedimente ale sistemului de educaţie precum dotările instituţiilor de învăţământ, pregătirea cadrelor didactice şi existenţa aptitudinilor şi competenţelor digitale în rândul acestora din urmă. Astfel, lucrarea va sublinia stadiul în care România se află din punct de vedere al digitalizării educaţiei, impactul acţiunilor întreprinse în acest sens până la momentul prezent, dar şi digitalizarea educaţiei din România în raport cu planul de acţiune pentru 2021-2027 regăsit la nivel european şi obiectivele prevăzute în Agenda 2030.

Cuvinte cheie: *Calitatea învăţământului, era digitală, necesitatea implementării noilor tehnologii, obiective de dezvoltare durabilă.*

1. Introducere

Tendinţa cetăţenilor de a apela din ce în ce mai mult la servicii digitale prin prisma avantajelor pe care le înglobează este în creştere şi, de asemenea, furnizorii de servicii sunt orientaţi din ce în ce mai mult spre tehnologizarea proceselor, scăderea implicării resurselor umane şi digitalizarea serviciilor oferite, aspecte care influenţează şi parcursul profesiilor în societate. Prin prisma acestor idei este observată influenţa tehnologiei în mediile socio-cultural, profesional şi economic, dar şi necesitatea de a dobândi aptitudini şi competenţe digitale. Din acest punct de vedere, instituţiile de învăţământ, atât preuniversitar, cât şi universitar, reprezintă un cadru ideal de dezvoltare şi învăţare, mai ales că acest proces ar avea loc de la vârste fragede şi până la încadrarea pe piaţa forţei de muncă. Astfel, procesul ar fi unul calitativ, de durată în raport cu tendinţele tehnologice într-o permanentă şi rapidă schimbare şi cu impact pe termen lung. În plus, o astfel de abordare ar conduce spre fundamentarea unui comportament responsabil şi a unei dorinţe de învăţare pe tot parcursul vieţii.

Transformarea digitală a societăţii survine prin prisma accesului larg la internet în întreaga lume, ceea ce favorizează acţiuni precum accesul la informaţii, conexiuni între date identificate şi interacţiuni la distanţă cu diverse entităţi, fie ele publice sau private. Această transformare vine însă cu anumite provocări, în raport cu resursele disponibile, mediul de trai, gradul de educaţie etc. Într-o continuă evoluţie tehnologică şi o rapidă transcendere în era digitală este inevitabilă transformarea sistemului educaţional în această direcţie şi adaptarea la noile tehnologii. Faptul că suntem permanent înconjuraţi de tehnologie şi dispozitive electronice reprezintă o oportunitate de a transforma calitativ învăţământul în raport cu cerinţele şi obiceiurile elevilor şi studenţilor care au crescut în era digitală, însă trebuie avute în vedere o serie de riscuri şi impedimente, raportate la factori specifici. Ideile referitoare la şcolile şi universităţile viitorului au în vedere transformările pe care le-ar aduce internetul în generarea unui mediu interactiv de învăţare, în detrimentul metodelor clasice, schimbând comportamentele profesorilor, elevilor, studenţilor şi al părinţilor. Astfel, cadrul didactic nu va avea doar rolul de a transmite cunoştinţe, ci şi de a orienta în dezvoltarea propriului proces de învăţare, bazat pe un curriculum personalizat în raport cu dorinţele şi nevoile fiecărui beneficiar al actului educaţional. [1]

2. Digitalizarea educaţiei şi influenţele pandemiei cu virusul SARS-COV-2

În mod constant societăţile se confruntă cu dezvoltarea tehnologică din ce în ce mai rapidă, digitalizarea fiind transpusă în toate domeniile, inclusiv în domeniul educaţional. În raport cu aşteptările cetăţenilor, aşteptările factorilor de decizie şi politicile adoptate, există o considerabilă presiune asupra instituţiilor de învăţământ pentru transformarea digitală. Procesul de tranziţie către digitalizarea instituţiilor educaţionale poate fi posibil doar prin cooperare şi împărtăşirea unor practici calitative. La nivel global, situaţia provocată de pandemia cu virusul SARS-COV-2 a evidenţiat inegalităţi de natură socială, economică şi digitală. Astfel, politicile publice în domeniu trebuie să aibă în vedere consolidarea infrastructurii digitale a

învățământului, inclusiv investiții în resurse pedagogice online, instruirea cadrelor didactice și accesul echitabil pentru toți beneficiarii actului educațional. [2] Contextul provocat de COVID-19 a presupus o trecere forțată la învățământul la distanță și a subliniat probleme și riscuri cu care se confruntă sistemele educaționale, mai ales în ceea ce privește rezistența într-o astfel de situație și redresarea ulterioară. O deficiență remarcabilă o constituie stresul provocat de sisteme suprasolicitante care nu au capacitatea dezvoltării de mecanisme de învățare la distanță într-un mediu digital adecvat. Pe de altă parte, accesul la educație a fost un drept restrâns în anumite circumstanțe, nu doar pentru elevii și studenții din instituții de învățământ diferite, ci și pentru cei din cadrul aceleiași instituții de învățământ. [3] Deopotrivă, decalajele s-au resimțit și în rândul cadrelor didactice, atât prin prisma resurselor puse la dispoziție de către unitățile de învățământ, cât și în concordanță cu resursele de care beneficiau și de adaptabilitatea și creativitatea de care dispuneau și de pregătirea pe care o aveau din punct de vedere al competențelor digitale.

În ceea ce privește provocările transpunerii proceselor educaționale în mediul digital, cadrele didactice trebuie să aibă în vedere menținerea nivelului de eficiență și accesibilitate. Chiar și prin mijloace de comunicare la distanță este esențială adaptarea practicilor de predare, astfel încât să corespundă mediului și abilităților digitale specifice învățării online. Îmbunătățirea competențelor digitale trebuie să fie o prioritate atât pentru profesori, cât și pentru destinatarii actului educațional pentru a le permite accesarea și utilizarea de resurse noi și inovative în mediul online. În acest mod va fi facilitată substituirea interacțiunilor care ar fi avut loc în mod fizic. De asemenea, învățarea la distanță presupune dezvoltarea mijloacelor potrivite de sporire a responsabilității elevilor și studenților față de progresul lor de învățare, conducând la automotivarea de a asimila informații și de a se dezvolta. [4]

În spațiul public național și internațional există opinii atât pozitive, cât și negative în ceea ce privește trecerea forțată către o educație digitală. Din anumite puncte de vedere, s-ar putea aprecia că un proces rapid și fără o planificare prealabilă suficient documentată nu ar putea genera o experiență pozitivă utilizatorului, însă se apreciază că poate conduce spre apariția unui nou model de educație, unul hibrid care are numeroase beneficii. Cu toate acestea, un principal impediment al învățământului digitalizat îl reprezintă lipsa accesului la internet și la resurse tehnologice, situație care provoacă decalaje internaționale, între țări, dar și naționale, între elevii și studenții din cadrul aceluiași stat. De asemenea, în dezbaterile privind învățarea online se pune problema eficienței acestei modalități, mai ales în raport cu factori precum vârsta, accesul la dispozitive potrivite, accesul la internet etc. Chiar dacă există și aceste impedimente, există cercetări [5] care arată că rata de reținere a informațiilor în mediul online este între 25% și 60%, pe când față în față într-o sală de clasă este între 8% și 10%. Aceste procente ar fi determinate de faptul că învățatul online permite studiul într-un ritm propriu și focusat asupra elementelor care sunt cu adevărat de interes pentru persoana în cauză. [6]

Acest context epidemiologic a reiterat modul în care instituțiile de învățământ au continuat chiar și în secolul XXI să acorde o mai mare relevanță metodelor tradiționale de predare și învățării bazate pe memorarea de informații, în detrimentul dobândirii de abilități practice precum gândirea critică, abilitatea, competențele digitale. [7] Însușirea unui volum mare de informații nu asigură

succesul într-o eră digitală, mai ales pe o piață emergentă a muncii care este într-o schimbare dinamică.

Abilitățile practice câștigă o mai mare apreciere în fața angajatorilor, însă de cele mai multe ori acestea sunt dobândite prin intermediul activităților extracurriculare la care cel mai adesea au oportunitatea de a participa doar o parte din elevi şi studenţi, în raport cu resursele financiare şi materiale de care dispun. Spre exemplu obținerea Permisului European de Conducere a Computerului (European Computer Driving Licence – ECDL) este condiționată de anumite costuri obligatorii (taxă de înscriere, taxă de examinare, taxa permisului) [8], dar și de costuri opționale (urmarea de cursuri, achiziția materialelor bibliografice necesare studiului). Chiar dacă există și anumite facilități pentru anumite categorii de persoane, printre care regăsim elevii şi studenții, costurile pot fi semnificative pentru persoanele cu un venit redus. În concordanță cu această idee, apreciez că instituțiile de învățământ, alături de autoritățile competente și în parteneriat cu actori privați, ar trebui să se focuseze pe asigurarea resurselor necesare și dezvoltarea de mecanisme optime de învățare, care să îmbine metodele clasice cu cele moderne şi care să includă tehnologia şi dezvoltarea de competenţe şi abilităţi practice, precum cele digitale. În aceste demersuri, un rol crucial îl va avea atât formarea constată și reală de care vor beneficia cadrele didactice, cât și implicarea de către unitățile de învățământ a părinților. Astfel, ar fi asigurată o pregătire adecvată noilor cerințe ale societății, accesibilă tuturor beneficiarilor actului educațional, indiferent de alte circumstanțe.

Pandemia COVID-19 a fost în sine o provocare pentru cetățenii din întreaga lume și a adus în lumina reflectoarelor nenumărate situații dificile și probleme cu care se confruntă statele, însă în ceea ce privește educația, tranziția bruscă la un învățământ exclusiv online și reiterarea problemelor cu care se confruntă au facilitat conștientizarea avantajelor, dezavantajelor, oportunităților și amenințărilor, ceea ce constituie un impuls pentru transformarea sistemelor educaționale.

3. Planul de acțiune pentru educația digitală (2021-2027). Educația și Agenda 2030

Prin prisma pandemiei COVID-19 care a oferit o experiență de învățare, accelerat schimbarea şi demonstrat necesitatea unei capacități digitale mai dezvoltate în domeniul educației și formării, la nivelul Uniunii Europene a fost reînnoită inițiativa Planului de acțiune pentru educația digitală (2018-2020), astfel fiind adoptat Planul de acțiune pentru educația digitală (2021-2027) pentru a sprijini adaptarea sustenabilă și eficace a sistemelor educaționale și de formare ale statelor membre UE la era digitală. Planul înglobează patru mari obiective: să ofere o viziune strategică pe termen lung care să favorizeze dezvoltarea educației digitale de înaltă calitate, incluzivă și accesibilă; să abordeze provocările și oportunitățile generate de pandemia cu virusul SARS-COV-2 care a influențat creșterea utilizării tehnologiei în scopuri educative și de formare; să urmărească consolidarea cooperării la nivelul Uniunii Europene în ceea ce privește educația digitală, punând accent pe importanța colaborării între mediul public și privat pentru a conduce la adaptarea educației la era digitală; să prezinte oportunități, implicit metode pentru o mai mare calitate și cantitate a actului de predare a noțiunilor legate de tehnologiile digitale, să ofere sprijin pentru furnizarea infrastructurii necesare învățământului

incluziv şi rezilient la distanţă şi pentru digitalizarea metodelor de predare şi a tacticilor pedagogice. [9]

Cele două domenii prioritare ale Planului de acţiune pentru educaţia digitală (2021-2027) vizează „încurajarea dezvoltării unui ecosistem de educaţie digitală de înaltă performanţă şi dezvoltarea aptitudinilor şi competenţelor digitale relevante pentru transformarea digitală" [10]. Aceste două domenii pun accentul pe necesitatea de a avea o infrastructură adecvată, cu echipamente care pot fi interconectate, pe alfabetizarea digitală, aptitudini şi competenţe digitale dobândite de la vârste fragede, dar şi pe formarea cadrelor didactice în domeniul digital, însă acestea nu ar fi posibile în lipsa unui conţinut educaţional de înaltă calitate, furnizat cu ajutorul unor instrumente accesibile şi a unor platforme conforme standardelor de confidenţialitate electronică şi de etică. [11]

Planul de acţiune pentru educaţia digitală (2021-2027) are la bază necesitatea deblocării potenţialului pe care îl posedă tehnologiile digitale în procesele de învăţare, predare şi dezvoltare de competenţe digitale în rândul tuturor cetăţenilor, ajutând astfel coeziunea socială, creşterea economică şi inovarea. Educaţia reprezintă un fundament pentru o Europă mai echitabilă şi mai sustenabilă, iar creşterea calităţii şi a incluziunii sistemelor educaţionale, dar şi dobândirea de competenţe digitale au o importanţă strategică pentru Uniunea Europeană. De asemenea, sistemele educaţionale trebuie să coincidă societăţii, aşa cum aceasta este remodelată de evoluţia tehnologică pe toate palierele pe care le însumează. [12]

Adoptarea măsurilor incluse în acest plan se integrează în rândul măsurilor adoptate drept răspuns al Uniunii Europene la criza provocată de pandemia cu virusul SARS-COV-2, în ideea de a orienta statele către prioritizarea finanţărilor în educaţie digitală în Planurile de Redresare şi Reziliență în care investiţiile emblematice fac referire la recalificare, perfecţionare şi stimularea conectivităţii în cadrul instrumentelor specifice politicii de coeziune. Această situaţie de criză a condus la necesitatea de regândire pe termen lung a modului în care sunt concepute şi furnizate educaţia şi formarea. Odată cu instaurarea pandemiei şi adoptarea unor măsuri drastice s-a evidenţiat că au fost mai bine pregătite sistemele şi instituţiile educaţionale care au investit anterior în dezvoltarea capacităţii lor digitale, având capacitatea adaptării metodelor de predare şi menţinerii nivelului de implicare a cursanţilor. În plus, creşterea utilizării tehnologiilor digitale este esenţială în atingerea obiectivelor asumate prin Pactul verde european şi pentru atingerea neutralităţii climatice până în anul 2050, fiind factori de stimulare în tranziţia spre o economie verde şi circulară. Pe de altă parte, trebuie avută în vedere reducerea amprentei climatice şi de mediu a produselor digitale, astfel încât să faciliteze trecerea către comportamente durabile în dezvoltarea şi utilizarea lor. [13]

Aşadar, Planul de acţiune pentru educaţia digitală (2021-2027) contribuie la îndeplinirea priorităţii Comisiei Europene de a avea o Europă pregătită pentru era digitală şi la Next Generation EU (pachet temporar de stimulente finanţat în cadrul Uniunii Europene pentru reconstruirea Europei în perioada post-pandemică). În plus, planul sprijină Mecanismul de redresare şi reziliență care îşi propunere să contribuie la crearea unei Uniuni Europene ecologice, digitalizată şi rezilientă. [14]

La nivel global există programul de acţiune care se regăseşte sub titulatura de Agenda 2030 pentru dezvoltare durabilă. Agenda 2030 însumează 17 obiective de dezvoltare durabilă şi are caracter universal, fiind adoptată de 193 de state membre

în Organizaţia Naţiunilor Unite (ONU). Documentul semnalizează necesitatea identificării unor soluţii la nivel global faţă de problemele cu care se confruntă toate statele. Cel de-al patrulea obiectiv vizează garantarea educaţiei de calitate şi promovarea oportunităţilor de învăţare pe tot parcursul vieţii, fiind o teză care stă la baza acţiunilor de reformare a sistemelor educaţionale din întreaga lume. [15] Agenda 2030 şi Planul de acţiune pentru educaţia digitală (2021-2027) reprezintă doar două exemple de măsuri adoptate la nivel internaţional şi în cadrul Uniunii Europene, însă prin alegerea prezentării acestora lucrarea subliniază că reformele în educaţie necesită planuri şi strategii concrete, gândite pe o perioadă suficient de mare de timp pentru a asigura o schimbare reală şi calitativă. Accentul pus pe educaţie în întreaga lume reiese din faptul că reprezintă cheia funcţionării corespunzătoare a societăţilor durabile.

Chiar dacă de-a lungul timpului educaţia a fost văzută drept o simplă etapă necesară formării şi un proces care este precedent intrării pe piaţa forţei de muncă, paradigma se schimbă prin promovarea necesităţii de învăţare şi perfecţionare pe tot parcursul vieţii, educaţia fiind un proces care nu ar trebui să înceteze niciodată. În cadrul Agendei 2030 educaţia este privită drept un obiectiv de dezvoltare durabilă prin prisma influenţelor pe care le va avea asupra generaţiilor şi comunităţilor viitoare. Astfel, există „şapte ţine de atins până în anul 2030:

- Asigurarea faptului că toate fetele şi toţi băieţii absolvă învăţământul primar şi secundar gratuit, echitabil şi calitativ, care să conducă la rezultate relevante şi eficiente pe planul învăţării;
- Asigurarea faptului că toate fetele şi toţi băieţii au acces la o dezvoltare timpurie de calitate, îngrijire şi educaţie preşcolară, astfel încât să fie pregătiţi pentru învăţământul primar;
- Asigurarea accesului egal pentru toate femeile şi toţi bărbaţii la educaţie tehnică, vocaţională şi terţiară, inclusiv universitară, accesibilă şi calitativă;
- Creşterea substanţială a numărului de tineri şi adulţi care deţin competenţe relevante, inclusiv competenţe tehnice şi vocaţionale, care să faciliteze angajarea, crearea de locuri de muncă decente şi antreprenoriatul;
- Eliminarea disparităţilor între sexe în educaţie şi asigurarea accesului egal la toate nivelurile de învăţământ şi formare profesională a persoanelor vulnerabile, inclusiv a persoanelor cu dizabilităţi, a populaţiilor indigene şi a copiilor aflaţi în situaţii vulnerabile;
- Asigurarea faptului că toţi tinerii şi o proporţie substanţială a adulţilor, atât bărbaţi, cât şi femei, dispun de competenţe elementare, precum alfabetizarea şi aritmetica elementară;
- Asigurarea faptului că toţi elevii dobândesc cunoştinţele şi competenţele necesare pentru promovarea dezvoltării durabile, inclusiv printre altele, prin educaţia pentru dezvoltare durabilă şi stiluri de viaţă durabile, drepturile omului, egalitatea de gen, promovarea unei culturi a păcii şi non-violenţei, cetăţenia globală şi aprecierea diversităţii culturale şi a contribuţiei culturii la dezvoltarea durabilă.” [16]

Evident, obiectivele de dezvoltare durabilă nu sunt privite drept ţinte separate pentru fiecare domeniu în parte, ci se întrepătrund şi se influenţează reciproc. [17] Interdependenţa celor 17 obiective subliniază că societăţile vor putea să se reformeze şi

să devină durabile doar prin atingerea mai multor scopuri din marile domenii care îşi aduc cel mai mult aportul asupra comunităţii. Accesibilitatea şi calitatea sunt primordiale în reformarea sistemelor educaţionale şi se observă accentul pus pe educaţie în raport cu noile tendinţe şi cu implicaţiile pe care le are asupra parcursului profesional şi inserării pe piaţa muncii. În plus, este imperativă determinarea metodelor de potenţare a abilităţilor practice în dezvoltarea cursanţilor.

4. Digitalizarea educaţiei din România

În ceea ce priveşte cazul României, fie că discutăm despre învăţământul preuniversitar, fie despre cel universitar, serviciile educaţionale nu sunt identice pe întreg teritoriul ţării, aspect adus din ce în ce mai mult în atenţia publicului concomitent instaurării pandemiei cu virusul SARS-COV-2, moment care a marcat o trecere bruscă a educaţiei în mediul online şi a subliniat care sunt lipsurile existente în educaţia românească. O diferenţă considerabilă în mediul preuniversitar se poate observa între instituţiile de învăţământ din mediul urban, comparativ cu cele din mediul rural, cele din urmă fiind private de dotarea cu resursele adecvate şi necesare desfăşurării unei educaţii calitative, cu impact pozitiv pe termen lung, şi cu atât mai puţin potrivită erei digitale. [18] Un studiu din anul 2019 [19], a arătat că unul din cinci tineri din Europa, având vârsta cuprinsă între 16 şi 24 de ani, spune că nu deţine un nivel de bază în ceea ce priveşte competenţele digitale, iar România se plasează pe ultimul loc în cadrul acestui clasament. Astfel, tinerii care nu beneficiază de un nivel ridicat de educaţie sunt de peste trei ori mai susceptibili să nu dobândească competenţele digitale necesare şi suficiente, ceea ce creează deficienţe în încadrarea tinerilor pe piaţa muncii. [20] Situaţia pentru România nu este favorabilă nici în ceea ce priveşte competenţele digitale pentru intervalul de vârstă 16 ani - 74 de ani, aşa cum reiese din figura 1. Chiar dacă faţă de anul 2015 situaţia pare să se fi îmbunătăţit în România, creşterea procentuală nu este una semnificativă, mai ales prin raportare la media Uniunii Europene.

La nivelul Uniunii Europene a crescut în ultimii ani nivelul general al competenţelor digitale după cum urmează: de la 60% în 2015 la 62% în 2019 în marile oraşe, de la 54% în 2015 la 55% în 2019 în oraşe şi suburbii, iar raportat la zonele rurale de la 46% în 2015 la 48% în 2019. În anul 2019, diferenţa dintre competenţele digitale deţinute de locuitorii marilor oraşe şi locuitorii zonelor rurale a fost, în medie, de 14 puncte procentuale la nivelul Uniunii Europene, însă în şapte state membre a atins o diferenţă de peste 20 de puncte procentuale (Irlanda, Lituania, Ungaria, Bulgaria, Grecia, Croaţia şi Portugalia). Aceste date sunt reliefate prin intermediul figurii 2. [21] În privinţa României putem spune că decalajele între comunităţi nu par a fi mari, mai ales prin prisma accesibilităţii reduse a tehnologiei şi a internetului în mediile rurale, însă datele trag un semnal de alarmă în ceea ce priveşte pregătirea cetăţenilor în raport cu media Uniunii Europene, aflându-ne şi în acest clasament pe ultimul loc.

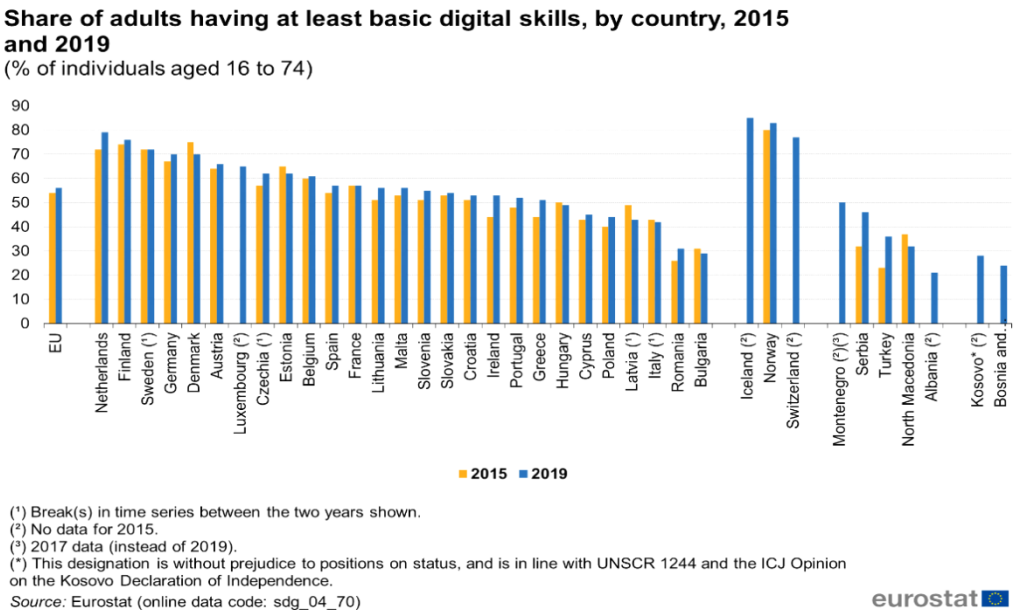

Fig. 1. Ponderea adulților care au cel puțin abilități digitale de bază, în funcție de țară, 2015 și 2019 (%dintre persoanele cu vârstă cuprinsă între 16 și 74 de ani)
Sursa: Comisia Europeană – Eurostat

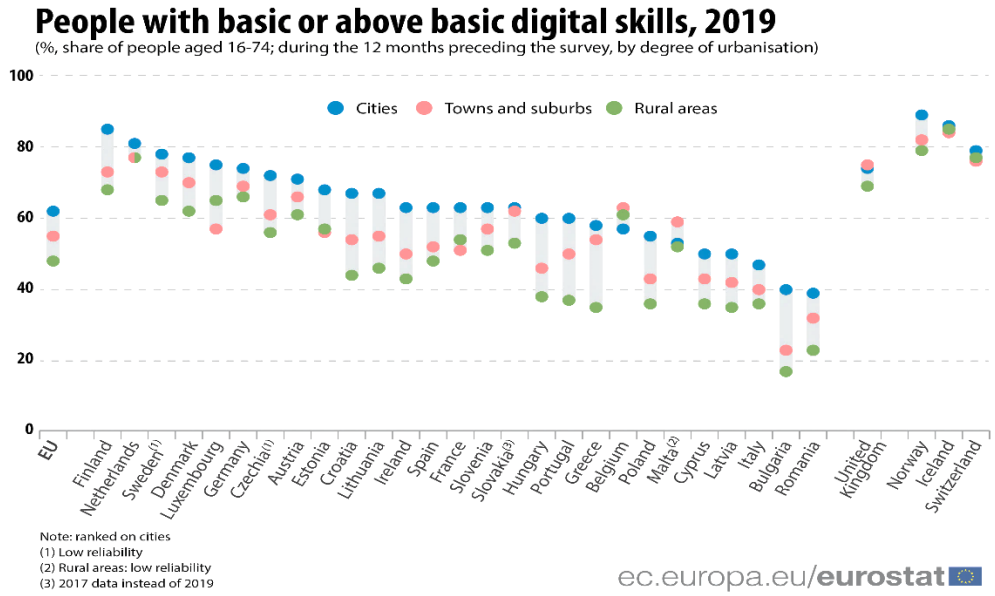

Fig. 2. Ponderea adulților în 2019 care au abilitățile digitale de bază și superioare (%dintre persoanele cu vârstă cuprinsă între 16 și 74 de ani, în funcție de gradul de urbanizare)
Sursa: Comisia Europeană - Eurostat

În concordanţă cu aceste date şi achiesarea la Planul de acţiune pentru educaţia digitală (2021-2027) la nivelul Uniunii Europene, în România s-a lansat în consultare publică în data de 18 decembrie 2020 Strategia privind digitalizarea educaţiei din România, prima strategie de la nivelul ţării de acest tip. Este o strategie complexă care vizează ca axe prioritare: dezvoltarea competenţelor digitale ale elevilor şi studenţilor; curriculum şcolar pentru meserii emergente; educaţia digitală pe tot parcursul vieţii; formarea iniţială şi continuă a cadrelor didactice pentru educaţie digitală; infrastructură şi resurse tehnologice digitale; conectivitate; crearea de resurse educaţionale deschise; securitate cibernetică, protecţia datelor, siguranţa online şi etica IT; capacitatea administrativă. În acest sens se doreşte o reformare a sistemului educaţional prin adaptarea la evoluţia tehnologică şi la noile cerinţe regăsite în societate, pe toate palierele acesteia, educaţia fiind principalul pilon în formarea cetăţenilor şi dezvoltarea lor pe termen lung. [22] Un raport de ţară din anul 2019 [23] arăta că România trebuie să acorde o mai mare atenţie şi importanţă: formării şi perfecţionării cadrelor didactice; investiţiilor în educaţie şi formare; modernizării învăţământului preşcolar, şcolar şi superior; modernizarea educaţiei şi formării profesionale; dezvoltării educaţiei adulţilor. [23]

Situaţia provocată de pandemia COVID-19 a fost nefavorabilă inechităţilor deja existente în învăţământul românesc, adâncind chiar unele probleme, însă a tras un semnal de alarmă asupra măsurilor ce trebuie adoptate de urgenţă şi care nu mai pot suferi amânare.

5. Concluzii şi consideraţii finale

Pandemia cu virusul SARS-COV-2 a provocat atât deficienţe, cât şi oportunităţi pentru sistemele de învăţământ din întreaga lume. Sistemele din întreaga lume care nu erau familiarizate noilor tehnologii în materie de învăţare şi predare au cunoscut mai multe probleme în asigurarea dreptului la educaţie, mai ales calitativă şi echitabilă, într-un învăţământ transpus 100% în mediul online, iar în această situaţie se află şi România. Prin prisma ideilor transmise pe parcursul lucrării identificăm o serie de avantaje ale învăţământului online, însă varianta optimă care va fi benefică şi după criza COVID-19 este cea a unui învăţământ hibrid care să îmbine procesele de învăţare faţă în faţă cu tehnologia şi oportunităţile pe care internetul şi accesul la informaţie la oferă.

Odată cu reformarea societăţilor pe plan economic şi socio-cultural în raport cu tendinţele tehnologice care evoluează rapid, se pune din ce în ce mai mult accentul pe necesitatea de a dezvolta sisteme educaţionale care să formeze tinerii şi din punct de vedere al abilităţilor şi competenţelor practice, fiind insuficientă asimilarea unui volum mare de informaţii pe care cursanţii nu ştiu să le aplice şi să le utilizeze în viaţa de zi cu zi.

Indiferent de schimbările care au loc în lume, educaţia deţine un rol primordial în dezvoltarea fiecărei comunităţi în parte. Chiar dacă există un decalaj semnificativ între România şi celelalte state membre ale Uniunii Europene, cu planuri concrete şi bine definite va putea fi recuperat. Până la pandemia COVID-19 au lipsit la nivel naţional astfel de strategii, chiar dacă tendinţele europene erau de a

dezvolta mecanisme prin care să crească competenţele digitale şi prin care noile tehnologii să fie integrate în procesele de predare şi învăţare. În detrimentul tuturor problemelor şi aspectelor negative pe care le-a reliefat, unul dintre aspectele benefice ale pandemiei pentru România a fost conştientizarea anumitor probleme şi lipsuri cu care se confruntă, determinând măsuri de îmbunătăţire a situaţiei regăsite în practică.

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Monitoring water parameters using IoT technology

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Abstract

Rivers are one of the most important sources of water for agriculture, industrial use, and other applications. The river systems are particularly exposed to the negative effects of pollution due to their dynamic nature and easy accessibility for waste management. The concept "water quality"

refers to the state or condition of a body of water, taking into consideration its chemical, physical, and biological aspects. The importance of measuring the water quality parameters for studying any aquatic system cannot be overstated. Indirectly, increasing the rate of water pollution will affect agriculture, leading to a decrease in the quality and quantity of vegetables and fruits grown. The objective of the article focuses on water quality determined by the analysis of the values of some parameters such as salinity, pH and conductivity. This article is based on the SWAM project's study, which intends to provide a strong and flexible platform through which humans can discover the reasons their health is affected by low water quality. The parameter monitoring system is based on IoT technology, the data being collected by sensors and then transmitted via an MQTT protocol to a Cloud database where it will be stored and processed. The results obtained from the parameter analysis were optimal, with the data collected not being drastically affected by the external environment. The presented study differs from other research due to the experimental data interpreted in a different way and the monitored parameters, the article being based on the evolution of pH, conductivity and salinity and how these parameters evolve in two weeks.

Keywords: *IoT, MQTT, conductivity, salinity, pH*.

1. Introduction

The world population has tripled in the last 66 years, from 2.5 billion in 1950 to 7.5 billion in 2016. This global population growth has affected the environment, namely three important factors of our livelihood: water, air and land. In the last year, according to statistics, there have been more than 600.000 thousand deaths due to water contamination causing health problems and developing infections transmitted through drinking water. If cautious procedures to monitor water quality were adopted, these problems might be avoided.

The growth of IoT technology in this industry will increase its long-term viability and profitability while also allowing it to respond to digitalization. Aquaculture is all about water quality, and mastering it is the key to success. Related work will include some methods presented in several articles for monitoring the parameters that show the quality of water. Parameters like pH, salinity, turbidity, conductivity and dissolved oxygen are of interest in the following article. The evolution of the parameters will be presented over a period of two weeks. The architecture of the system consists of four layers, and each layer had an important role.

The article is organized as follows: Section 2 describes the current state of the art of the article that gives a brief history of IoT technology used to monitor salinity, pH and conductivity. The next section presents the design architecture of the model used in this article. Section 4 focuses on the experiments performed and the results of using this prototype. Furthermore, the article summarizes the conclusion in the end.

2. Related work

In the article [1], the system about water quality is solved with flow rate measurement while also proposing a strategy for preventing water waste. It can measure the quality of water delivered to each household through the deployment of sensors. Where there is a need to have safe water and minimize water loss, the suggested IoT system can be utilized for verifying the level of pH and conductivity of water. Thus, when the pH and conductivity values are not in the predefined safety range, the valves of the reservoirs that supply water to households are blocked.

The authors of [2] provide a solution to the challenge of real-time water quality monitoring. The system is developed with the help of the WeMos D1 mini and sensors (temperature, pH and turbidity). The WeMos D1 small is an Arduino-style board with built-in Wi-Fi for sending sensor data over the Internet. The whole experimental setup for water quality data gathering, online data transfer, monitoring, recording, and analysis is created and tested. It is noted that the system changes its settings in less than a minute. This low-cost solution is ideal for residents, as well as businesses looking to check water quality.

The article [3] describes a sensor-based water quality monitoring system. A microprocessor for system processing, a communication device for inter node communication, and multiple sensors are the essential components of a Wireless Sensor Network (WSN). Access to data collected with sensors is achieved through remote monitoring and IoT technology. This data is displayed in a visual format via a PC server using Spark MLlib streaming analytics. Afterwards, they are compared as follows: if the measured value is higher than the threshold value, the user will receive an SMS alerting him that something has happened. This unique system brings a breakthrough in water quality in Bangladesh as it will closely monitor substances that pollute drinking water, and it is also a low power, high mobility system.

The article [4] highlights a new water monitoring system for rivers, lakes and coastal areas at a minimal cost. The underlying components of this system are commercially available electrochemical sensors, a microcontroller, a wireless communication system and a custom beacon. The system detects water pH, dissolved oxygen and water temperature within a given time frame. Through a web portal the collected data is imported into a graph and a table. The stability of the beacon is tested in harsh environmental conditions. The results of the system prove its effectiveness in monitoring water quality.

The article [5] provides a review of the application of IoT for real-time water quality monitoring and the creation of prediction systems in an aquaculture scenario. The capability to anticipate the evolution of water parameters is allowed by the creation of a wide variety and significant volume of data. As a result of the Internet of Things' contribution to Artificial Intelligence, aquaculture may take the technical leap required to expand while maintaining an environmental sustainability goal. The system is used on farms and is designed to monitor water quality parameters such as salinity, dissolved oxygen, conductivity, pH. The monitoring device consists of an electronic card, an antenna, water quality sensors, solar panels, rechargeable batteries and a LoRaWan module. The system used allows the integration of monitored data into algorithms to predict the quality of water by estimating factors that influence a change in water quality.

In article [6], the water quality of the Krishna River is analyzed by monitoring various parameters such as conductivity, dissolved oxygen, temperature, pH. The system uses IoT technology to collect data and interpret measurements to perform a more detailed water quality analysis. This system includes the following devices: Arduino Mega 2560, Wi-Fi module - ESP 8266, together with pH, temperature, conductivity, dissolved oxygen sensors. The data is effectively used to assess the water quality of the Krishna River using one-way ANOVA, which analyzes a specific parameter and predicts the rate based on the value obtained.

The article [7] presents a new technology based on an IoT system that monitors the quality, especially the pH of water from drinking water reservoirs. The data is sent to the authorities to inform them about the level of pH. This system uses a GSM module for transmitting the messages and an Arduino board for finding the pH level. For visualizing data, it uses a led display.

The problems presented in the article [8] show the degradation of water resources and air pollution. To solve this problem, it uses a technology based on IoT and several sensors which monitor some parameters which show the quality of water like temperature, pH, turbidity, dissolved oxygen. The collected data from the sensors are transmitted by using a microcontroller. The ADC in the controller converts the measured data to digital and sends it to a GPRS module attached to the microcontroller through the UART protocol. The information collected is forwarded to a server via GPRS and to the end user.

3. Architecture

The main purpose of this approach is to create a Smart Water Management platform that can monitor, alarm and provide technical solutions to improve water quality.

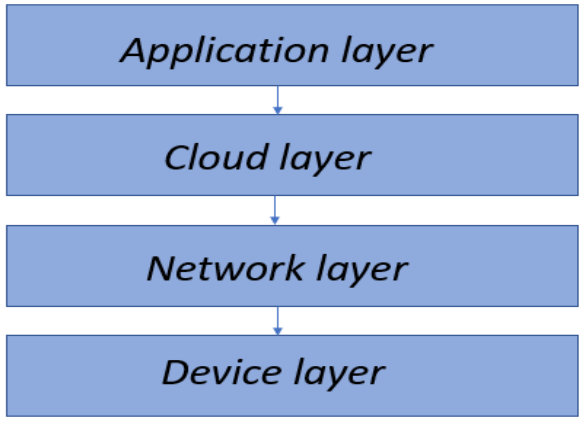

Fig. 1. SWAM Architecture

The architecture presented in Fig. 1 has four levels, each of them having an essential role in having a better performance. The levels are: Device, Network, Cloud and Application.

3.1. Device Layer

This layer is characterized by several sensors for monitoring water parameters such as conductivity, pH, salinity (Table 1). The sensor information is collected by a microcontroller and is processed to reach the network layer. The PHEHT sensor was used for water pH measurement with high accuracy and a high-speed response time. A single sensor called CAE was used for salinity and conductivity measurement, which has an impressive accuracy because it is made of two graphite and two platinum electrolytes.

Table 1. Parameter of interest for water

Parameter	Sensor	Measure Unit
Conductivity	CAE	mS/cm
pH	PHEHT	pH
Salinity	CAE	g/kg

3.2. Network Layer

The Network layer consists of an HAN, which is a tiny network that assures communication between two components, whether wired or wireless. NAN is the solution responsible for transmitting data from the gateways to the concentrator. The WAN is responsible for transferring data from the concentrator to the different zones.

3.3. Cloud Layer

Any IT services provisioned and accessible through a Cloud Computing provider are referred to as Cloud services. This is a broad phrase that encompasses Cloud Computing and related solution delivery and service methods. Using a Blockchain component that secures the water supply, this platform analyses data collected from sensor probes, then stores and processes it to improve water quality.

3.4. Application Layer

This data is analyzed using maps, notifications, or warnings sent to users if problems with the water quality are detected. A time-series database, called Influx DB, is used to store a more significant amount of data, which is analyzed in real-time. This system may be customized to meet the needs of the user. Furthermore, the platform is protected by cutting-edge technology.

4. Experimental results

For two weeks, several experimental measurements were carried out and the evolution of the parameters of interest was monitored.

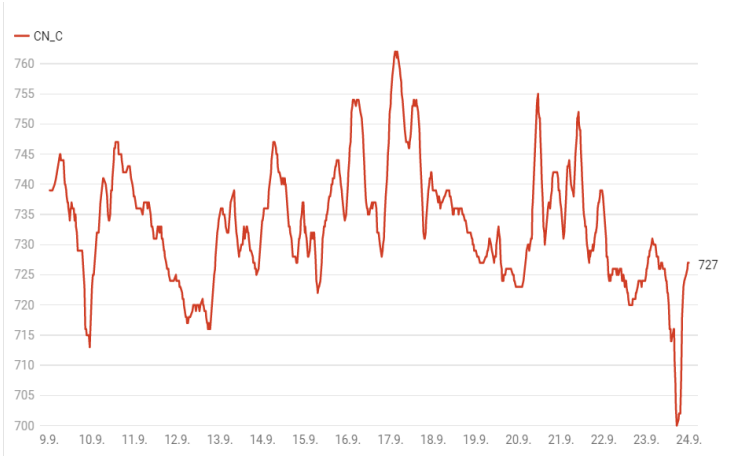

Fig. 2. Water Quality - Conductivity evolution - 09.09.2021 - 23.09.2021

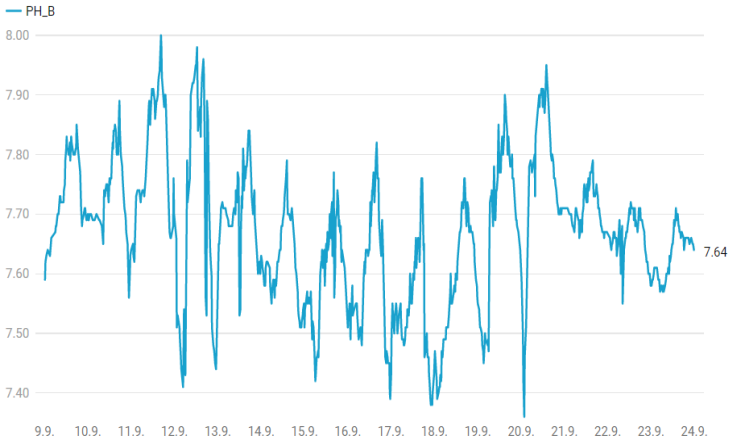

Fig. 3. Water Quality - pH evolution - 09.09.2021 - 23.09.2021

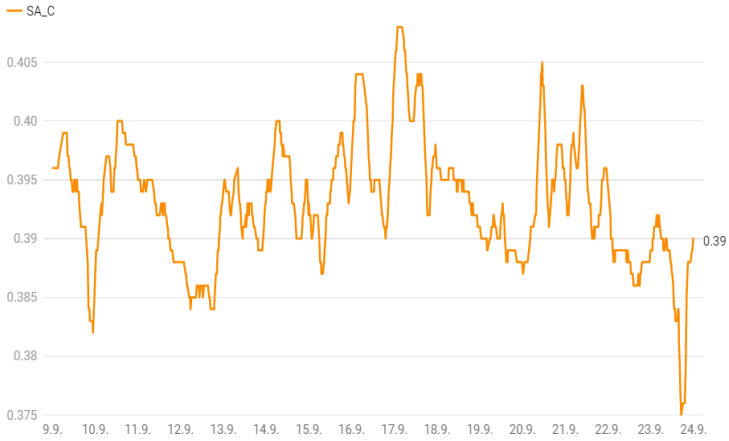

Fig. 4. Water Quality - Salinity evolution - 09.09.2021 - 23.09.2021

In Fig. 2, it is presented the evolution of the conductivity values for two weeks. Following the analysis of the conductivity over the days, it was found that the highest conductivity value was 762 μS/cm, which was recorded on a rainy day. This value was recorded on 17.09.2021 at 02.45 a.m. During the night, the temperature was 17 °C and during the day, it was 29°C. Fig. 3 shows that over the two weeks, the highest pH value was 8.00 pH, recorded on a sunny day. This value was recorded on 11.09.2021 at 04.30 p.m. During the night, the temperature had a value of 11°C, and during the day, a value of 28°C. Fig. 4 describes the evolution of salinity for two weeks. The highest value was measured on 17.09.2021 at 02.30 a.m., with a value of 0.408 ppt. Precipitation was presented and the temperature recorded during the night was 17°C and during the day 29°C.

5. Conclusions

This paper presents an ingenious method to monitor water quality parameters using IoT technology. This research proposes to monitor the characteristics of water to improve the quality of life. The system has a larger number of sensor probes for water monitoring, but for this research, it was chosen to focus all attention on experimental data related to pH, conductivity and salinity.

Acknowledgements

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The use of smart sensors in viticulture

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Abstract

Over time, agriculture has gone through a series of changes and had to provide food for a growing population. The same can be said for

viticulture; production and standards have increased significantly. Climate change is causing crops to be repositioned and resized. These environmental changes also mean that new diseases are appearing, leading farmers to use different substances to save crops and achieve the desired yields. The study of smart viticulture in this paper aims to implement methods that will bring improvements in quality standards and production yield. This paper aims to present the research realised in the DISAVIT project, which uses agricultural, meteorological and air quality sensors along with data processing and modelling technologies. In the experimental part, sensors were positioned on plants, soil or machinery to collect and monitor data. These are then processed to extract useful information. Analysis of results is done to optimise the process, grow and cure the crop. Data is sent generating MQTT messages using Libelium Smart Agriculture Pro and an IoT device. In this study, an experimental part is also carried out to monitor essential parameters in viticulture. Data on air humidity, soil temperature and humidity, and solar radiation were analysed. It was found that most of the time the studied environment was optimal for crop growth. The presented study differs from other research due to the architecture presented and the experimental data interpreted in a different way. The architecture aims at both data collection, using appropriate sensors and stations, and communication of the data with a platform for storing and creating solutions for diseases.

Keywords: *Smart Viticulture, IoT, sensing, vineyard*.

1. Introduction

Vineyards are an important economic factor in most countries. Geographically speaking, regions with temperate climates have the most vineyards. Europe is the continent with the largest area under vines (approx. 40%), with Italy, Spain and France contributing most [1]. Vineyards are mostly located in areas where water scarcity is a real problem. This is because of people's desire to grow necessary food in suitable areas [2]. Climate is a significant factor for yield, crop phenology and grape composition. In recent decades, several studies have shown that climate change has a significant impact on crops. For this reason, these changes are increasingly researched in order to find solutions. These changes can easily be monitored using crop models, which allow the consequences of changes in temperature, water supply or CO_2 levels to be visualised [3].

Soil microbiology can also be affected, involving the drought resistance of vines. Temperatures may change in relation to climate change, but this is not true in all regions. Temperatures have started to be higher during the ripening period, which can be significant in phenology and harvest quality. Evaporative demand contributing to vine transpiration and soil evaporation is increased by higher temperatures. Therefore, the soil water balance will be increasingly negative throughout the season.

This paper proposes a new IoT platform for viticulture. It is retrieved data on air humidity, solar radiation, and soil humidity and temperature. The data are

interpreted to realize whether the environment is conducive to vine growth. With this data, new solutions for viticulture can be implemented and it can be monitored if it develops properly. The architecture of the project uses some of the most advanced technologies, consisting of several sensors and specially developed equipment for vineyard maintenance.

This study is structured in sections: Section II presents the state-of-the-art on IoT monitoring platforms and technologies for viticulture. In Section III, an architecture based on IoT technology for smart viticulture is proposed, highlighting the components used. In Section IV it is presented the experiments conducted and their final results. Section V summarizes the conclusions and remains open to new experiments related to monitoring.

2. Related work

For vineyard condition monitoring, remote sensing and proximal sensing sensors have become widely used. With their help, it can be observed plant health, water supplies, pathogens and environmental changes. This process is used to capture information that is needed in the process of growing and improving crops.

Vineyards face many environmental constraints, and climate change is exacerbating them. Lately, studies have focused on numerous experiments on the response of grapevines to biotic and abiotic stresses and it has been concluded that there is a certain tolerance. Marker Assisted Selection (MAS) [4] is an advanced technique to characterise this tolerance in detail. MAS can identify genomic portions that have resistance genes in vineyards. Using this method, pathogen resistance genes have been recorded in several varieties of genetic backgrounds as well as hybrids. Introducing genes from the wild into the cultivated environment vineyards is also possible using the MAS technique.

Wireless Sensor Network (WSN) [5] technologies are widely used in viticulture because they help to monitor the crop. They are a method for real-time monitoring of various parameters needed in wine production, but also for processing and transmitting data and alerts to farmers. In this study, the aim is to implement a WSN in which field images are captured by each sensor node. Then it uses image analysis to detect various leaf changes, which can indicate a range of diseases, pests or other deficiencies in the soil or air. When the symptom is identified, the farmer receives a notification.

A study [6] proposes an architecture for an M2M telemetry system. This architecture brings very low power consumption, is easy to handle, has a high life expectancy, is implemented for radio communications and integrates GSM, GPRS, 3G and UHF technologies. The software of this system is designed on an architecture that takes data from the Adcon gateway and then processes or visualises it. The system allows the user to measure, send and process parameters over large distances or specific areas for agriculture or meteorology.

The implementation of IoT solutions [7] in precision viticulture is strictly linked to the implementation of a WSN. The deployed application contains certain requirements, and for this, the structure, number and location of nodes must be

done accordingly. The sensors will be installed in each node, but this is conditioned by climatic parameters. The sensor network must meet certain conditions to ensure the reliability and cost-effectiveness of the data.

A study [8] proposes an IoT solution that relies on DIY and open hardware. This method is very low cost and aims to monitor how IoT nodes are forming. The architecture of IoT nodes is introduced to describe logical and physical aspects. It aims to implement a modular design at the software and hardware level. 3G connectivity gives more control when the node is configured and allows it to adapt to other IoT scenarios. This IoT node is implemented in an IoT management platform, SEnviro connect. This generates alerts on vineyard diseases. It offers a self-contained solution in terms of connectivity and energy.

In precision viticulture, a study [9] has implemented a new method of crop monitoring. This experiment involved the installation of three platforms onboard a ship to take NDVI images of Italian vineyards using multispectral sensors. A spectral framework was used to determine similarity. It was found that in heterogeneous crops, low-resolution images do not capture the variability in the vineyard. Following the financial analysis, the Unmanned Aerial Vehicle (UAV) remote sensing platform was found to have the most advantages for areas up to five hectares. UAV is a technology that is increasingly used in viticulture because of the results it delivers. Its costs are low, it is very flexible in use, and it has a high spatial resolution.

3. Project solution

The DISAVIT project aims to provide an easy-to-use and low-cost solution for intelligent viticulture systems. It covers all phenological stages and provides strategic and operational applications for vineyards.

3.1. Architecture

The advancement of vineyard monitoring methods and the resolution of emerging The study is accomplished on specific conditions and sizes, location and technical data sets are taken into account. deficiencies is the main goal of the project.

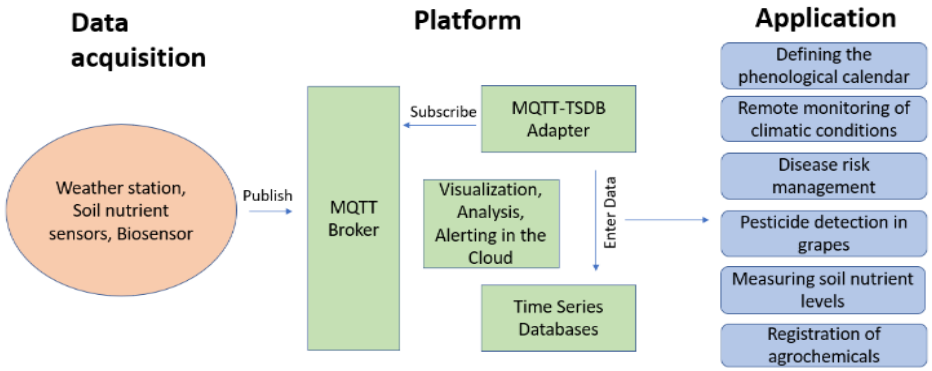

Fig. 1. Architecture of DISAVIT project

Data on water resources, air quality and soil condition will be carefully analysed. The platform will monitor diseases and create solutions to cure crops also, treatment plans will be created. Fig.1 presents the DISAVIT project architecture, which comprises three fields: Data Acquisition, Platform and Application. Their importance and composition will be described below. The project has been designed for both producers and consumers. The creation of crops with the highest standard is ideal in this study.

3.2. Device layer and targeted parameters

The sensing devices used in this project are based on the Smart Agriculture Pro platform, which includes various sensing probes.

This station is equipped with a probe that provides temperature, humidity and pressure sensors. The BME280 is a combined sensor for these parameters, and its detection is proven. The humidity sensor offers both high overall accuracy over a wide temperature range and a very fast response time. In the pressure sensor, the drastic noise is quite low. It is an absolute barometric pressure sensor that has extremely high accuracy and resolution.

The temperature sensor is also used in the experiments, as its output is used to compensate the temperature of the pressure and humidity sensors. When the sensor is deactivated, current consumption drops to 0.1 μA.

The station also features a leaf moisture sensor. Its resistance has an infinite resistance behavior, when condensation is missing. The output voltage can be observed at the analog input of the Waspmote ANALOG3, which is inversely proportional to the humidity on the sensor. The sensor can be powered on or off using the switch controlled by the ANALOG7 digital pin.

The solution uses the Watermark sensor, which is a resistive sensor consisting of two electrodes. These are embedded in a granular matrix and are highly resistant to corrosion. The resistance of the sensor is proportional to the soil water voltage. Three sockets for the Watermark sensors and the equipment required to power and condition the signal have been placed in the electronic board so that soil moisture can be measured at three different depths.

The soil temperature sensor requires a 3.3V power supply. The DS18B20 digital thermometer manages to record 9-bit Celsius temperature measurements. It requires a single data line for communication with Waspmote.

The Pt-1000 sensor has a resistance that varies between 920Ω and 1200 Ω. This can result in voltage variations that are too small for the Waspmote's analog-to-digital conversion resolution.

The SQ-110 sensor is specially calibrated to detect solar radiation. The output voltage is directly proportional to the intensity of light in the visible range of the spectrum.

For best readability, the output is via a 16-bit analog-to-digital converter, which communicates with the motor microcontroller.

The radiation sensor provides an output voltage proportional to the intensity in the ultraviolet range of the spectrum. The power supply is 5V and is controlled by a digital switch, which can be internally turned on and off by the library.

The brightness sensor is a light-to-digital converter that converts light intensity into a digital output signal. The device contains a broadband photodiode and an infrared photodiode, both on a single circuit. The photodiode currents are converted by two ADC integrators to a digital output representing the irradiance measured on each channel [10].

In addition to sensors, dendrometers are used in the data collection process. These are very precise instruments, an ideal tool for observing how much the plant is growing.

3.3. Network and Protocol layer

MQTT is a communication protocol that uses M2M connectivity because it is energy efficient. The main feature of this protocol is that it uses less energy than the HTTP protocol. This is very important in IoT applications, as the number of devices increases. This protocol was chosen for the DISAVIT project because, with its tools it can process and analyse data in real time, ensure reliability and robust energy efficiency in IoT devices [11].

3.4. Cloud layer

The system designed for DISAVIT collects data via sensors attached to the device, and the results are sent to the internet system. The information is to be processed in the Cloud, and the IoT provides a private web network. The Cloud architecture includes three main applications: Data analysis, configuration (sensor parameters can be changed), and monitoring (notifications are sent about the state of the crop and the environment) [12].

3.5. Application layer

The system designed for the DISAVIT project will monitor vine crops in real time in order to observe the health of the plants and prevent potential problems. An advanced dashboard was used to visualise and analyse the data, which also plays an important role in decision-making by sending alerts and notifications.

4. Experimental results

To obtain the data to be processed, a case study was carried out on a vineyard in the vicinity of Beia Consult International. Detection devices were installed in the soil and near the grapes. Sensors were used for this process, together with Libelium Smart Agriculture Pro hardware. The aim of this experiment was to detect the soil quality, but also the climatic changes that can affect the crops. Next, the evolution of the vines and the problems that can occur in the stem, root or fruit are monitored.

The variation of solar radiation is shown in Fig. 2. Solar radiation heats the ground as it reaches the surface. 30% of extraterrestrial solar radiation is reflected back into space, but about 51% is absorbed by the Earth's crust and waters, and

another 19% is absorbed by clouds and the atmosphere. The Sun heats the Earth, conditions the evaporation of water, the formation of air currents and weather variations. In summer, direct radiation is higher, but in winter, when the sky is cloudy, diffuse radiation is higher [13]. The annual daily average is 2.75 kWh/m^2, so the soil was favorable for crop development most of the time.

Vineyards should not be planted in narrow valleys where cold air collects and stagnates. It yields well in areas with annual rainfall of 500-650 mm and air humidity of 60-70%. Observing that in Fig. 3, the air humidity has an average value of more than 50%, resulting that the development of the grapes was optimal [14].

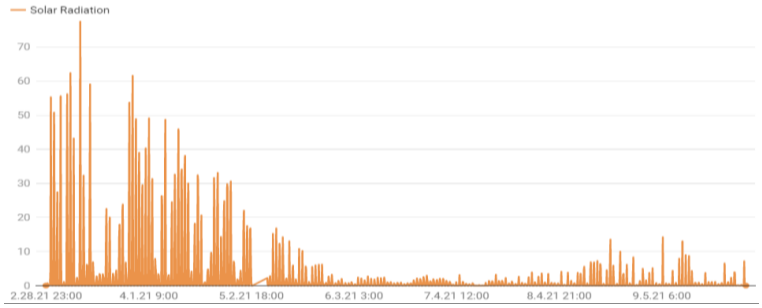

Fig. 2. Solar Radiation evolution between 28.02.2021 - 30.09.2021

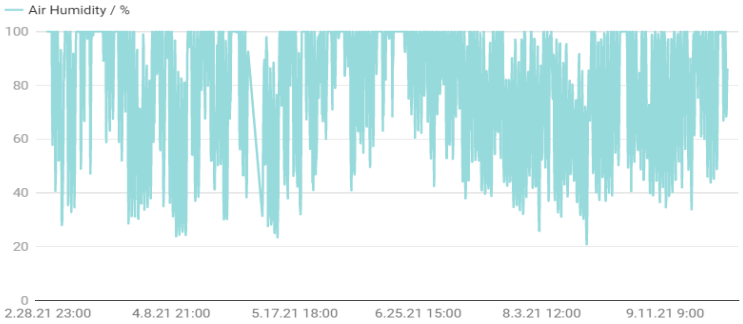

Fig. 3. Air humidity evolution between 28.02.2021 - 30.09.2021

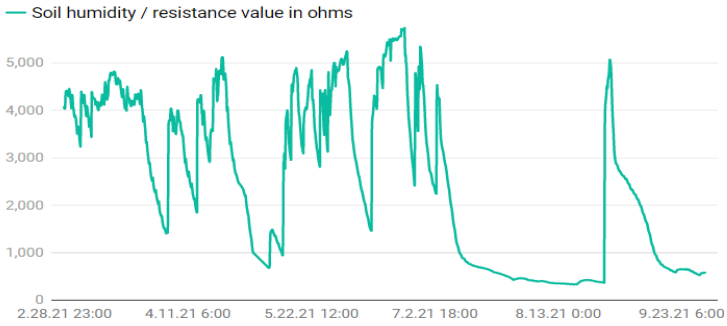

Fig. 4. Soil humidity evolution between 28.02.2021 - 30.09.2021

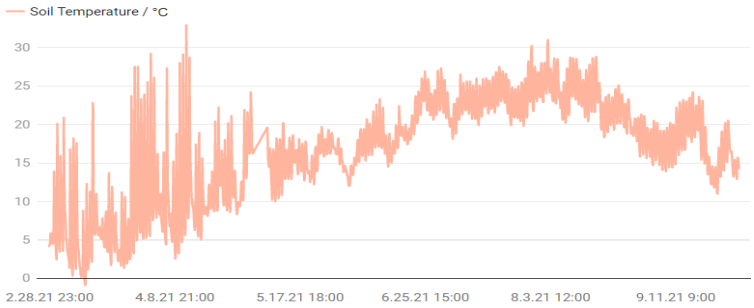

Fig. 5. Soil temperature evolution between 28.02.2021 - 30.09.2021

Fig. 4 shows the evolution of soil humidity. Soil and substrate moisture is the amount of water physically bound to the soil-substrate. Soil moisture is an essential parameter in crops. The optimum soil moisture for grapevines is between 50% and 80% of the active moisture range, with lower values considered favorable for berry ripening and higher values for shoot growth. Analysing Fig. 4, it can be observed that in the range of active humidity, values above 50% were recorded. However, there were also much lower values for grapes ripening.

The temperature determines the area under vineyards, the cropping system, the onset and timing of the growing phases, the quantity and quality of production. In general, vineyards are planted in spring as early as possible, when the soil temperature is 9-10ºC. Fig. 5 shows the soil temperature from February to September [16]. By analysing these experimental data, the paper can build a preliminary basis for vine crops. These values are useful in the process of increasing yield and quality.

5. Conclusions and future work

Viticulture has always been affected by climate change. Requirements and standards have also increased, and growers must therefore comply to stay in business. New technologies are being implemented to support the evolution of viticulture. The DISAVIT project aims to offer the possibility to implement cost-effective and efficient solutions to produce superior crops. Based on IoT technology, new methods of monitoring vineyards are proposed so that crops will be more protected, diseases can be prevented early, and grapes will be of higher quality.

In terms of devices, the proposed architecture is different from other solutions, using Smart Agriculture Pro devices, hardware platform and sensors from Libelium. At the network level, the Meshlium Gateway is used, which has storage capabilities, using an internal database, when the communication link cannot be achieved.

The experimental data was accomplished using the Libelium Smart Agriculture Pro station, mounted in a vineyard. The research team investigated and interpreted the data obtained. The performance of the devices used was also tested, but some of the sensors need to be integrated into the test bench for further case studies.

The future work proposes to develop an algorithm for the correct identification of events. The system should be self-configurable and autonomous. An accessible platform for people who are not in the specified field is also a consideration.

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Arhitectura contemporană, între tabula rasa şi adaptarea existentului

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Abstract

Singura constantă din evoluţia arhtecturii este schimbarea. Clădirile nu oferă doar umbră şi protecţie faţă de mediul extern, ci au o multitudine de funcţii de îndeplinit şi o serie de condiţii la care să se adapteze şi la care să răspundă. Arhitectura s-a transformat din funcţională în inteligentă, odată cu noile cerinţe ale timpului. De la originea sa, arhitectura s-a dezvoltat pentru a satisface nevoile oraşelor şi ale oamenilor săi. Cu toate acestea, poate mai mult decât oricând, în vieţile complexe de astăzi, având în vedere condiţiile fluctuante ale oraşelor şi mediile în schimbare, arhitectura trebuie să îşi însuşească o multitudine de funcţiuni pe parcursul ciclului său de viaţă. Astfel, este necesar ca mediul construit să răspundă la toţi parametrii dinamici şi să servească scopului existenţei sale.

Arhitectura modernă a fost în cea mai mare parte dominată de o ideologie esenţială - tabula rasa – înlocuirea vechiului cu noul. Albul, minimalismul şi geometria veneau în detrimentul spaţiilor complicate, întunecoase şi încărcate. Această viziune a condus ca în prezent să ne aflăm prinşi într-un cerc nesfârşit de demolări şi construiri, sub falsa impresie că mai nou reprezintă implicit şi mai bun.

Astăzi, în situaţia în care aproape 40% din emisiile de carbon sunt legate de industria construcţiilor [1], continuarea acestor cicluri nu este doar nesustenabilă, ci iresponsabilă în mod flagrant. Ar trebui ca înainte de a construi ceva nou să ne punem problema dacă nu am putea să folosim, să adaptăm ceea ce avem deja la dispoziţie.

Confruntat cu pericolul iminent al calamităţii climatice, dar şi cu alte situaţii de criză neprevăzute, există un imperativ clar de a regândi modul în care ar trebui să abordăm arhitectura şi să contestăm această noţiune că fiecare proiect începe neapărat cu o placă nouă din beton.

Cuvinte cheie: *arhitectură adaptivă, reutilizare sustenabilă, dezvoltare durabilă*.

1. Introducere

Mai des decât ne place să admitem, nu suntem angajaţi în schimbarea lumii într-un scop determinat. Noi ne adaptăm, răspunzând forţelor exterioare dincolo de controlul nostru, căutând să supravieţuim, să păstrăm ceva, pentru a menţine nivelul dorit de performanţă [2].

Aşa cum afirmă mai sus şi Kevin Lynch, clădirile au fost refolosite de-a lungul istoriei, din Antichitate şi până în Renaştere sau Clasicism. Întregi construcţii sau doar părţi ale lor au fost adaptate, modificate sau reutilizate pentru a răspunde unor cerinţe funcţionale diferite, într-un proces firesc de evoluţie şi transformare.

Cu timpul, toate clădirile suferă inevitabil schimbări funcţionale, pe măsură ce culturile sunt asimilate, distruse, subminate sau cucerite. Poate cel mai elocvent exemplu premodern în acest sens îl reprezintă Sfânta Sofia din Istanbul – concepută ca o catedrală greco-ortodoxă, reconfigurată ca o moschee otomană, devenită muzeu contemporan şi apoi din nou funcţionând în prezent ca spaţiu de cult islamic.

Fig. 1. Catedrala Sfânta Sofia, Istanbul, vedere aeriană
Sursa: https://www.planetware.com/istanbul/hagia-sophia-ayasofya-tr-is-iohs.htm

Această abordare a suferit o schimbare majoră odată cu epoca modernă, ce a marcat în special mijlocul secolului XX, când discursul progresist s-a concretizat într-o etapă de idealism arhitectural şi inovaţie tehnologică rapidă asociată cu o creştere fără precedent a construcţiilor şi a suprafeţei construite. Ne referim la o perioadă care neagă tot ceea ce a existat până atunci, la o încercare susţinută de înlăturare a tot ceea ce reprezenta trecutul şi de afirmare exclusivă a unor noi idealuri considerate ca fiind singurele acceptabile în contextul dat. Nu există o negociere între trecut şi prezent şi niciun fel de raportare la experienţa precedentă, ci doar un entuziasm şi o încredere totală în puterea tehnologiei de a transforma şi de a rezolva toate problemele de până atunci ale omenirii.

Însă pe măsură ce tendinţele în proiectare au devenit globale şi sistemele mecanice au evoluat pentru a oferi acces facil la încălzire şi răcire, clădirile au devenit mai puţin sensibile la climă şi au devenit tot mai mari consumatoare de energie pentru a funcţiona [3]. Arhitectura din acest timp a celebrat, de asemenea, inovaţia structurală şi materialele noi, care au condus la integrarea frecventă şi oarecum eficientă a structurii, anvelopantei şi instalaţiilor. Aceste caracteristici au dus la un stoc de clădiri cu o eficienţă energetică de obicei slabă şi noi provocări

materiale pentru conservare. Mai degrabă decât o justificare pentru a demola aceste clădiri şi a le înlocui, numărul lor mare şi contribuţiile semnificative la emisiile globale de gaze cu efect de seră sunt motive pentru care clădirile de la mijlocul secolului trebuie reutilizate în mod eficient pentru a îndeplini obiectivele climatice, respectând în acelaşi timp istoria lor. Având imperativul de a limita încălzirea globală la mai puţin de 2 grade Celsius, reutilizarea şi modernizarea acestor clădiri oferă o strategie esenţială de reducere a carbonului pe termen scurt.

2. Temperarea tentaţiei de a construi

Desigur că orice nou proiect este întâmpinat de un arhitect cu entuziasm şi reprezintă începutul unui nou drum de parcurs, la capătul căruia se află de multe ori satisfacţia încă unui proiect încheiat, ce reprezintă materializarea propriei viziuni.

Totuşi, în contextul în care este cunoscut faptul că industria construcţiilor reprezintă o sursă de poluare consistentă, poate că prima întrebare pe care ar trebui să ne-o punem în prezent înainte de a lua decizia de a demola, proiecta şi mai ales de a construi este: "Este oare nevoie cu adevărat de această clădire în acest loc, sau pot adapta/refolosi ceea ce există deja?" Această întrebare începe să fie punctul de pornire pentru din ce în ce mai mulţi arhitecţi, pentru care nu mai primează neapărat orgoliul personal şi cel profesional, ci mai degrabă au o viziune de ansamblu şi pe termen lung în privinţa arhitecturii şi a mediului construit.

Este nevoie să fim conştienţi că nu putem şi nu are rost să înlocuim de fiecare dată ceea ce am moştenit şi că tendinţa arhitecturii moderniste de a nega orice urmă a trecutului este perimată şi complet ineficientă astăzi. Oricât ne-am dori ca arhitecţi să ne punem amprenta asupra epocii în care trăim, avem mai multe şanse să o facem gândind sustenabil, pe termen lung, astfel încât clădirile pe care le proiectăm să nu devină şi ele complet inutile peste alţi cincizeci de ani, subiectul unor noi demolări. De aceea este necesar să privim cu mai multă reţinere şi luciditate modul în care ne dorim să construim, felul în care se face dezvoltarea imobiliară şi viitorul a ceea ce construim astăzi.

3. Reutilizarea adaptivă în arhitectură

Reutilizarea adaptivă se referă, de obicei, la reutilizarea siturilor sau a clădirilor în alte scopuri decât cele în care au fost construite sau proiectate iniţial. Aceste noi utilizări pot oferi beneficii economice, sociale şi culturale mediilor în care se găsesc. De asemenea, reutilizarea este o abordare a durabilităţii, deoarece păstrează materialele de construcţie originale. Reutilizarea adaptivă se ocupă de probleme de păstrare şi conservare a patrimoniului construit, precum şi de strategii şi politici [4]. Odată ce structurile vechi devin improprii pentru cerinţele lor funcţionale şi programatice, reutilizarea adaptivă devine o opţiune durabilă pentru reabilitarea siturilor.

Reutilizarea adaptivă este o formă specială de renovare care ridică arhitecţilor dificultăţi majore întrucât constă în preluarea unei clădiri sau parte a unei clădiri existente şi adaptarea ei la o nouă utilizare. Modificarea clasificării funcţionale a

unei clădiri presupune noi condiţii de reglementare şi avizare. Cu toate acestea, există beneficii economice, de mediu şi sociale incontestabile care pot face această opţiune atractivă pentru dezvoltatori. Reutilizarea adaptivă a fost aplicată cu succes în cazul multor tipuri de facilităţi din întreaga lume. Este văzută ca fiind fundamentală pentru o politică guvernamentală solidă şi pentru dezvoltarea durabilă în în multe ţări dezvoltate ale lumii [5]. Deşi clădirile au fost refolosite de-a lungul istoriei, noile intervenţii arhitecturale sunt văzute ca o modalitate creativă de a insufla viaţă nouă unui context istoric existent, reinventând în acelaşi timp o valoare economică şi socială. Combinarea arhitecturii noi şi vechi asigură păstrarea caracterului autentic, oferind în acelaşi timp o nouă utilizare adecvată. O astfel de utilizare se adaugă în cele din urmă la ţesutul istoric al clădirii, precum şi la spaţiul construit în ansamblu.

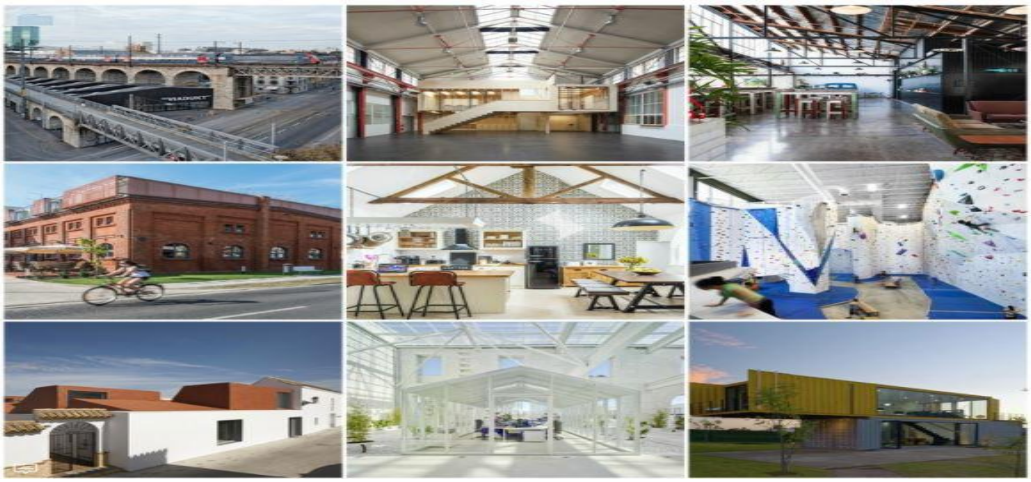

Fig. 2. Exemple de arhitectură adaptivă prin care se reutilizează clădiri sau fragmente de clădiri existente. De la foste spaţii de cult la clădiri industriale sau chiar containere, acestea primesc o nouă funcţiune şi sunt reconfigurate şi adaptate pentru a putea răspunde noilor necesităţi.
Sursa: https://www.archdaily.com/783283/20-creative-adaptive-reuse-projects

Arhitectura adaptivă recunoaşte că edificiile nu sunt în niciun caz nemuritoare şi că ele suferă de uzură într-o multitudine de moduri:

- uzură fizică – componenta materială şi structura unei clădiri nu mai este capabilă să funcţioneze independent;
- uzură economică – nu mai este viabil din punct de vedere economic ca o clădire să fie operată în modul pentru care a fi fost proiectată iniţial;
- uzură funcţională – funcţiunea unei clădiri pentru care a fost proiectată iniţial nu mai este necesară;
- învechirea tehnologică – o clădire este incapabilă de a se adapta la schimbările tehnologice din cauza rigidităţii amenajării şi structurii sale spaţiale originale;

- învechirea socio-culturală – nu mai este necesar un loc cu semnificaţie socio-culturală (cum ar fi un lăcaş de cult), deoarece practicile culturale s-au schimbat, făcând clădirea învechită.

Ca urmare a acestor moduri de învechire, principiile adaptării se încadrează în două mari categorii:

- forma extinde funcţiunea – prin care modificările şi completările contemporane sunt adăugate pentru a completa o utilizare preexistentă şi
- funcţiunea modifică forma – prin care modificările şi completările contemporane au fost introduse pentru a oferi o nouă utilizare compatibilă, care diferă de intenţia de proiectare iniţială a clădirii.

Discursul actual al diverselor tendinţe în conservare, împreună cu conştientizarea pentru mediile durabile, a condus la o creştere a proiectelor de reutilizare adaptivă. Combinaţia dintre arhitectura nouă şi veche asigură păstrarea caracterului autentic, oferind în acelaşi timp o nouă utilizare adecvată şi revitalizarea structurii. Învăţarea din precedente este una dintre cele mai importante baze de cunoştinţe pentru arhitecţi. Are multe straturi de cunoştinţe referitoare la clădirea veche şi la utilizarea sa iniţială, la clădirea transformată şi la noua sa utilizare şi la transformarea în sine.

4. Adaptarea arhitecturii postbelice la realităţile secolului XXI

Se vorbeşte mult despre conservare şi reutilizare adaptivă, mai ales în ceea ce priveşte clădirile de patrimoniu şi în general cele istorice. Suntem deja familiarizaţi cu importanţa lor culturală în cadrul societăţilor, însă mai rar se ridică problema unei categorii de construcţii existente, care influenţează major peisajul construit contemporan, cele construite după cel de-al doilea război mondial. Este necesar ca şi acestea să fie luate în considerare atunci când avem în vedere dezvoltarea urbană şi avem nevoie de o viziune care să presupună întegrarea lor în fondul construit, mai degrabă decât înlocuirea lor cu inserţii noi.

Ne place să detestăm clădirile construite la mijlocul secolului al XX-lea [6]. Şi totuşi, pe măsură ce aceste clădiri ating 50 de ani, specialiştii în mediul construit au început să recunoască această moştenire arhitecturală şi semnificaţia ei istorică şi să se confrunte cu provocările tehnice şi sociale ale acesteia. Pe lângă valoarea lor culturală, aceste clădiri au o valoare de mediu enormă. Pentru a rămâne în limitele bugetului global de emisii definit de Grupul Interguvernamental al Naţiunilor Unite pentru Schimbările Climatice (IPCC), care ar necesita o reducere cu 65% a emisiilor până în anul 20302, nu ne putem permite costul operaţional al carbonului pentru a permite acestor clădiri să continue să existe în forma în care se găsesc acum. Ele funcţionează ineficient şi nu ne putem permite costul carbonului încorporat pentru a înlocui acest procent semnificativ din mediul construit existent cu construcţii noi. La nivel global, exploatarea tuturor clădirilor existente reprezintă aproximativ 28% din emisii, în timp ce emisiile încorporate din fabricarea de noi materiale de construcţie contribuie cu aproximativ 11% [7]. Reutilizarea şi modernizarea acestor clădiri reduc emisiile operaţionale, evitând în acelaşi timp emisiile asociate construcţiilor noi. Reutilizarea arhitecturii postbelice, care beneficiază atât de avantajele de mediu,

cât şi de respectarea valorii istorice, este o strategie puternică pentru realizarea unei economii circulare.

Totodată, clădirile de la mijlocul secolului al XX-lea se confruntă cu câteva obstacole specifice pentru reutilizarea cu succes. Integrarea structurii clădirii şi a incintei este una dintre aceste provocări. Utilizarea betonului ca principal material de construcţie până la începutul secolului al XX-lea a condus la dizolvarea ideii de cadru interior separat şi a sistemelor de pereţi exteriori şi la apariţia cadrului monolitic [8]. În special în arhitectura brutalistă, betonul nu a fost folosit doar ca un material ascuns, ca material structural, ci el a fost şi celebrat şi exprimat ca parte a anvelopantei clădirii. Această utilizare a betonului presupune multiple provocări, ce ţin de conservare şi de eficienţă energetică. Din punctul de vedere al conservării, betonul expus la intemperii este foarte vulnerabil la infiltrarea apei şi la variaţiile de temperatură.

4.1. Piramida Tiranei, un model de arhitectură adaptivă propus de MVRDV

Biroul de arhitectură olandez MVRDV demonstrează potenţialul clădirilor existente prin reutilizarea adaptivă a „piramidei Tiranei" din inima capitalei Albaniei. Arhitecţii au propus integrarea şi reutilizarea monolitului de beton în cadrul proiectului lor, mai degrabă decât să demoleze structura brutalistă. Intervenţia MVRDV va transforma acest simbol al vechiului regim albanez într-un nou centru pentru viaţa culturală a Tiranei.

Fig. 3. (a) Imagine a piramidei Tiranei din ziua inaugurării, 1988;
(b) Imagine aeriană a piramidei din ziua inaugurării
Sursa: (a) https://www.researchgate.net/figure/The-Pyramid-Piramida-former-museum-of-Enver-Hoxha-during-its-inauguration-after-Ylli_fig1_345016222
(b) https://www.chnt.at/wp-content/uploads/eBook_CHNT23_Miho.pdf

Piramida din Tirana a fost inaugurată în 1988, ca muzeu închinat dictatorului comunist Enver Hoxha, fiind proiectată de fiica dictatorului, Pranvera Hoxha şi soţul ei, Klement Kolaneci. În urma prăbuşirii comunismului din Albania, edificiul a

îndeplinit multe funcţiuni diferite: ca bază temporară pentru NATO în timpul războiului din Kosovo, club de noapte şi spaţiu pentru evenimente [9]. În încercarea de a recupera structura deteriorată şi de a şi-o însuşi, tinerii din Tirana o folosesc în prezent ca loc de întâlnire şi pânză pentru graffiti, şi obişnuiesc să urce pe ea noaptea expunându-se riscului de a aluneca pe rampele sale.

Fig. 4. (a) Imagine a piramidei Tiranei în prezent; (b) Tineri escaladând rampele piramidei
Sursa: (a) http://www.albaniantourist.com/pyramid-of-tirana-albania.html (b) https://www.architectural-review.com/essays/outrage/outrage-the-unwilding-of-the-pyramid-of-tirana

De-a lungul anilor 2000 au apărut numeroase propuneri de demolare a piramidei şi de reamenajare a acesteia. O propunere anterioară pentru ca edificiul să devină o operă sau filarmonică a fost aprobată, dar anulată la scurt timp după aceea. Plăcile exterioare de marmură care acoperă structura au fost îndepărtate şi depozitate într-un spaţiu din afara Tiranei. Propunerea de demolare a Piramidei în sine a devenit un punct de controversă în rândul arhitecţilor, iar istoricul Ardian Klosi a iniţiat o petiţie împotriva demolării structurii, adunând în jur de 6000 de semnături. Un studiu început în 2013 şi publicat în 2015, a sugerat că majoritatea cetăţenilor din Tirana sunt împotriva oricărei demolări [10]. Încă o dată în 2017 a fost făcut un anunţ că Piramida nu va fi demolată, ci renovată.

Aşa că în 2018 s-a decis transformarea piramidei. Nu a existat nicio competiţie de arhitectură sau dezbatere publică pentru a decide asupra utilizării viitoare a clădirii: premierul şi echipa sa au numit biroul de arhitectură olandez MVRDV să transforme Piramida într-un hub tehnologic şi spaţiu comercial. Ei au proiectat noi volume în formă de cutie şi scări exterioare pentru a face urcarea „sigură" şi „mai accesibilă". MVRDV susţine astfel că „salvează" clădirea şi creaturile sale sălbatice, căţărătoare, dintr-o practică „periculoasă". „Nu vrei să ştii câte braţe au fost rupte", a spus cofondatorul biroului, Winy Maas, în 2018, la o prelegere AA [11]. Desigur, nu se ştie cu siguranţă câte victime au fost de-a lungul timpului, dar neîndoielnic că au existat şi persoane rănite în timpul escaladei piramidei.

Fig. 5. Imagine exterioară a piramidei Tiranei – propunerea arhitecţilor de la MVRDV
Sursa: https://www.mvrdv.nl/projects/312/the-pyramid-of-tirana

Prin proiectul lor, arhitecţii de la MVRDV vor deschide în mod radical structura, care acum este aproape sigilată şi complet inaccesibilă; se va refolosi structura din beton existentă, iar atriumul şi împrejurimile lui vor fi ecologizate şi deschise; va fi amenajat un mic "sat" de cafenele, studiouri, ateliere şi săli de clasă – unde tinerii albanezi vor învăţa gratuit diverse aspecte legate de tehnologie, care se va dezvolta atât în interior, cât şi în exterior. Au fost propuse clapete uriaşe de sticlă ce pot închide clădirea când plouă. Elementele adăugate în cadrul renovărilor anterioare vor fi eliminate pentru a dezvălui un spaţiu interior clar şi deschis. Copacii şi alte elemente vegetale dau acestui spaţiu deschis un aspect primitor. Cutiile care conţin camere individuale sunt amplasate în interiorul, deasupra şi în jurul structurii existente.

Fig. 5. (a,b) Imagini din interiorul piramidei din Tirana, propunere MVRDV
Sursa: (a,b) https://www.mvrdv.nl/projects/312/the-pyramid-of-tirana

Deasupra grinzilor de beton înclinate se vor amplasa trepte, astfel încât vizitatorii să poată urca în siguranţă pe piramidă. Una dintre grinzi va fi păstrată ca rampă pe care vizitatorii pot aluneca în jos – pe propriul risc. Instituţia de învăţământ non-profit TUMO Tirana va fi principalul utilizator al Piramidei, oferind educaţie gratuită după şcoală pentru tinerii cu vârsta între 12 şi 18 ani în tehnici noi precum software, robotică, animaţie, muzică şi film.

Prin urmare, se aşteaptă ca Piramida să devină un nou centru pentru viaţa culturală a Tiranei şi un reprezentant al noii generaţii.

Echipe de arhitecţi este foarte optimist în privinţa modului în care oamenii vor primi noul proiect şi sunt conştienţi de importanţa acestuia în cadrul societăţii post-comuniste a Tiranei: "A lucra la un monument brutalist precum piramida este un vis", spune partenerul fondator al MVRDV, Winy Maas. „Este izbitor şi interesant să vedem cum ţara s-a luptat cu viitorul clădirii, care pe de o parte este un capitol controversat din istoria ţării şi, pe de altă parte, a fost deja parţial recuperată de locuitorii din Tirana. I-am văzut imediat potenţialul şi că ar trebui să fie posibil să-l transformăm într-un „monument al poporului" în loc să-l demolăm. Partea provocatoare este crearea unei noi relaţii între clădire şi împrejurimile acesteia. Sunt convins că designul nostru reuşeşte acest lucru. Aştept cu nerăbdare să văd tineri şi pentru prima dată bătrâni urcând treptele de pe acoperiş!"[12]

5. Concluzii

Deşi practica de a utiliza şi refolosi clădiri existente şi a le adapta nevoilor actuale nu este nouă pentru omenire, totuşi astăzi, mai mult decât oricând, ar trebui să fim mai conştienţi de impactul asupra mediului pe care îl are nevoia noastră continuă de dezvoltare. Nu doar clădirile de patrimoniu ar trebui să fie subiectul acţiunilor de conservare sau reconversie, ci este necesar să integrăm în ţesutul construit contemporan şi obiectele de arhitectură ale secolului XX, considerate în mare parte până acum lipsite de valoare şi de interes din punct de vedere cultural. Totuşi, acestea fac parte din istoria noastră şi nu ar trebui să reprezinte un capitol pe care să îl ştergem din memoria colectivă, ci dimpotrivă, prin intermediul arhitecturii de calitate putem găsi echilibrul între prezent şi mărturiile trecutului.

Transformarea piramidei din Tirana demonstrează cele de mai sus prim modul în care o clădire poate fi potrivită pentru o nouă eră, păstrând în acelaşi timp istoria sa complexă şi demonstrează că edificiile brutaliste istorice sunt ideale pentru reutilizare. Proiectul îndeplineşte, de asemenea, o serie de obiective de dezvoltare durabilă conturate de Naţiunile Unite [13]. În loc să demoleze în mod risipitor structura, carcasa sa robustă din beton este adaptată în conformitate cu principiile economiei circulare. Acest principiu este dezvoltat în continuare în proiectarea treptelor exterioare, care utilizează plăcile de piatră care au împodobit iniţial faţada, ca agregat în noul beton.

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Smart cities development based on S4ALLCities project

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Abstract

The global urbanization that happens nowadays raises the need for cities to face new challenges, which can vary from the organization of its resources to the protection of its population. For short, today, cities around the world need to become smart.

A smart city is a technologically developed urban area that uses different technologies and synchronized IoT systems that collect data from its sensors and devices in order to keep track of the current situation. This data can help organize resources, energy, traffic, cyber or physical attack alerts on events with large or restricted audiences. The smart-city concept integrates information and communication technology (ICT) and a certain number of physical devices and sensors placed around the city and connected to the Internet of Things. This article aims to present the existing technologies offered by the S4ALLCities project, useful for the development of a smart city, which will be described during the following part of this article.

Keywords: *IoT, Cybersecurity, ICT, Digital Twins*.

1. Introduction

Today, more than 60% of the planet's population lives in cities, and the trend is growing, according to Statista's Degree of Urbanization by continent [2]. For this reason, the need for cities to face new challenges in terms of organization and security is growing alarmingly worldwide, especially in Europe [3]. This is triggering many initiatives around the world, from city councils to companies, all wanting one thing in common: to make the city smart. Although still considered work-in-progress, the Smart city concept continues to be increasingly mentioned and opted for today. Most cities are looking for intelligent solutions to optimise their functioning. This term involves the combination of innovative ideas that include improvements, in general, to existing technologies, all usually borrowing the same principles from each other. The technologies borrowed by all innovative ideas are those related to IoT, cybersecurity and ICT.

The increased advances in ICT must improve management and environment operations. As a result, the problems of smart cities are also becoming difficult due to the high speed of change. This leads to constantly updated technologies that bring about organisational changes. These can be improved by gathering personal information about people, using mobile applications and social networks. [5]

According to The Department for Business Innovation & Skills of the UK, it has been estimated since 2013 that in 2020 the global market for smart city solutions will reach $408 billion, representing approximately 24% of the global market. The actual amount reached in 2020 was $410.8 billion and is estimated to grow to $820.7 billion by 2025. [6] [7]. An important factor driving the global growth of the smart city market is the interest of authorities in platform manufacturers over smart solutions. The majority of shareholders opt to use their platform.

The Internet of Things is an ever-growing paradigm that allows electronic devices to communicate via the internet. The IoT aims to make lives easier by providing innovative solutions to various challenges or problems related to government, public or business situations. They represent the combination of a

variety of smart devices, sensors and frameworks, with the advantage of providing storage space and high processing speed. (Fig. 1)

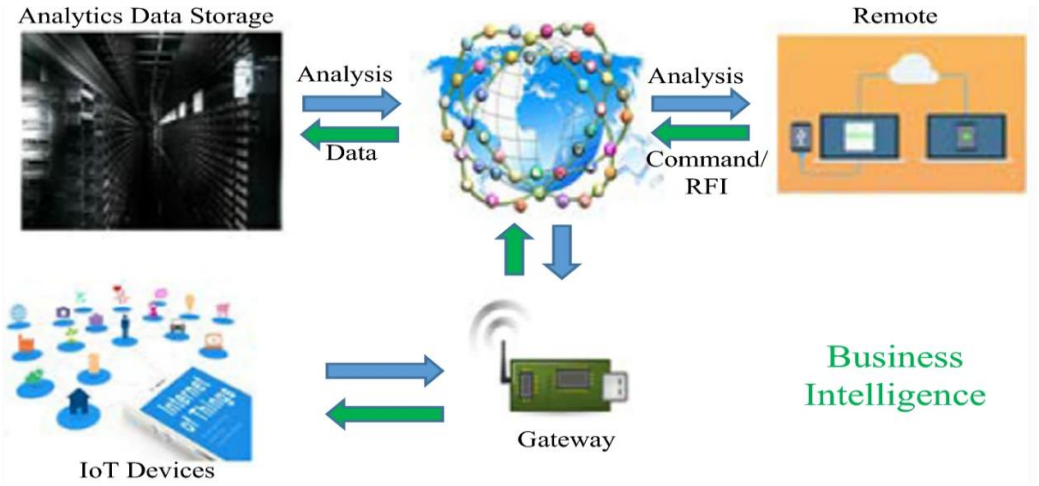

Fig. 1 General architecture of IoT
Source: [9]

IoT technology is the basis of the European Spaces Safety and Security for All Cities project, S4ALLCities for short, which aims to implement and assess cyber and physical security threat levels in smart cities via digitally augmented situational awareness. It is in continuous development and will focus on risk-based systems, dealing with security management, detecting suspicious activities, identifying illegal objects and real-time estimation of physical or cybernetic attacks from multiple locations, and providing countermeasures for crisis management. S4ALLCities will also play an important role in promoting the security of European cities.

2. Architecture

The S4ALLCities project aims to address the solution of smart cities optimization through modular subsystems, called digital twins, each of which contributes in a complementary way to the goal itself. These digital twins are specialized in real-time digital representation and machine understanding of processes and objects encountered in different open public spaces. (Fig. 2)

The Digital Twins are:

- Distributed Edge Computing IoT (DECIoT), which offers intelligent edge processing of measurements and sensors observations;
- Malicious Actions Information Detection Systems (MAIDS), which is responsible for machine detection and intelligent detection of suspect behavior;
- Augmented Context Management System (ACMS), responsible for information within a common operational picture and augmented reality.
- Thus, digital twins used together achieve high levels of awareness of possible risk situations in public spaces.

Fig. 2. Digital Twins
Source: [10]

The main objectives of the S4ALLCities project are:

- to develop an open platform aimed at information exchange and management, providing real-time situational awareness and decision support, thus increasing the resilience of European cities, while respecting the fundamental right of citizens to privacy;
- designing and developing an intelligent architecture for communication and interconnection of smart systems through IoT;
- completing smart city monitoring systems to improve preparedness and responsiveness in case of physical or cyberspace attacks.

3. Demonstrators

The S4ALLCities project will be validated in 3 European cities: Trikala (GR), Bilbao (ES) and Pilsen (CZ), where it will be installed and pilot tested for three months. Its benefits will be presented to stakeholders using different scenarios involving physical and cyber attacks on soft targets in the smart cities mentioned above. An example of a soft target could be public space, which is currently quite exposed to attacks of all forms. The demonstration events will showcase the effectiveness of the smart monitoring system by taking key measurements of city infrastructure (such as traffic, access to restricted areas, evacuation routes), detecting explosives, cyber-attacks and suspicious activity.

The pilot scenario in Trikala will focus on two important soft targets:

- the autonomous bus transportation;
- the park of Trikala;
- municipal buildings.

These two scenarios will demonstrate how the Digital Twins technology will handle the protection of crowds in public spaces or in autonomous bus transport infrastructure.

The Bilbao scenario will be based on detecting suspect behaviour, explosives and guidance of people to a safe place. This scenario is based on the 2017 terrorist attack in Cambrils when several pedestrians were attacked on the street by members of a terrorist organization. On the same day, 100km away, a van driven by another member drove into the crowd, killing 14 people and injuring many others. With the help of detection systems to be implemented, these grim scenarios can be prevented and stopped in time. [8]

The Malicious Actions Information Detection Systems will detect the anomalies and illicit behaviours of different individuals or groups of people in different crowded places situated in a high-risk area. The Augmented Context Management System will use the augmented reality technology to detect the explosives and suspected armed attackers. Furthermore, the early detection and protection of cyber-attack will be tested, its purpose being to avoid the loss of control over the information and systems involved in the scenario.

The demonstration in Pilsen will have insight into the evacuation of the football stadium. It can hold up to 15000 people, and if the surroundings, including a pedestrian zone, park and bus terminal, are taken into consideration, the number can be much more.

The scenario focuses on managing a crisis situation at the stadium in case of a terrorist attack or a leak of toxic ammonia gases from the neighbouring brewery. Its main purpose being the evacuation in safet of the people from the stadium and its neighbouring.

Another data collection method that will be further implemented in the S4ALLCities project is fibre optic networks for communications, which are already in large numbers in urbanised cities.

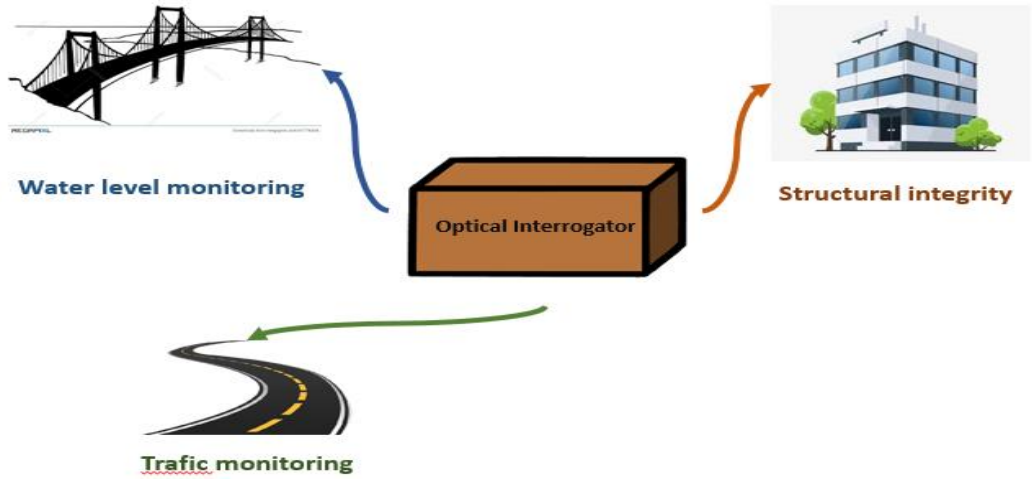

Fig. 3. Data collection using FBG

These can transmit various low data optical signals from various deployed sensors, which are positioned in locations with critical infrastructure. The sensors

will be Fibre Bragg Grating (FBG) sensors, which exhibit high accuracy at a low cost. (Fig. 3)

This System of the Systems aims to achieve a TRL-7 by the end of the project, showing the S4ALLCities functionality to the relevant end-users and stakeholders. [10]

4. Conclusions

At the conclusion of this paper, Smart Cities face difficulties due to far too rapid changes. The S4ALLCITIES project, through its solution, optimizes solutions through modular systems or, as they are also called, digital twins. These digital twins help determine possible risks in public spaces in the city. They will be validated for three months in three European cities: Trikala (GR), Bilbao (ES) and Pilsin (CZ). They will measure the city's infrastructure, such as traffic, access to restricted areas, detect possible explosions, cyber-attacks that may occur or suspicious activity.

Acknowledgements

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Reducing city household water consumption with internet of things devices

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Abstract

This research aims to prove that inexpensive Internet of Things devices can be used to monitor domestic water consumption, thus lowering water usage, educating consumers about better water habits and preventing or detecting leaks. Such devices can also expose their information to the local water utility company, which can then use these data points in their decision-making.

This paper is built on direct experience and research with Home Assistant, a free and open-source Internet of Things device management system, which allows for detailed statistics to be compiled at database level about water consumption, including the effects of optimizing daily usage.

The main method employed was a case study comparing household water consumption before and after sensors and valves were implemented, with 4 stages: 1 - no sensor info, 2 - with sensors but no changes made to habits, 3 - sensor info analysis, 4 - changes made to habits based on the previous analysis, 5 - before/after result comparison.

Key results included: 20% water consumption reduction after daily habit changes; broken pipe smartphone notification while residents were away, alongside automatic water closure to the household; detection of leaks which were too small to be visible at water meter level, but nevertheless existed.

Implications of the study for smart city practitioners are that even inexpensive water sensors and valves can significantly reduce water usage and prevent incidents, quickly paying for themselves and allowing for a more sustainable level of water consumption at city level.

The value of this paper is that it shows how a combination of off-the-shelf sensors and valves and free software can be used at household or even city level to bring intelligent water management to communities which might be suffering from the effects of climate change or other causes of water scarcity.

Keywords: *IoT, Water Management, Home Assistant*.

1. Introduction

The growth in the number of inhabitants of urban environments requires measures which can ensure needed energy, water and food. An urban area that allows sustainable economic growth and provides high quality of life in essential areas, such as the environment, mobility, the economy and governance, can be called a smart city.

A smart city needs the foundation provided by an infrastructure based on standards for Information Technology, this aspect supporting a large array of requirements and being adaptable to new technology, such as advanced Internet of Things sensors, analysis and measurement instruments and solutions led by machine learning and artificial intelligence (Camero, 2019; Costache et al, 2020).

Building a smart city is a gigantic task, because of the multiple structural issues and components involved. Building such an urban space from the ground up is difficult, albeit not impossible, as has been proven by cities like Songdo – Korea or Neom – Saudi Arabia (https://www.kpf.com/projects/new-songdo-city; https://www.neom.com/en-us/regions/ whatistheline).

Obviously, other, existing cities, which we may call "traditional cities" have also reached certain targets proposed by the concept of a smart city. Most of their achievements have had to do with transportation or carbon emissions management (Singapore, Dubai, Oslo, Copenhagen, etc.).

The current challenge is in transforming classic cities into smart cities.

Intelligent development of a city is a process which is constantly evolving, with transformations taking place at a slower or quicker pace depending on the volume of investment and legislation created in this sense. Standardization of measures and techniques being applied in development and increase of intelligence of component systems of cities can lead to their eventual interconnection (ISO/TR 37150:2014; ISO/TS 37151:2015).

The European Commission defines the concept of a smart city as "a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business. A smart city goes beyond the use of ICT for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply and waste disposal facilities and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an ageing population" (https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en).

There are also alternatives to the "smart city" concept, such as the Japanese "smart community" (Japan Smart Community Alliance Smart Community Development - available online: https://www.smartjapan.org/english/). Analyzing the definition of this notion we realize that there are many similar points being made: "A smart community is a community where various next-generation technologies and advanced social systems are effectively integrated and utilized, including the efficient use of energy, utilization of heat and unused energy sources, improvement of local transportation systems and transformation of the everyday lives of citizens".

As part of smart cities, smart water systems employ IoT-enabled sensors to collate real-time data. With precise and reliable data, smart water systems can drive great transformations in water sector transparency and accountability (https://www.hitachi.eu/en-gb/social-innovationstories/communities/smart-water-smart-cities; Hope et al., 2011).

Smart water metering refers to a system that measures water consumption or abstraction and communicates that information in an automated fashion for monitoring and billing purposes.

Smart meters differ from conventional meters in that they measure consumption in greater detail and transmit that information back to the service provider without the need for manual readings (Ng, K. S., et al., 2017).

Smart metering systems can be configured in many ways, and when broadly defined, the term includes both Automated Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) systems. AMR refers to any system that allows automated collection of meter reads (usually by radio transmission), without the need for physical inspection. AMI is used to describe a system that involves two-way communication with a water meter. Smart water metering is experiencing strong growth throughout the industrialized world with annual growth projections varying between 8% and 13% until 2016 (Hope et al., 2011).

Most researchers present macro-structural approaches of the smart city and smart water concepts. Our research, however, wishes to highlight a micro approach, of one of the components of a smart water system.

Although water loss can be attributed to a variety of reasons, pipeline leakage is the main cause of world water loss, about 48.6 billion cubic meters (Thornton, R. Stunn and G. Kunkel, 2008).

Many studies have suggested automated intelligent methods to detect and predict leaks to reduce the workload of human detectors.

The chosen approach allows for a better understanding of the concept, as well as horizontal integration of the mechanisms needed for large-scale implementation. Not least, reducing water waste generates lower costs, protection of water resources and creates the premise for sustainable growth.

2. Methodology

This case study used a combination of open-source software (Home Assistant) and off-the-shelf hardware in order to create a water-monitoring and alerting solution that can be made available to any user, even though initial setup is relatively technical.

An important aspect, is that, although some IT technical knowledge is required, this approach can be implemented without requiring any structural changes to the home's water system.

2.1. Case study hardware setup

For this case study there were several aspects to be considered at hardware level:

1) Water consumption monitoring, which would enable data points that could be used for habit modification, as well as provide abnormal consumption information that could be used for detecting leaks that would not yet be considered an actual flood.

For this there are online providers of devices that clamp on to water meters (Figure 1), record the consumption and transmit it via Wi-Fi and an open API to a receiver. In this case, a Home Assistant server.

Fig. 1. Example Water Meter Monitoring Kit setup
Source: www.watermeterkit.nl

2) Leak detection in the case of sudden in-house pipe ruptures which could cause extensive damage to property.

For this use case Zigbee flood sensors are an effective solution, as the low-power Zigbee radio enables 12+ months of constant wireless operation with just one Li-Ion battery (Figure 2).

Fig. 2. Zigbee Flood Sensor
Source: www.xiaomi.com

They are also the lowest-cost sensors on the market, which would enable more of them to be placed within the household, depending on the number of areas which need to be protected.

Once the sensor detects water on the house or apartment floor, it can send a Telegram notification to the users, as well as initiate mitigation via an automation.

3) A flood mitigation system, which can be activated automatically via a flood sensor. The extent of this system depends on the number of areas in the household which would need to be protected. It can typically be installed either at each tap in the household, or just made to stop the water supply outside the household, thus shutting water off completely, regardless of the area in which the leak is occurring.

The system relies on a leak sensor, which starts a software automation in the Home Assistant server that can trigger a smart power plug, which can be set to turn on and thus shut off water via a 220V solenoid valve connected to the water pipe (Figure 3). This system is fully "local", which means that even with Internet access down, the automation will run and the solenoid valve (Figure 4) will protect the household from a leak (as long as electric power is still functioning).

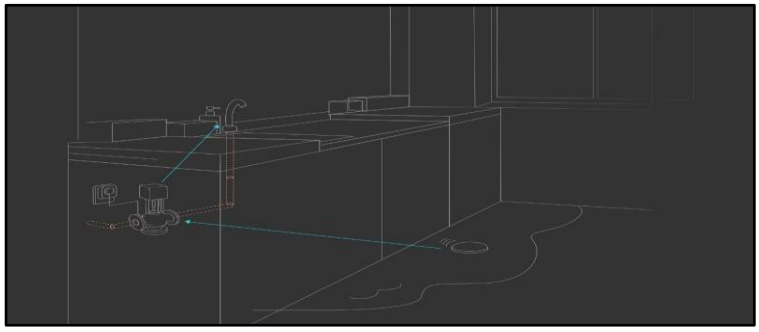

Fig. 3. Water leak detection system
Source: www.xiaomi.com

This approach eliminates two major drawbacks that such systems that are connected to the "cloud" have, namely that lack of Internet access can cause the automation not to run and that if the provider of the hardware has a business reason to turn off their cloud servers (such as a re-focus on other products or even bankruptcy), the system can still run indefinitely. Notifications of a leak sent to a user's phone are still dependent on the existence of household Internet access, though.

The smart plug can be connected via Zigbee radio, much like the leak sensor, but since constantly powered devices don't have the same low-power needs as battery-powered sensors, a Wi-Fi smart plug (Figure 5) can be considered as a more cost-effective device for such uses.

It would however add another point of failure to the system (the Wi-Fi router to which the plug would connect), so depending on the stability of Wi-Fi in the target household, Zigbee might be preferable.

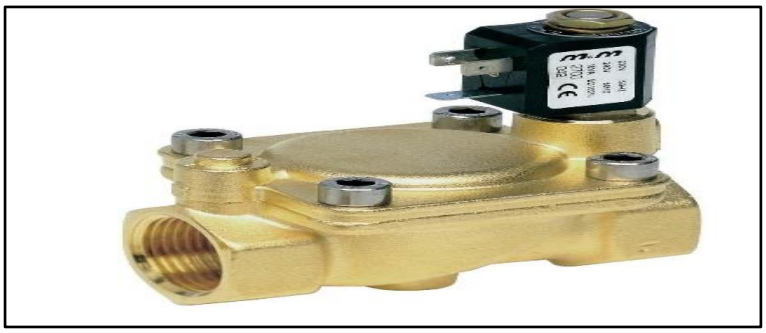

Fig. 4. 220V solenoid valve for shutting off water supply
Source: www.fluid24.eu

Fig. 5. Wi-Fi Smart Plug
Source: www.xiaomi.com

4) The smart home server that acts as a controlling hub for all the other devices.

Home Assistant is open-source software that can run on everything from a low-power Raspberry Pi device to a virtual machine on a multi-purpose server, but for this case study the choice was made to use first-party hardware, the Home Assistant Yellow device (Figure 6).

Fig. 6. Home Assistant Yellow smart home server
Source: www.home-assistant.io

This choice allowed for maximum flexibility and cost-savings compared to a more traditional server setup, as the Zigbee radio module included on the motherboard can connect to Zigbee devices from any brand (as opposed to other such radios, like the one included in the Xiaomi Aqara gateway, which are limited to the manufacturer's own-brand devices).

The Home Assistant Yellow also features built-in support for the future Matter wireless standard, which promises to unite multiple disparate Internet of Things standards into a common one.

Also, the usage of a Raspberry Pi Compute Model 4 as the main processing hardware in the unit allows for future upgrades as new modules become available and household needs increase.

The presence of wired Gigabit Ethernet instead of Wi-Fi also ensures that the server is constantly connected to the home network and the Internet with minimum latency, which is a very desirable feature in a system that is supposed to send critical notifications to the users.

2.2. Case study software setup

In terms of software setup, the Home Assistant server has a custom Linux-based operating system, with many configurable options.

This allows for data to be collected from any sensor in the home and that data can trigger automations, which are coded in YAML. By using such a standard Markup language, automations can be shared between user communities, with only the affected sensor entities needing to be changed, as they pertain to each household's setup.

The code below is such an example, which takes the data from a flood sensor and sends the user a Telegram notification when the sensor indicates the presence of water (Figure 7):

```yaml
- alias: Small Bathroom Flooded Florin
  initial_state: 'on'
  trigger:
    platform: state
    entity_id: binary_sensor.small_bathroom_flood_sensor
    to: 'on'
  action:
  - delay:
      seconds: 7
  - service: notify.telegram_florin
    data:
      title: FLOOD
      message: Your small bathroom is being flooded!
```

Fig. 7. Setup for flood notifications to phone via Telegram
Source: Author's personal server

Sensor data can also be used for graphing purposes, showing trends that can be helpful for user habit modification, as well as abnormal longer-term usage which can highlight hidden problems with the water system.

3. Results

3.1. Water consumption results

After viewing real-time data about household water consumption, especially during water-intensive activities like showers, laundry & outdoor watering, a decision was made to limit this consumption, by:

- adding weather information to the Home Assistant server in order to prevent automatic outdoor watering on rainy days
- making sure the washing machine is always running at full load instead of performing more cycles (which also led to a decrease in power consumption)
- adding a bathroom smart speaker notification when showers exceeded a certain number of minutes

The results of this habit modification are presented in Table 1.

Table 1. Household water consumption for Q2 2021 (post-sensor install) & Q3 2021 (post-habit modification)

Month	04.2021	05.2021	06.2021	07.2021	08.2021	09.2021
Consumption (m^3)	10	11	11	9	9	8

Source: Author's personal household water consumption data

3.2. Disaster prevention results

During the case study period, the water measurement sensors set up at building and apartment level exposed two issues:

- Light water consumption at apartment level with all inside taps shut & central heating off, which was revealed to be caused by an in-wall pipe which had burst and was slowly leaking water into the wall (also leading to the appearance of mold in a non-directly visible part of the apartment).
- Heavy water consumption at building level, which was due to a crack in the main underground pipe leading to the building (Figure 9). Because this issue was between the outdoor water source and the apartment water meters, it would have been undetectable at apartment water meter level, as the soil was absorbing all the excess water. It was however detected by the outdoor water meter sensor, which showed abnormally high water consumption via the daily history graph in Home Assistant, thus enabling rapid fixing of the problem.

Fig. 8. Outdoor main building water pipe rupture
Source: Author's personal household

4. Discussions

4.1 Applicability

The water pipeline leakage detection device is able to monitor the water pipeline 24/7 without the presence of a human leak detector.

The relative low cost (starting at 250 EUR and increasing depending on the number of areas which need to be monitored) of the system in the case study can allow for scaling at neighborhood or even city level. Compared with other leak analysis methods such as the μPAD system for colorimetry, it is technically simple to implement (Zodidi G. et al., 2011).

The presence of an open API also allows for the data to be shared to interested parties, although privacy considerations do need to be made. For example, Mashford et al. uses the Support Vector Machine (SVM) to classify the data in the EPANET hydraulic modeling system to improve water leak prediction (J. Mashford, et al., 2009). Leu et al. used the Bayesian learning process to optimize the water leak prediction accuracy (S. Leu and Q. Bui, 2016.).

4.2. Limitations of case study

This case study was performed on a single household & multiple-apartment building, with a constant power supply and reliable Internet.

In areas where either power or Internet access (or both) are intermittent, for maximum reliability of the system there would need to be further investment in hardware like an uninterruptible power supply for the server and a failover Internet connection via the mobile network. This would ensure that even in the event of a power or Internet outage, the user would at least get a notification of the problem.

5. Conclusions

Leaks in water pipes are a major problem of many cities at present. Not only do they waste valuable natural resources, they also create huge economic losses.

The main conclusion that can be drawn from the case study is that, with minimum investment, not only can flooding disasters be prevented, but water consumption can be significantly decreased without noticeable effects on quality of life or major changes in lifestyle.

Decreases of 20-28% in household water consumption as recorded here would have huge effects at global level and cities like Las Vegas or Cape Town have shown that, when dealing with water scarcity, even heavy-consuming users can be helped and convinced to change habits and use water in more efficient ways.

Sensor data can also be provided via an open API to water utility companies, which can use this information to forecast trends in water consumption, as well as take action if multiple consecutive days of unusual consumption are detected, which would be an indicator that the user is not present during an incident and should trigger a valve shut-off by the water utility company.

Overall, such systems are already under increasing use, with even DIY solutions like Home Assistant featuring more than 500.000 users across most countries worldwide.

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Smart consumption behavior? An approach related to fast fashion industry

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Abstract

Objectives: *Given that the growing phenomenon of fast fashion has become an integral part of the daily life of individuals, it is imperative to analyze this industry from a consumer` point of view. This article points out the industry's ability to shape consumer behavior, raising several questions about the moral grounds practiced within the community while emphasizing the competitiveness that retailers have managed to create among buyers, which currently has a significant impact on individuals and ecosystems.*

Prior work: *Considering the lack of studies in relation with creative industries in Romania, our research, based on the concept of behavioral economics, investigates the irrational conduct of the consumer by breaking down the underlying decisions behind it.*

Approach: *To conduct the analysis, qualitative research methods were used by applying a survey for 88 respondents located in Romania to observe the consumers' perception on how fast fashion impacts the environment and local businesses. The decision to follow this methodology is based on a differentiated approach, in which the scope is rather an exploratory one.*

Results: *Regarding the results, a profile of the Romanian fast fashion consumer was outlined, based on which one can observe the awareness degree of the industry's negative externalities, consumption habits as well as the desire to be part of a smart society.*

Implications: *This research can be considered useful by companies operating in the field, as it can serve as market research.*

Value: *By exploring one of the main attributes of fast fashion industry success`, namely its ability to be a part of the daily life of consumers and simultaneously shape it, this paper aims to fill in the gaps in the literature given that the presence of empirical data on the profile of the Romanian fast fashion consumer is limited.*

Keywords: *behavioral economics, smart decisions, creative industries*.

1. Introduction

Fashion may be catalogued as one of the most complicated concepts related to social behavior as consumers actively choose to buy fashion items for what they mean rather than for their practical utility [1]. Fast fashion is currently a social and cultural phenomenon with a significant impact on the economy and the environment, succeeding in shaping consumers' behaviors and the way they think through the specific business model [2]. The fast fashion industry focuses on the rapid production of large volumes of clothing and more. Within it, all the processes related to the textile industry, from the creation of a design to their production and marketing stages are conducted in a much shorter time to allow the launch of 52 micro-collections per year instead of the 4 classic collections [3]. The fast fashion industry is based on replicating the trends promoted by the big fashion houses by creating garments from inferior quality materials.

It is a movement that has significantly increased consumerism and has negative effects on the environment, garment employees and, ultimately, on consumer wallets. Currently the fast fashion industry seems to be portrayed as exactly the opposite of what some authors would define as a circular economy because it does not maximize the service that its material flows offer and does not limit these flows to what nature can withstand [4]. Others defined fast fashion as a business model based on "giving buyers frequent novelty in the form of low priced, trend led products" [5]. Following the trend of retailers like Inditex, starting from the 1990, more and more companies decided to outsource production to low-income countries from Asia and later, Eastern Europe, thus enabling the fast fashion model. This has led to a geographical separation through subcontractors, thus alienating the social and environmental cost from buyers. In addition to this aspect, fast fashion determined the total fiber production to double in less than 20 years, meaning that on a per capita basis, the figure rose with 47% from 2000 to 2015 [6].

Globally, clothing consumption increased from 74.3 billion items of clothing and footwear in 2005 to 130.6 billion items purchased in 2019 [7]. This means that every person on the planet bought on average, 15 clothes and 2 pairs of shoes annually, although consumption patterns vary between countries. With such a rate of increase in consumption, considering the increase in living standards in emerging economies and the birth rate globally we can expect a tripling of textile and footwear production by 2050 [8]. It is estimated that every year an American throw away about 38 [9] kilograms of clothes while at European level 26 kilograms of textiles are used and about 11 are thrown away [10]. Less than 30% of what we wear is donated worldwide, although at every corner, in almost any country we can find thrift stores. By 2030, it is estimated that we will dispose of 134 million tons of textiles annually and only 12% of the clothing used will be recycled.

1.1. How much more the environment can take?

Fast fashion is seen by some authors [11] as a global environmental justice issue. In terms of ecosystems, the fast fashion industry destroys wildlife and threatens endangered species, using 115 million animals annually. One of the

underlying issues is how these clothes are produced. The current system uses huge volumes of non-renewable resources, including oil and once discarded, the clothes end up being burned or lying in landfills. It is a system that puts pressure on the earth's natural resources, contaminates water and degrades ecosystems.

Globally, the garment industry is responsible for 10% of greenhouse gas emissions, with estimates showing that textile production releases 1.2 billion tons of greenhouse gases into the atmosphere annually. The amount of water used in the production process is responsible for 20% of global wastewater. For example, to make a pair of jeans you need at least one kilogram of cotton that needs about 7,500-10,000 liters of water, which is the amount of drinking water for a person for 10 years. Although there are currently ways to significantly reduce the amount of water used in cotton processing, polymeric synthetic polyester is the most widely used fabric in the industry, with 65% of clothing used globally based on polymers. To produce polyester fibers, 70 million barrels of oil are needed, a material that is easy to clean, cheap and most importantly for consumers, durable. However, it should be noted that a T-shirt or polyester fiber shirt has a double carbon footprint compared to a cotton one, producing the equivalent of 5.5 kg of carbon compared to 2.1 kg for a cotton shirt. Every time someone washes a garment made of synthetic fibers, especially polyester, up to 700,000 microfibers can be released that contain micro-plastic particles that are too small to be trapped by the conventional water treatment system and end up in rivers, lakes, and oceans. As a result, the textile industry is currently the largest source of microplastic pollution, with such particles being detected even in the deepest areas of the oceans [12]. It is an alarming problem, but only 20% of brands make public the actions taken by the company to minimize the problem.

1.2. My brand, my religion

Although the literature has not yet addressed the dilemma, there are current issues within our society related to the idolatrization of some brands, where shopping goes beyond the status of hobby and is perceived rather as a religion, just as one of our respondents very well captured this aspect by saying "Some believe in a brand as in a religion." If 20-30 years ago, the malls were not open on Sundays, this being considered a day spent with the family, or at church, where I could reflect or meditate, this is no longer valid. Some even believe that it is time to modernize and redefine what we mean by religion, which is also perceived as a subcategory of human activities [13]. Smith, however, believes that every activity, if performed in a ritualistic way, either at the community or individualist level, can be considered a religion [14]. Brand idolization is marginally approached by academics, but recent literature points out that brands have shifted almost imperceptibly, focusing on existing customers rather than attracting a new wave [15]. Thus, the consumer attitude varied from commitment and loyalty in the early stages to deeper connection with the brand such as attachment, love [16] and the most powerful yet toxic one – addiction [17]. Fast fashion consumers immediately want the items, so companies are forced to put pressure on the delivery time specific to the supply

chain. Because of the demand for fast supply, the resulting product is poor in quality. The life of clothes produced in fast fashion is measured in the number of washes they withstand; the average being located somewhere at 10 wash cycles. Now the quality of some fast fashion stores is so poor that we can talk about disposable clothes, which will not withstand more than 2-3 washes without degrading, but which still has a high chance of being sold because the consumer will choose the store that offers the fastest product at the lowest price. By simply replicating fashion trends, fast fashion giants can create new styles on a weekly, if not daily basis, generating massive amounts of different clothes and designs, thus ensuring that people will always return to buy more. It is observed that accelerating the process of developing a product and launching it on the market in a shorter time increases the consumer's responsiveness, which translates into higher profit margins for retailers. This decreases the consumer's inclination to anticipate and expect future discounts, a behavior that stimulates the customer to buy instantly. The immediate response of the consumer to purchase as soon as a micro-collection appears decreases the need to use discounts to get rid of stocks for retailers, while the pleasant design of the clothes further increases the usefulness of buying the product at a full price [18].

The strategy associated with the fast fashion industry, which requires a rapid rotation of stocks by implementing a short manufacturing cycle and a limited supply has induced the perception of rarity in the eyes of consumers. Moreover, some studies suggest that the social overcrowding in stores, as well as the way clothes are arranged in the store can induce a competitive spirit among customers, while an apparent "disorder" in the store could lead consumers to believe that there are promotions, unconsciously inducing the element of rarity to individuals [19]. It has been shown that this competitiveness leads to impulsiveness in purchasing, as well as strong desires for possession that arise from the psychological need of the consumer to regain his freedom to make a choice [20]. This competition and the need to hide products in the store during a shopping session can be explained by reactance theory, which talks about an individual's reaction to the apparent loss of freedom. Therefore, it explains that when an individual's freedom is threatened or denied, one will experience a psychological reaction, a motivational state aimed at protecting a person's behavioral freedom, a motivation that increases the attractiveness of the denied behavior. The seemingly limited availability of a product can trigger such a reaction from consumers, leading them to buy or reserve items they may not really want.

Even though the consumer is the central piece of the fashion industry, the literature remained relatively limited in analyzing the buyers' perspectives on fast fashion retailers [21,22,23].

2. Results

Participant characteristics

The questionnaire was completed by 88 respondents. Most participants were women (85.2%), 13.6% identified themselves as males while 1.1% preferred not to disclose their gender. 62.5% were between the ages of 16 and 24, while 27.3% had

an age between 25 and 40. Giving that a vast majority of the respondents are still in their twenties, 40.9%, respectively 37.5% had a bachelor and master's degrees, with only 4.5% of the respondents being graduates of postgraduate studies. Looking at the amount of money the respondents are willing to spend on fashion items per year, the results are well balanced, 26.1% spending between 600 and 900 RON, followed by 19.3% of the respondents that choose to spend between 900 and 1201 RON, respectively above 1500 RON.

As we can see from the chart below, a majority of 68.2% have heard at least about the concept of fast fashion, although almost 24% do not know exactly what it means. Unfortunately, those 24% do not differ from those over 30% who have never heard of fast fashion, as the tragic impact of this industry remains foreign to them. So, we see that less than half of those interviewed are aware of the negative effects of the fast fashion industry on the economy and the environment, but we must keep in mind that this does not mean that they would like to take concrete steps to change the current situation in the garment industry.

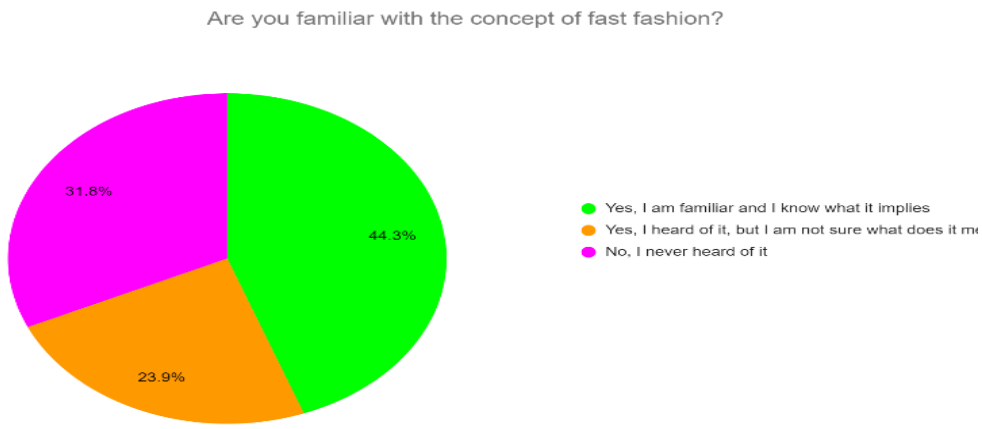

Fig 1. Are you familiar with the concept of fast fashion?

Over 50% of those interviewed declared they buy clothes several times a year, but a solid 25% purchase their clothes every month and over 10% even a few times a month. Although the figures do not seem worrying, the questionnaire was applied to a small number of people, but the global data looks different. Scaling the problem worldwide, the fashion industry makes 80 billion items annually, which means that every man on the planet could own 10 items of clothing, thus producing 400% more than 20 years ago. If we refer only to clothing, the world retail market amounts to 1.34 trillion dollars per year, but if we include footwear and jewelry, it amounts to two trillion. Out of 88 people, 60 said they bought clothes they had never worn. The justification for this behavior calls into question the motivations and behaviors of consumers who denote that clothing is often bought based on a fantasy that individuals have about themselves, buying things for a projection of their own person they aspire to, imagining more what they will be in the future rather than

what they are now. It has been shown that there is no physiological or psychological limit to the amount of clothing that people are willing to buy.

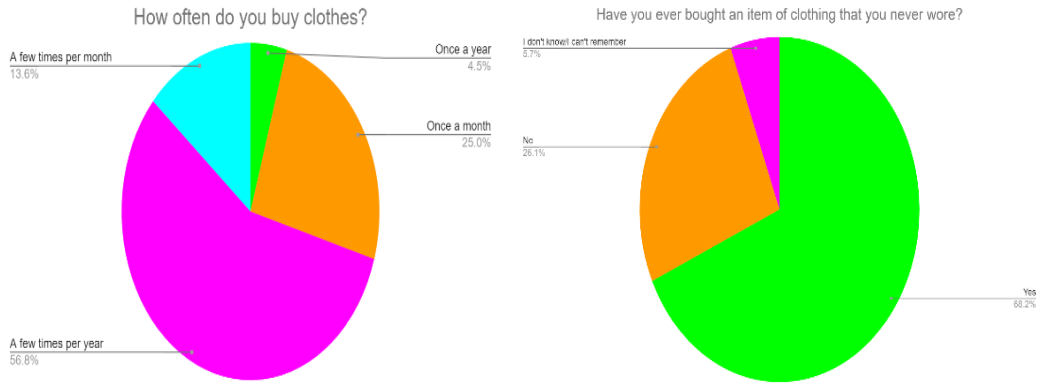

Fig. 2. a.How often do you buy new clothes? b. Have you ever bought an item of clothing that you never wore

For consumers, the quality and durability of materials is the most important thing, as can be seen from the chart below. Today's consumer wants quality items that are made without harming animals, that are not harmful to the environment and that do not use toxic substances. The fashion industry offers the exact opposite. We see that 68 people chose the strength of clothing as a basic criterion, followed by the absence of harmful chemicals in fabrics. 43 people were motivated by a low price and only 10 respondents prefer locally made products. 40 and 36 individuals, respectively, showed interest in animal and environmental safety, while only 25 were interested in worker safety when purchasing clothing. Surprisingly, only 9 people choose clothes that correspond to social media trends.

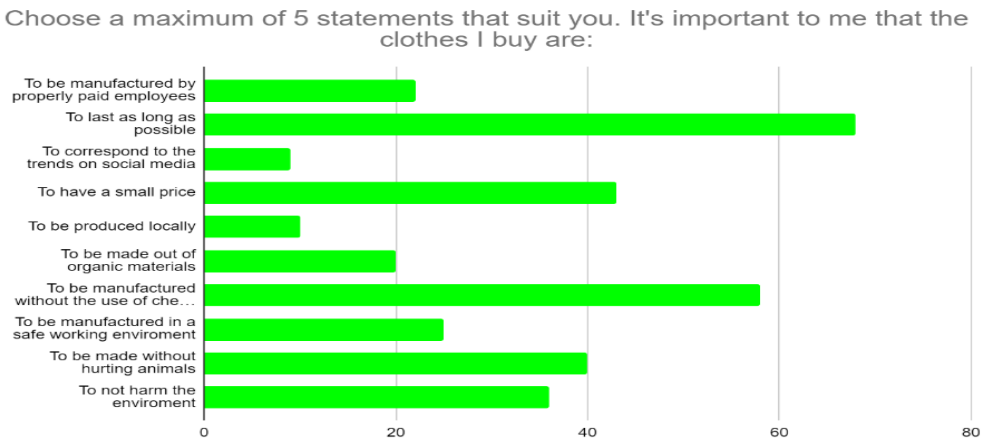

Fig. 3. It is important to me that the clothes I buy are.

2.1. An uneducated consumer is not a smart consumer

Once again, we see from the chart below that price remains the most important criteria in choosing stores, and the style that the brand promotes ends up taking precedence over quality, in the context in which stores that produce clothes for certain generations are above quality. superior offered. Another paradox that must be emphasized is the dwindling number of people aware that they frequent certain stores because they reproduce clothing items of the big fashion houses. The concept of the Zara store, for example, based its production for an exceedingly long time on copying the great fashion designers and on anticipating the style they were going to promote. Even today, they continue to be followers and not trendsetters, but we tend to believe that the younger generation, which includes the second half of Millennials and the entire Gen Z, misses this aspect. The familiarization of the Z generation with social media platforms from a noticeably early age has created a completely different environment that changes their perception as a consumer, changing the paradigms regarding consumerism. It is a subtle manipulation of large retailers, which offer illusions and feed on the human need to achieve a social status.

Strictly related to the Romanian market, 8 people consider that there are no Romanian products on the market and 6 people believe that local brands are more expensive. Both answers are true. The Romanian clothing market is still mainly based on exports, and most Romanian clothes that remain in the country are affiliated with fashion designers, larger or smaller, but which automatically sets a price well above the market bench.

Fig 4. Why do you shop from fast fashion stores most often?

Only 3 out of 88 people identify perfectly with the statement "You feel compelled by society to dress a certain way," even though previously they declared they did not feel forced by their friends to frequent certain stores. Although the answer options were integrated into different questions and formulated in different

forms, the message remained the same, namely whether individuals feel constrained by society and indirectly by their friends to dress in a certain way. Friends create the society we belong to, as evidenced by the very definition of society "Group of people who spend some time together; companionship, company." The reality is that society is represented by each of us, and the circle of friends who force each other to take certain actions, as was the case, is part of the society we blame and accuse of lack of responsibility and cruelty to the environment.

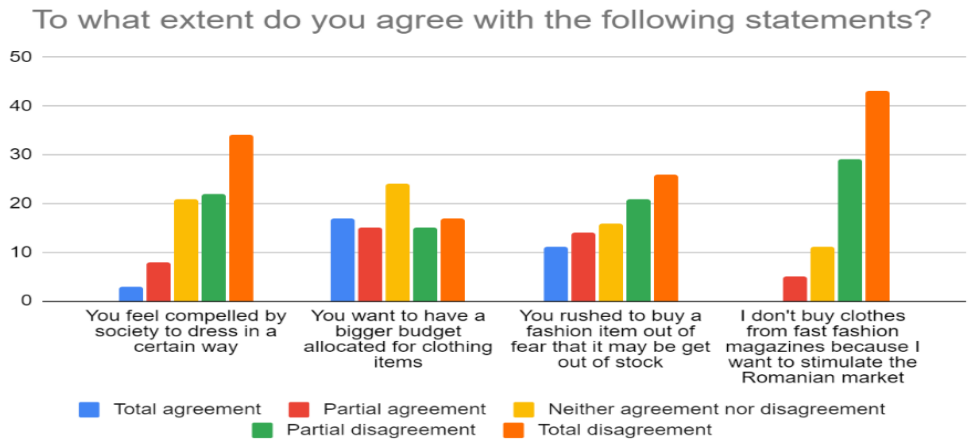

Fig. 5. To what extent do you agree with the following statements?

Asked if they would like a bigger budget for shopping, 17 people completely agreed to this statement, while another 17 completely disagreed, most giving a balanced answer. Now there is a conflict between people who choose to buy less and buy better, and people who continue to take advantage of the low prices of fast fashion retailers, which balances the dynamics of the results. What is certain is that we are already consuming more than we should. The answers show that Romanians are more temperate when it comes to shopping for clothes, as only 11 people admit that they hurried to buy an item of clothing, just out of fear of running out of stock, while 26 people did not identified at all with this statement. Instead, no one completely identified with the statement "I do not buy clothing from fast fashion stores because I want to stimulate the textile industry in Romania", 43 people being in total disagreement, and another 29 in a partial one. This, as we have seen before, we can motivate by the absence of textile factories in the country. The Romanian textile industry has lost 150,000 jobs from 2008 till now and remains heavily dependent on exports. If we do not consider undeclared work, 175,000 tailors and shoemakers officially work in Romania, making clothes and slippers for Zara, H&M, Moncler or Buerberry. It is an industry that produces approximately 2% of GDP and houses 4% of Romanian employees.

38 people agreed partially about the statement "I would like to know how my clothes were made", while the rest of the statements on environmental policies and

the improvement of diversity were fully embraced by the respondents. A behavior like this minimizes the possibility of brands to greenwash their customers, a real malpractice of fast fashion companies in the face of the environment that invokes the climate crisis as a means of marketing, but without pursuing a fundamental change in its business model. Therefore, one can observe that a more informed customer will have more power over brands; as Amancio Ortega, the founder of ZARA, once declared, the customer has always been the one to dictate the business model, so the initiative must belong to consumers and force brands to become sustainable. However, there is also another issue here represented by the current gap in legislation and terminology as sustainability is not defined in clear, quantifiable parameters, and notions of ethics and ecology are powerless in the courts when it comes to the garment industry, which encourages a lack of commitment. Another hurdle is the lack of empirical data, which in turn leads to a lack of public education and an insufficient level of awareness of industry practices, allowing brands to increase their sales on false information.

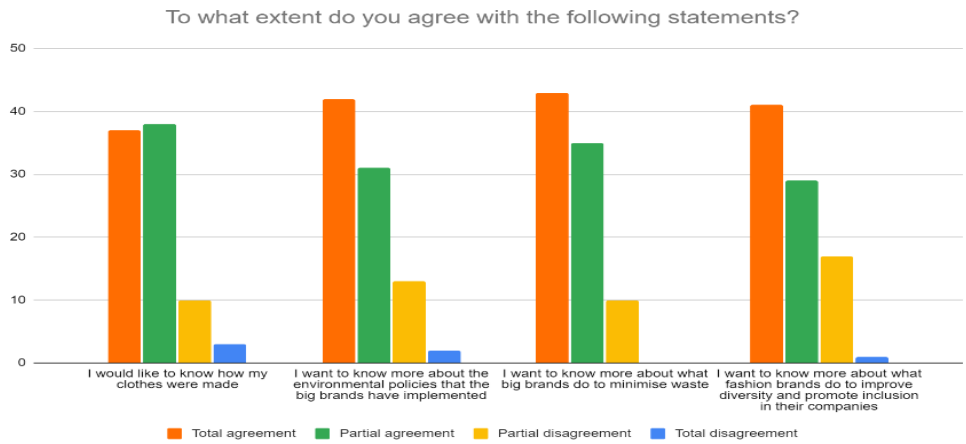

Fig. 6. To what extent do you agree with the following statements?

Analyzing our results, the impact that the fast fashion industry has on consumers is not perfectly clear to them as 33% declared that there is some impact, while 30% consider that they do not think they are affected, and 13.6% simply do not know. In such scenarios we feel it is imperative to mention that fast fashion implies a crippling degree of consumer involvement, as they do not have a strong motivation to process the information provided or to understand the advertisements. For retailers, however, this disinterest can be a disadvantage because greater efforts must be made to build the product, and the chances of launching products fail on the market increase. Asked to give concrete examples of how they feel the negative impact of the industry, 30 people admitted that they feel compelled to spend more money than they can afford on clothing, while another 17 do not feel "fashionable" if not he dresses from certain stores. Hence the stigma, one of the current issues of the young generation, from which derives another

underlying problem, bullying. When a young person does not allow himself to follow the trends of social media and those of their friends, he will be marginalized and later excluded from the community. Indirectly, the fast fashion industry changes the behavior of consumers, urging them to judge and accept people not for their value, but for the way they look. Even one of the respondents stated that "*most of the fast fashion clothes are for people with a certain body that I don't even fit in, so in fact very rarely are fast fashion products accessible to me*", while another person stated that she is concerned about the quality of the products and how much they are treated with chemicals.

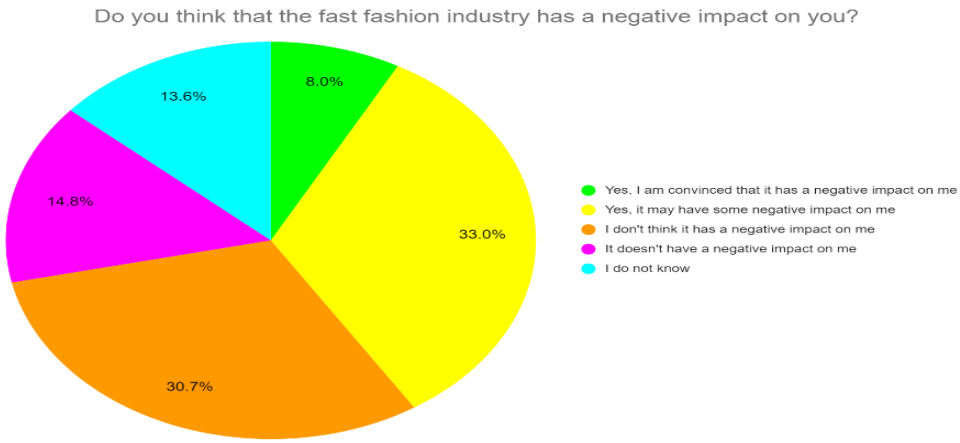

Fig 7. Do you think that the fast fashion industry has a negative impact on you?

Although 34% believe that the fast fashion industry has contributed to reducing unemployment in Romania, 22.7% have failed to notice any improvement from this industry. However, the only positive aspect are the jobs created by opening numerous branches of large retailers throughout the country. It is a temporary benefit that does not support the Romanian economy in the long run. Characterized by a cheap and experienced workforce in the field, the Romanian clothing market remains the largest exporter of clothing in Central and Eastern Europe, being easily integrated into the supply chains of Western European companies, particularly for Spain, Italy, France, Germany, and Belgium [24]. Although Romanians pay hundreds and even thousands of lei for foreign brands such as Asos, Benetton, Dolce Gabbana, Esprit, Hugo Boss, Levi Strauss, Marks & Spencer, and Armani, they are made in Romanian factories.

The biggest problem regards wages, which, although illegal, are often below the minimum wage in the economy. Many workers say they must borrow from banks or other creditors at high interest rates to cover their living costs, such as heating their homes in the winter or paying for their medical treatment. The sad alternative to this situation is subsistence farming on which the families of these workers or working abroad are based. In a report by The Clean Clothes Campaign, almost all Romanians interviewed stated that they had at least one member who

went abroad to work in construction or agriculture, with labor migration being a direct consequence of poverty. In addition to a meager salary of up to 230 euros net, garment workers have complained that they are constantly verbally and physically abused, but do not have the courage to speak out or be photographed for fear of being fired. Even though the minimum wage in the economy has continued to rise, the difference has not been felt by workers, who often work at least 15 overtime hours a week who remain unpaid just to reach the working quota, which increases exponentially more than each once the minimum wage in the economy increases. According to the ILO, those who work overtime to complete the workload assigned by their superiors fall into the category of forced laborers, which includes over 50% of Romanian garment factories that produce for export.

We believe that it is imperative to invest more in the development and consolidation of a horizontal industry, which would support the garment industry, as in Romania the presence of a textile industry is in serious need of improvement. Without government intervention, things cannot improve, given the cost of building a weaving mill amounts to around 50 million euros, while a spinning mill costs about 15 million euros. These investments would help the Romanian garment industry to reach its potential, while solving the problem of competitiveness.

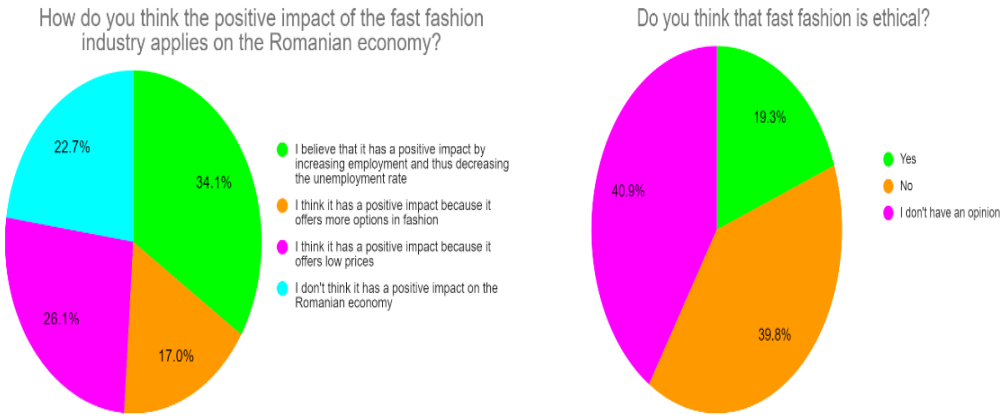

Fig. 8. a. How do you think the positive impact of the fast fashion industry applies on the Romanian economy? b.Do you think that fast fashion is ethical?

Taking into consideration everything we exemplified above, it comes as a surprise to see that 40% of respondents do not have an opinion about the level of ethics in the fast fashion industry. Equally shocking is the affirmative response of 19.3% people who believe that fast fashion is ethical. Once again, one can see one of the defining features of the fast fashion consumer, namely the lack of interest in the well-being of those involved in the production process, but also in the preservation of natural resources. In this context perhaps it is time to redefine our main question and ask not if fast fashion has the means to be reshaped but whether for how much longer its customer base can neglect the industry's negative effects.

3. Conclusion

To first address the limitations of this research, we must acknowledge that this was only a pilot study that can be extended to all the regions in Romania and afterwards applied on a regional level, in other East European countries, such as Poland and Slovakia, two countries that chose different roads when it comes to fast fashion, the latter aiming for a more sustainable and smart approach. As we mentioned in the beginning of our research, the paper had an exploratory approach, with a more general aim – that of creating a complete profile of the Romanian fast fashion consumer - and thus being differentiated from the existing literature.

Given the small sample taking into analysis we sadly conclude that the fast fashion consumer does not seem to be aware of the impact that the industry has on workers, the environment and upon themselves. Unfortunately, these clothes remain in the top preferences due to the low price and the appearance of superior qualities that Romanians attribute to these clothes. We can therefore see that their expectations for the quality of the materials worn is low, easily satisfied by fast fashion retailers. However, they also paradoxically believe that change must come from consumers and only after from companies, which they believe should be held accountable to anyone involved in the production chain. Most respondents would like to know information about the environmental policies applied by companies, respectively the policies that favor inclusion and diversity, but less than 5% are willing to buy items only from such stores. Moreover, over 45% said that although they do not believe that the fast fashion industry should exist, they will continue to buy this type of clothing. After analyzing the answers, the reality of a developing country with a minimum net wage of only 458 EUR is sad, as almost half of those surveyed admitted that they feel compelled to spend more money than they can afford on clothing, while another 17 do not feel "fashionable" if they do not dress from certain stores. In Romania, the problem of stigma and bullying has become a rising phenomenon, which continues to grow, present in Romanian society only marginally, through isolated cases, before the entry of these brands on the market. We can say that one of the factors that fuels this problem, which leaves the individual with mental and even physical traumas is the fast fashion industry itself, which cancels you out as part of society when you fail or cannot keep up with the current trend. Another problem is the variety of sizes, which in the Eastern European market is not as well covered as in Western Europe or America. This, as one of the respondents stated, excludes people with a certain body type from the social environment, thus inducing the idea that they are on a lower level only because they have a certain number of kilograms. Although brands such as H&M have begun to offer Plus Size collections, they are only available online, indirectly conveying the idea that such people have nothing to look for physically in their stores.

We cannot find a culprit who can take all the blame. The problem is one on a global scale and each party involved tends to highlight system defects as a whole instead of fixing the area they control. Consumers complain that there are no more convenient options. Brands claim that if consumers were willing to pay more, they would have the resources to manufacture more ethical products and implement a

stronger ethical policy. The owners of the factories, in turn, claim that if the brands were willing to pay better, they would allow safer working conditions for employees. It is a concentric system that can rotate in this rhythm indefinitely if we do not assume our own involvement, no matter how defective the circle we belong to is. Society needs to understand that we can be part of the solution to a problem for which we are not responsible.

Where the consumer's desire for change is not even vaguely present, the scenario remains ambiguous, as it is not clear how we can teach consumers to change their consumption patterns for the good of society and not for their own comfort. Given that many consumers loyal to the fast fashion industry have begun to recycle, save and control water waste, we hope that there is a high probability that a new type of consumer will emerge in the near future to consider more. than their own needs that can be met in the short term.

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Space as integrator: from horizontal to vertical urban planning

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Abstract

The 'smart city' as an evolving paradigm, situates at the convergence of technology and the city. In fact, a smart city's development is connected to the ICT technology in such a way that its 'smartness' translates into high technological integration. At the same time, the outer space infrastructure opened up critical information to numerous mass market applications, fostering not only urban innovation, but access to fundamental services such as transportation, provision of energy, water and food, and healthcare, among others. Smart cities use information and communication technologies to increase operational efficiency, share information with the public and improve citizens' welfare and the quality of key services. Advances in satellite-based technologies are giving rise to more competitive services, while minimizing environmental and social impacts. Certainly, these intimate integration aspects between space technologies and cities are also valid in the cases of malevolent interventions, disruptive technologies or in any other case in which space technologies are interrupted by intent, this feature trickling down inevitably to the well-functioning of smart cities. In fact, in the moments of failure it is the most visible the profound interconnections between technologies, services and societal well-being.

Historically, urban planning has considerably changed over the last century. When, as a consequence of industrialization and massive rural-urban development in the 19th and 20th century, cities expanded beyond their middle-age walls, engineers planned the urban expansion by designing urban street networks, building electricity grids, water supply and sewage networks. In the beginning of the 21st century, a new era of infrastructure development emerged and information and communication entered the

stage of urban development. Currently, the smart city adds up another dimension of urban development, one in which urbanization expansion is happening in a networked manner, giving rise to a different reality.
The networked city relies on resilience, without which expansion in the 'vertical' plane would not have been possible. Thus, drawing from disciplines of urban studies, aerospace engineering and security studies, this research attempts to answer the question related to what is the nature of the relationship between the outer space and smart cities? In order to answer it, the paper looks into the state of the art that involves the concepts of "smart city", "resilience", as well as "critical infrastructure protection" and "outer space technologies" in relationship to urban settlements. By disentangling the information provided in the literature, the current research attempts to highlight particular patterns, models, frameworks or tools to be further used and developed when discussing how smart cities and outer space are interrelated, as well as to raise critical questions on contemporary understanding of smart cities.

Keywords: *networked city, outer space technologies, critical infrastructure, smart city, resilience*.

1. Introduction

The 'smart city' as an evolving paradigm (Albino, Berardi and Dangelico 2015) situates at the convergence of 'technology' and the 'city' (Yigitcanlara, et al. 2018). While each of these two latter concepts are broad enough to basically incorporate more or less all aspects relating to economy, people, design, infrastructure and many more, a smart city is directly connected to the information and communication technologies (ICT) in such a way that its 'smartness' translates into high technological integration. Using this understanding as a common ground, this paper attempts to make a case on the ways in which we can perceive the boundaries of such a complex system of systems. Consequently, the argument is structured in seven sections as following: after this introduction, the paper asks about the boundaries of a smart city, then in sections three and four addressing a bit of a historical background of how smart cites evolved, before bringing in the real vision of 'verticalisation'. The last sections attempt to set the scholarly context and draw final conclusions. Ultimately, the paper makes a case on how intimately interwined are outer space technologies and the urban services and infrastructures that sustain our daily routine.

2. The boundaries of a smart city

The "classic" vision of the border is that of a demarcation of the nation state. Malcolm Anderson defines the border as being linked to the territory and the formation of the state, to the physical boundaries of political and legal authorities (Anderson 2013). The border can be understood as the limits of the State as a physical demarcation which is a delimitation between different authorities. When discussing the city borders, this geopolitical delineation fades away, with more emphasis on the demarcation of the city proper from the outskirts. Obviously, this limit brings forth not only ownership in terms of taking care of the city, but also raises deeper emotional states of identification.

With urban settlements expanding in the aftermath of the Second World War, and even being now in the so called the "anthropocene" period, i.e. humans overpassing the nature, the logics behind defining the city limits are also changing. From the last built house in the city to the area served by urban utilities, bordering zones were always places of contestation and resisstance. From military borders (e.g. Berlin in 1945) to economic borders (Hong Kong, among others) and to expansions of cities due to raise in informal settlements (most of the mega cities in developing countries), the boundaries of cities are dynamic and in continuous formation.

Nevertheless, all these examples have in common the idea of a finite and well-delineated territory. However, with a smart city, the territory is harder to grasp. Where does a smart city start and where does it end? What actors are responsible for bridging particular infrastructures to others, and where the legitimacy of such actors ends? And assuming all borders are well defined, whom are these borders including and whom are they excluding, because borders are neither eroding nor evolving, but are being re-articulated around the territorial exclusion of undesirables while ensuring easy access for those who have the right to move freely. If we look at the smart city as the new paradigm of urban development, i.e. a new phase of the urban, how do we related to former ideas of territory, borders, authority, and legitimacy?

3. From being smart to getting smart

The concept of 'smart city' represents the new buzz word in all discussions related to the developement and management of contemporary urban settlements. However, its definition is not agreed upon at the global level, nor by legislation, and it pretty much relies on how each of the participants in the decision making process understands and defines it. In fact, the literature argues, it is just on the contrary, the 'smart city' is an evolving paradigm (Albino, Berardi and Dangelico 2015).

Indeed, the novelty of the smart city relates to its high degree of technological integration. A 'smart city' relies on applying the ICT throughout the urban structure (Marin 2020) with the aim of integrating technology with urban services (Albino, Berardi and Dangelico 2015). Other authors refer to the smart cities as "instrumented, interconnected, and intelligent" (Harrison, et al. 2010), where "instrumented" refers to sources of near-real-time real-world data from both physical and virtual sensors, "interconnected" means the integration of those data into an enterprise computing platform and the communication of such information among the various city services, and finally, "intelligent" refers to the inclusion of complex analytics, modeling, optimization, and visualization in the operational business processes to make better operational decisions.

Moreover, the analysis of the literature reveals that technology represents one of the three main drivers of smart cities, alongside community and policy, being linked to five desired outcomes—productivity, sustainability, accessibility, wellbeing, liveability, governance (Yigitcanlara, et al. 2018). Although the literature indicates that these drivers and outcomes altogether assemble a smart city framework, where each of them represents a distinctive dimension of the smart cities notion (Yigitcanlara, et al. 2018), without technology there would not be such

a thing as a 'smart city'. It falls from here the fact that the definitory feature of a smart city relies in its technology integration.

The 'smart city'is also congruent to the meaning of contemporary urban development (Kunzmann 2014). As Kunzmann (2014) argues, the notion of smartness can be added to many dimensions of human life. Smart learning, smart shopping, smart tourism, smart health services, smart governance, smart mobility, smart coworking, smart energy consumption, even smart dating to find the right partner for smart living-together in smart houses and smart city quarters (Kunzmann 2014, 10).

The process of smartification is not a liniar end-to-end path. On the contrary, it actually means aligning all realms or urban space to the technological development and by that, it gets to be inevitable selective, discriminatory and biased. The European Commission defines 'smart city' as "Systems of people interacting with and using flows of energy, materials, services and financing to catalyze sustainable economic development, resilience, and high quality of life; these flows and interactions become smart through making strategic use of information and communication infrastructure and services in a process of trans parent urban planning and management that is responsive to the social and economic needs of society." (Commission, European Innovation Partnership on Smart Cities and Communities, Strategic Implementation Plan 2013, 5)

4. From horizontal to vertical development

Historically, urban planning has considerably changed over the last century. When, as a consequence of industrialization and massive rural-urban development in the 19th and 20th century, cities expanded beyond their middle-age walls, engineers planned the urban expansion by designing urban street networks, building electricity grids, water supply and sewage networks. In the beginning of the 21st century, a new era of infrastructure development emerged and information and communication entered the stage of urban development. Currently, the smart city adds up another dimension of urban development, one in which urbanization expansion is happening in a networked manner, giving rise to a different reality.

The Oxford English Dictionary defines "vertical" as:

A Adjective. 1. Of, pertaining to, situated at, or passing through the vertex or zenith; occupying a position in the sky directly overhead or above a given place of point.

2. Placed, extending, moving, or operating at right angles to a horizontal plane; perpendicular; upright.

The word takes its origin from late Latin verticalis, from vertex 'whirlpool, crown of a head, vertex', from vertere 'to turn'.

In a 2012 interview, the American artist, geographer, and author, Trevor Paglen, posed an unusual question: "What would happen if you took geographic thinking and instead of putting in on a horizontal axis, you added a vertical axis?" (Ellsworth, Kruse and Beatty 2013) Indeed, *going vertical as a way of thinking* means not only shifting the perspective from a linear and finite Euclidean view of space and time, towards a continuum of space-time-speed, uncontained and heterogeneous.

This perspective rather opens up a whole spectrum of critical questions on how verticalising cities is tightly enmeshed in a world of drones, helicopters, satellites, mines and submarines, among others. It is a cross-section of a world that highlights the overlapping layers of humanity's history, development, and patterns of needs and imagination. Furthermore, such a vertical perspective would also raise critical interrogations on the meaning of geopolitics (traditionally understood as the politics of state geography), that essentially represents the study of interactions of nation-states according to their cartographic distribution on the globe. Going vertical therefore, is not a question of space but a whole different ontology of life that this research attempts to disentangle.

The idea of seeing things in a vertical manner is rooted in sacred geometry and religious thinking. "As above, so below" – the famous motto - derives from a passage in the Emerald Tablet, attributed to Hermes Trismegistus, the author of a series of sacred texts that constitute the basis of Hermeticism. Initially, the phrase indicated that earthly matters reflect the operation of the astral plane. However, in a secular context, the phrase can refer to the idea that the microcosm reflects the macrocosm. In the New Testament, the phrase is traditionally rendered "on earth, as it is in heaven", as a reminder of God's work as a reflection of himself.

Figure 1 presents an abstract visualization that shifts our predominantly static and technological view of the world from above, to open a longitudinal lens on the processes and patterns of contemporary urbanization across three horizons: the orbital, the subterranean, and the submarine. The world's deepest mines are over four times deeper that the world's highest skyscrapers are tall. Multiple grounds are revealed as index and interface: a registration of existing temporalities, shifting territories and emerging agencies. This longitudinal landscape provides an augmented understanding of where we live in relationship to thermodynamic exchanges, latitudinal variations and hydrological ranges that are associated with vectors of movement—from logistics to communications, policies to legislations, planetary processes to intertidal cycles, climatic differences to barometric pressures, to better understand the live, dynamic ecologies under the influence of, and exerting pressure on, the altitudes of contemporary urban life. (Harvard University 2013)

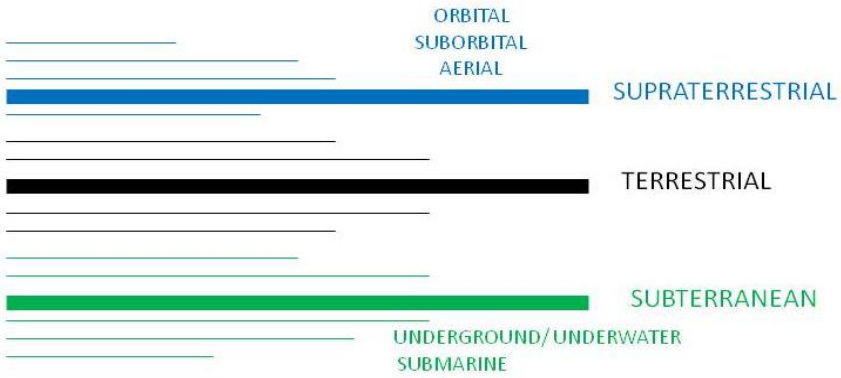

Fig. 1. Vertical planes

However, it is not to say that vertical perspective is only a question of symmetry or reflection. On the contrary, in practical terms, air, land and water are three very different mediums of life that are to be tamed by completely different technological approaches. In this regard, the understanding of 'vertical' in this research is more a question of complexity rather than pure changing the eye view. Figure 1 also attempts to present graphically a cross-section of the complete ecosystem of Earth, in order to highlight that the highest satellite or function that humanity has placed on orbit (say GEO) is or may be connected to the lowest technology we use, such as submarines or subaquatic cables.

In Architecture, the whole idea of verticalization was taken up very literally and translated into vertical build spaces. However, we argue that verticalization is more than just building skyscrapers, or bringing Lunar landscapes into the Earth, but an approach to understanding the whole constellation of system-of-systems that bring these vertical layers into life, including technicalities, politics and perceptions. As the architect Léopold Lambert explains, an expansion of the classical two-dimensional perspective "opens up a new paradigm in which the legal action of a State on a territory will be defined through the complexity of space and its multiple layers". (Lambert n.d.)

These processes bring to the forefront struggles over security, resources, privacy, mobility, basic food and water, across vertical (and horizontal) geographies of power. Going vertical therefore means also going political, opening up how verticality matters in the contemporary world. It is equally about engineering as it is about history, architecture, anthropology or international relations. Therefore, not the geological layers are at stake in this research, but the technological ones that essentially undress centuries of human development, by revealing the logics as well as the tensions in our collective journey as humanity.

5. Politics of verticality

In 2002, inspired by the conflict in West Bank, Eyal Weizman posed the question of a politics of verticality. He argued that "a new understanding of territory had to be developed to govern the West Bank. The Occupied Territories were no longer seen as a two-dimensional surface, but as a large three-dimensional volume, layered with strategic, religious and political strata." (Weizman 2002) He then continues by elaborating on this new approach: "new and intricate frontiers were invented" and control was retained "over the airspace above them and the sub-terrain beneath." (Weizman 2002) As a process, Weizman sees politics of verticality as "a set of ideas, policies, projects and regulations proposed by Israeli state-technocrats, generals, archaeologists, planners and road engineers since the occupation of the West Bank, severing the territory into different, discontinuous layers." (Weizman 2002) In other words, the whole ontological stance of political forces through which the built environment has been shaped to be able to surveil, control and predict resistance, was entirely based on both an expansion of space and time, and an ontological view of security/ insecurity brought by design/in-design.

Too often we think of geographical spaces in terms of areas, not volumes (i.e. as incorporating depth). Territories are bordered, divided and demarcated, but not

understood in terms of height and depth. (Elden 2013) In other words, geopolitics can be understood through processes and technologies of geo-metrics, means of comprehending and compelling, organizing and ordering. Geo-metrics might therefore be a term worth retrieving from the rather bland sense of modern geometry. Geo-metrics remains a useful way to make sense of calculative strategies turned towards land, terrain and territory.

Furthermore, Stephen Graham brings to the forefront the idea of 'vertical geopolitics' by correlating the American military interventions in Baghdad to the concept of 'full spectrum dominance' (Graham, Vertical Geopolitics: Baghdad and After 2004). He argues that "it would need to inscribe the contemporary geopolitical imagination with a paradigm which addresses the ways in which global air and space power are used to marshal geopolitical access to, and control over, key underground resources (Iraqi and central asian oil, Palestinian water, etc.) to fuel the ecological demands of western urban complexes." (Graham, Vertical Geopolitics: Baghdad and After 2004, 17)

In the end, as Weizman argues, "geopolitics is a flat discourse. It largely ignores the vertical dimension and tends to look across rather than to cut through the landscape. This was the cartographic imagination inherited from the military and political spatialities of the modern state". (Weizman 2002, 3)

6. Vertical (in)security: from the unconscious mind to outer space

Verticality seems to be woven into human cognition, as vertical scale is universally used as a metaphor to describe hierarchies of power. "Low-ness" suggests deceit, weakness, vulgarity, or immorality. Words starting with the prefix "-sub" imply powerless status, weakness and invite experiences of violence and domination (e.g. 'subordinate', 'subaltern', 'subhuman'). At the other pole, "High-ness" is related to royalty, superiority ('superior', 'supervisor', 'superman') and brings forth perceptions of status, and power. Although the usages of these words are usually unintentional and unconscious, somehow they manage to shape the world.

The same logic spreads in ubiquitous life instance, the penthouses are perceived more valuable than the basements ('up', 'upper', 'upper-class') or with technologies (satellites are more expensive). Globally, vertical logics operate subtly vertical schemes of attributing worthiness, e.g. the under-developed Global South versus the well-organized and effective Global North. Even the Christian notions of "heaven" (up, harmony) and "hell" (down, inferno) are based on equal meaning-posing vertical distinctions.

Consequently, a whole set of perceptions of (in)securities is related to these unconscious usage of verticality. Aliens coming from the upper grounds, beautiful princesses locked in towers and monsters rising from the underneath have shaped the early-life stories of every child. Mass surveillance, the "eye-in-the-sky" and the entire image of attempted easy control from above, have shaped criminology studies, especially in the Anglo-Saxon world. However, as the multimedia artist Dario Solman reflects, "verticality pushed to its extreme becomes orbital". (Solman 2001)

Figure 2 presents the cover the book "Operating Manual for Spaceship Earth" written by the visionary architect Buckminster Fuller in 1968. The drawing, named "Spaceship Earth", was made in 1928 and emphasized the global, spiritual, practical and vertical challenges facing engineering, architecture and human life.

Fig. 2. Spaceship Earth (Fuller 1968)

The Earth's fast-expanding array of more than 1000 active satellites is pivotal to the organization, experience and security of contemporary life on earth's surface. Controlled through ground stations, satellites could be tasked to a wide array of missions, from observing the surface of Earth (important to precision agriculture, monitoring of floods and landslides, or even in conflicts, like the genocide in Rwanda where images have revealed common pits), to conducting military operations on the ground (through the use of PNT/GNSS functions), and to protecting the planet against solar winds and asteroids that enter the atmosphere, TV and radio broadcasting, as well as telecommunication. The messaging between the ground stations and the satellites is being achieved through links of data that could be corrupted. However, once aloft, satellites become distant, enigmatic, and quite unearthly.

7. Discussion: deconstructing and reconstructing the smart city

This paper attempted to open up the ideas of the space of smart cities as open, multiple, permeable, and bound by identities. In other words, the connection with the outer space exemplify the relational forms of territoriality in which urban services that are built in the 'smart city' are spatially regulated based on their different identities. By that, the smart city (as its analogical ancestor) perpetuate 'accessibility' as exclusionary, which subtly underpins the identity differences.

More scholarship is needed in the area of defining boundaries of smart cities, as well as now accessibility is being evasively moderated in discurses of universal access and high technological integration.

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Ageing in COVID era – Social isolation risk factors, outcomes and smart solutions

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Abstract

Objective: *To highlight the importance of social life, with focus on seniors, and to point out modalities to enhance and improve social participation.* ***Prior work:*** *Social interactions influence our daily life rhythms and content, impacts our mood and our physical and cognitive wellbeing, the way we see and appreciate ourselves. Social distancing and physical confinement required to reduce spreading of a pathogen, like during the nowadays COVID-19 pandemic, have a serious impact on the social life of all, changing the dynamic and the flows of the society itself.* ***Approach:*** *A narrative review of risk factors and outcomes of social isolation provides the base for a sample-based exploration of solutions for social isolation during pandemic times.* ***Results:*** *A series of physical health and psychological factors, as well as physical, social cultural and economical environment related factors impact social participation. Retirement, age associated frailty and all disabilities reduce social participation, in a vicious circle. Physical and psychological optimisation lead to efficiency in activities of daily living and provides the resources and the drive for social participation. Inviting physical as well as virtual spaces have been built or adapted to enhance and grow social participation. Hightech - based virtual communities and a series of assistive technologies flourish in post-speed century and are of real help in pandemic times, supporting the continuity of social life and the coherence of the society.* ***Value and Implications:***

Social interaction has several dimensions. It maintains the cohesion and shapes the present and future of the communities and of the entire human society. Smart solutions are available and must be further developed with the contribution of IT-AI developers as well as of rehabilitation experts, geriatricians, psychologists, architects and ecophysiologists, in order to support and grow social participation in sustainable multigenerational communities.

Keywords: *social participation, active and assisted living, seniors, multigenerational communities.*

1. Premises

Humans are social beings, designed to live in groups and to behave in collaborative manner. We define ourselves through these interactions with the others and through the value we perceive we have for our society. Social interactions influence our daily life rhythms and content, impacts our mood and our physical and cognitive wellbeing, the way we see and appreciate ourselves and others.

Social distancing and physical confinement required to reduce spreading of a pathogen, like during the nowadays COVID-19 pandemic, have a serious impact on the social life of all of us, changing the dynamic and the flows of the society itself and shaping its functionalities. Seniors are a population at high risk of social isolation even in normal times and this risk is heightened in these pandemic times, with severe consequences at individual as well as at society level. And seniors are no longer a small population, as we are nowadays living longer than ever before. The 65+ population in Europe will increase even more, going from 90.5 million in 2019, up to 129.8 million in 2050, while the general population will have quite the same numbers in 20150 as in 2019 (after a short peak in 2026-2029). The median age in European Community is going to reach 48.2 years in 2050, when Europe will number half a million centenarians [1]. In this situation, with an increasing pressure on the labour force, keeping the ageing people active, healthy and independent in activities of daily living, as long as possible, must go beyond the status of wishfull thinking. Feasible strategies and solutions must be developed and implemented to ensure active ageing goals.

2. Objectives

To highlight the importance of social life, with focus on seniors, and to point out modalities to enhance and improve social participation.

3. Method

A narrative review of risk factors and outcomes of social isolation provides the base for an exploration of smart solutions for social isolation during pandemic times. The responses of 10 Romanian from different age categories to an unstructured interview highlight their perception of different aspects regarding the specific situation of social isolation during the COVID-19 pandemic.

4. Main results

4.1. Social isolation or loneliness?

Perceived as loneliness, seclusion, breaking connection with community, alienation, estrangement, abandonment, social isolation is defined as the lack of social interactions, lack of contacts and relations with family and friends. It regards lack of communication and interaction with others, at individual level, as well as lack of interaction with the society at large. Lack of contact with society leads to the disconnection of the individual from the rhythms of the social life, and to the dissolution of his social roles and of his value as a social being, first of all in individual's own eyes [2]. Social isolation relates to an objective condition, regarding reduced social contacts and participation. The subjective feeling of loneliness may be or not related to the objective situation of the individual. Loneliness is the subjective distressed feeling of being alone or separated. It's possible to feel lonely while among other people, and you can be alone but not necessarily feeling lonely [3]. The phenomenon gets new dimensions during special situations like the ones generated by the needs of restraining disease spreading during the pandemic of COVID-19. While social isolation may be self decided and managed, the feeling of loneliness has deep emotional resonance, especially when the isolation is associated with imposed confinement. In this situation, keeping the individual in place, in his usual, welknown and life-history resonating environment has some benefits, even if it is challenging for the ones providing for the senior.

4.2. Social isolation risk factors and outcomes

Literature review shows an increasing interest regarding social isolation risk factors and outcomes, especially for the elderly. A series of health related and psychological factors, as well as factors related to the physical, social, cultural and economical environment have impact on the quantity and the quality of social participation. Age is directly related to the level of social participation. A report from the National Academies of Sciences, Engineering, and Medicine (NASEM) points out that more than one-third of adults aged 45 and older feel lonely, and nearly one-fourth of adults aged 65 and older are considered to be socially isolated. Older adults are at increased risk for loneliness and social isolation because they are more likely to face factors such as living alone, the loss of family or friends, chronic illness, and hearing loss [4]. The living environment (rural/urban) also matters [5]. In rural environment, although women reported greater social participation, women reported laso more frequent feelings of loneliness, especially feeling left out, and were less likely to have a spouse or partner [6]. The costs of healthcare are higher for isolated elderly [7].

Most important risk factors for social isolation, as perceived by 10 Romanian respondents from all age categories, seem to be the lack of motivation and of the

sense of coherence, lack of trust in decision makers and in media, lack of trust in fellow citizens, the feeling of being abandoned and overlooked, of hopelessness, cognitive decline, depression and anxiety, lack of emotional connection and lack of resources (financial, informational, support). These associate with disability increase due to progression in frailty as consequence of lack of motivation and activity, hygiene, nutrition and engagement, as well as with poor sight and hearing, poor mobility (lack of physical activity (including chores) and more time spent in bed and in a more and more limited space), poor diet and progressive dysmetabolism, in a vicious circle. Low levels of digital literacy decrease the possibility of the elderly to use electronic means of communication, contributing to social isolation, too.

The most recent comprehensive review on social isolation of elderly was published in 2020 by the National Academies of Sciences, Engineering, and Medicine in the USA. This review [8], in order to support the improvement of healthcare for elderly, summarize their findings in regards of risk and protective factors for social isolation and loneliness in elderly, grouping their main evidence-based risk factors in three main categories:

- ***Physical Health Factors***: common chronic diseases and conditions, including heart disease, stroke, cancer (inducing disabilities), the functional status of the individual (difficulties in activities of daily living), sensory impairments (reducing the abilities to communicate);
- ***Psychological, Psychiatric, and Cognitive Factors***: the presence of psychiatric disorders, such as major depression, generalized anxiety disorder, and social anxiety disorder, the impairments and restrictions of activity nd participation due to neurocognitive disorders;
- ***Social, Cultural, and Environmental Factors***: lack of supportive relations, especially those with family, friends, and caregivers (aspects with cultural specificity), losing a close family member (spouse) is a frequent disruptive event for older adults, particularly for women (loneliness is primary symptom of bereavement), retirement from activity, along with social environmental factors such as driving abilities, housing status, location and accessibility to social life, being an immigrant or belonging to some unclustered minorities.

The review of recently published literature provides us an image also on the impact of social isolation on health and quality of life of the elderly:

- The impact of the social isolation on ***health outcomes*** includes changes in physiological parameters (high blood pressure [9], changes in heart rate variability [10], changes in glucose levels in Diabetes mellitus [11], even increased levels of inflammation markers [12]), psychological aspects (depression, anxiety, rapid decline in global cognition, processing speed, executive function, visuospatial abilities, immediate and delayed recall, increased risk of dementia [13,14]), reduced muscle strength and mobility, increased frailty, reduced ability to climbing stairs and upper limb tasks, reduced performance of activities of daily living, increased fear and risk of falling, increased risk of outpatient visits, emergency department visits, hospitalisation for stroke and heart, cardiovascular disease [15] and increased susceptibility to cold (symptoms), upper respiratory illness [16].

- The impact of social isolation on ***health related behaviours*** include: poor diet, tobacco use, heavy alcohol use, physical activity – low level, reduced going-out behaviour [17], overweight, reduced sleep quality, frequent insomnia, shorter duration of quality sleep, but longer time spent in bed [18], reduced quality of life and health-related quality of life indicators, hoplesness, reduced wellbeing socres [19], increased risk of abuse (financial, physical, even sexual abuse), outright neglect, more isolation and progressive disabilities [8].

The following factors may act as risk factors or **protective factors from social isolation**, if efforts are made to improve the individual condition, by making changes in regards with the frailty syndrome severity, disabilities, the severity of chronic diseases: stroke, heart disease, cancer and related risk factors – addressing these including through diet, physical activity level, sleep quality and rhitms, compensate sensory impairment: hearing loss, visual, smell loss, treat depression and anxiety, address cognitive decline and risk related factors, improve social communication and human-animal interactions, implement and enhance supportive relations disregarding unsupportive ones, develop efficient strategies of coping with disruptive events, stimulate active ageing in place, postpone retirement and develop strategies to keep individuals socially involved after retirement, deveop and implement solutions in regards with accessibility [8].

4.3. Social isolation in old age – the vicious cycle

Social isolation is not easily identified nor quantified, due to the subtlety of the risk factors and isolation outcomes as well as due to the complex interdependence of the above mentioned. Also, the relations between each risk factor and isolation are bidirectional. The ageing individual enters at some point (the moment of retirement or the death of a life partner, or the installation of a certain disability) in a vicious circle, because of stressful environmental conditions, because of an illness or to some physical or psychological disabilities due to chronic health conditions, associated to the reduced energy level and to the frailty syndrome inevitable in oldage. This vicious circle includes firstly: reduced social interaction, reduced motivation, reduced performance of the activities of daily living, decrease in physical and cognitive functioning, decreased quality of life [20].

Social isolation is frequently associated with signs and symptoms as: social withdrawal, lack of interest regarding appearance, house keeping, lack of interest expressed even in simple daily activities like eating, hygiene, sleep [21]. Thus, the consequences of entering the vicious cycle of social isolation impact all physical and psychological aspects of the human being, as well as health, activity level and abilities, practically all the aspects of quality of life and wellbeing of the human being. It is very difficult to exit the cycle or to transform the vicious cycle of ageing and isolation into a virtuous cycle. The barriers are so many. Due to: retirement from work networks, losing friends, family decomposition, physical and psychological based impairments/disabilities making the individual unfit for social participation, losing sense of coherence, motivation, being technically outdated (hardware, software, knowledge), the older loses the string connecting him/her

with the social hive, and it is very difficult to recover, to reconnect to the actual complex society situation if you don't keep up on a daily basis.

4.4. Isolation during current pandemics – new challenges

Mental and physical health of older people is negatively affected during the social distancing for COVID-19. A systematic review found that the main mental and physical outcomes reported were anxiety, depression, poor sleep quality and physical inactivity during the isolation period. Experts organizations and WHO have given different recommendations to keep older people mentally and physically healthy. An integrated and multidisciplinary assessment done by geriatricians, psychiatrists and physiotherapists could be needed [22].Restrictions in regards of visiting community meetings, parks, neighbourhoods, places of worship, and day-care centres (the only socialisation channels for most aging adults) associated the decrease in the social network itself (losing more friends and relatives). With lockdown or quarantine, these activities have become impossible [23]. Also, older people are adversely affected by the ageist discourses that imply that elderly are not that important [24]. Older patients were, sometimes, denied appropriate treatment, when the healthcare system was overwhelmed. People were not even allowed to organise funeral ceremonies for relatives that have died isolated in COVID-19 facilities and this dramatic situation has significantly induced fear and lack of trust in authorities and in younger people, among older people all over the world, "as they feel unwelcome in the world they built through all their life" [25].

4.5. The perspective of Rehablitation Medicine in regards of active ageing

Older user is not only socially disconnected, but also frail and presenting with disabilities affecting his/her ability to perform the daily living activities and decreasing his/her participation capacity. Physical and psychological optimisation lead to efficiency in activities of daily living and provides the resources and the drive for social participation. The International Classification of Functioning, Disability and Health put activity in the center of the diagram representing the interrelations between the components of the bio-psycho-social model of the human being [26]. Personal factors, disease and environment influence the ability to perform, as well as the real-life performance in the activities of daily living, which, in turn, will influence these aspects. Social participation is in bidirectional relationship with the activity domain, too. In order to improve the social participation level, one must address the barriers hindering activity, in all aspects.

The interventions implemented through technological means should respect both Physical and Rehabilitation Medicine approaches:

- Restorative approach - Regain the function – by training the function and the ones related closely
- Compensative approach - Assist the function – by real-time and quantified assistance (assist as needed)

The World Health Organization (WHO) defined active ageing as "… the process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age" [27]. The concept of active ageing is based on optimising three main domains: participation, health, and security. The model proposed by WHO contains six groups of determinants, each covering important aspects: health and social services, behavioural, personal (biology, genetics and psychological factors); physical environment; social; economic aspects.

The key aspects of active ageing are autonomy (decision making, coping abilities, being in control, in accord with one's rules and wishes), independence in regards with the activities of daily living, quality of life in one's terms of values, standards, aims and concerns, healthy life expectancy. Quality of life in seniors is mainly determined by their perceived ability to live independently and to live as long as possible without developing severe disabilities [28].

There are objective and subjective variables of active ageing, the psychological aspects being essential to this construct, as well as the cultural specificity.

5. How can we improve social participation?

We have to be able to empower and support the older individual by providing him/her with accessible and sustainable means to improve activity level and participation. We can improve social participation addressing all modifyable aspects related to it:

- By improving access to and engagement in social activities provided in:
- Old ways:
- Physical Agora, recalibrated to social distancing and air hygiene requirements;
- Meeting-spaces designed for different activities;
- Real time accurate information regarding access, due times and organisational aspect;
- New ways:
- Enhance access to electronic non-interactive media and interactive social media – on reliable trustful platforms providing meaningful and useful info and activities, service and savvy support;
- Empower users to use the new technologies;
- Mediate communication, filter the right information.
- By improving fitness for social participation. In order to make the older person able to be socially active, we need to:
- Improve physical (including sensory) and psychological (including motivation and drive) functions;
- Improve ADL efficiency and reduce ADLs costs in terms of time and energy;
- Improve adaptability and reserve, as well as drive;
- Improve time management;
- Improve stress management;
- Improve communication and digital skills.

5.1. ICT based technology impacts on social isolation in elderly

ICT solutions are already in use, enhancing social participation, no matter the age of the users. According to the latest Digital Economy Outlook Report from the Organization for Economic Cooperation and Development (OECD), 62.8% of 55–74-year-olds are connected to the internet nowadays [29]. According to Ofcom's Adults' Media Use and Attitudes report 2018, 28% of people over the age of 75 now use tablets in UK. The same report states that 32% of people aged over 75 have a social media account [30].

A systematic review published in 2016 concludes that ICT could be an effective tool to tackle social isolation among the elderly. However, it is not suitable for every senior alike. ICT was found to alleviate the elderly's social isolation through four mechanisms: connecting to the outside world, gaining social support, engaging in activities of interests, and boosting self-confidence [31].

An even more recent systematic review (2021) showed no evidence supporting the effectiveness of digital technology interventions (DTIs) designed to tackle loneliness, in reducing loneliness (the subjective aspect) in older adults [32].

Digital technology is implemented in all domains nowadays and can be of real help for the healthcare sector in regards with older people, by improving access of heathcare provider to important data related to the progress of chronic diseases and disabilities, by providing means for continuous intervention programs to improve mental health, physical and cognitive functions, and to improve social participation, but older people seems not ready yet for this approach [33].

Telehealth platforms are used by the elderly to get medical counsel and telerehabilitation intervention, but are not adapted to the requirments of this specific group age [34]. GPS can be used to track their level of activity [35] and even to locate seniors in space, if they get lost [36]. Remote fall detection is used largely [37]. Internet use is associated with reduced likelihood of depression in older people, and social networking sites are used by older adults to maintain close interactions and to keep informed regarding family and friends. Elderly groups on social media channels and of Alzheimer's disease forums on the microblogging system are increasing, social networking systems being intensively used to stay informed by sharing the latest health-related information, as well as for discussion on general and important themes by ones, and as a source for reminiscence triggers by others [38].

In Romania, 40% of 55-74 years old people stated in a survey they never used the internet. The older Romanian are using the internet to get general information, to read about medication, to get the necessary information to reach a destination, to pay bills, to make online shopping and to keep close with friends and family members [39]. Scheduling visits to healthcare providers by using the internet and the possibility to remotely communicate with their GP or with organisations of public interest is of great help for elderly in Romania. The need and interest for improving digital literacy in elderly can be notice as In July 2019 Transilvania IT Team implemented digital literacy courses for elderly, in Cluj, Romania, ECDL launched also, in April 2021 a similar program in Bucharest, and there are non-governmental organisations supporting elderly in learning how to use smartphones,

tablets and PCs. A small number of elderly use Smart technologies for home assistance, reminders, errorless learning procedures fro activities of daily living and wearables for digital health interventions [40,41]. The COVID pandemic emphasized the need to improve the digital literacy of all, including older people, aspect mainly overlooked [42].

5.2. Designing technology to reduce social isolation for elderly

When developing a new assistive technology for daily living, we need to keep into account the basic needs of a human being, along with user weak points, but also user strong points, the ones we need to use to empower user to get in control, in order to improve his/her own quality of life.

Inviting physical as well as virtual spaces have been built or adapted to enhance and grow social participation. Hightech - based virtual communities and a series of assistive technologies flourish in post-speed century and are of real help in pandemic times, supporting the continuity of social life and the coherence of the society.

In order to design optimal solutions, one must focus on finding dolutions for the real needs of the future users.

Senior users (primary users) needs in regards with technology can be summarized as:

- Need for monitoring vital and safety parameters and to provide real time interventions to improve health condition;
- Need for hazard and disability prevention;
- Improve senior lifestyle behaviours with personalized recommendations using different user interfaces and types of interaction methods in view of improving their independent living and active ageing in place;
- Consider retirement as a big risk factor - persons become especially vulnerable for emotional isolation rather than social isolation. The absence or loss of a spouse or intimate partner interacts in several ways with social isolation and loneliness;
- Give access to public information regarding access to public utilities and events, like public transportation means and other relevant information for public issues and everyday living;
- Support Secondary and Tertiary end users (hospitals, caregivers) to communicate and collaborate with each other.

Secondary users – the carers needs emerge from all the above along with the constraints of the secondary user's own life. The need of emotional meaningful interaction with their beloved or their patients, the need of closely monitoring the activities of daily living and specific physiologic parameters are not met due to physical distance, lack of appropriate locally based or remote technology, financial resources to acquire these, lack of knowledge of even the existence of such assistive technologies, lack of professional healthcare and technical support. Healthcare services are even more impacted by the isolation in pandemics, elderly avoiding even visiting their GPs, which put at severe risk their frail health condition even

more. The need for accessible, safe and well-designed communication channels for medical communication is increasing, as well as the need for communication between healthcare providers and family caregivers.

Tertiary users – healthcare system and healthcare service organisations have the following challenges to face: the "need for speed" in getting positive therapy outcomes, to avoid overburden, the need for data management, the need for experts in new healthcare, the need for internal communication and teamwork, the need to implement the new trend for community-based healthcare, the need to fully implement and support the new trend for telecare.

Gerontechnology is defined as the inter- and multidisciplinary academic and professional field combining gerontology and technology. When designing gerontotechnology, we must take into account the following aspects:

- Challenge: Older users means a diverse group, age range from 60 to 120 people with different experience and life vision. Many have physiological limitations and disabilities, different from those experienced by younger populations.
- Possibilities: Gerontechnology can be at once both assistive and training technology for older persons – decreasing real life challenges, improving safety in using technology for ADLs and postponing cognitive decline, at the same time.
- Attention: "...designers often become an expert with the device they are designing. Users are often experts at the task they are trying to perform with the device" [43].
- Must do: "nothing about us without us" [44]. Users' involvement is mandatory in order to develop a technology with real utility for our target population, namely cognitively challenged older persons. We need to design and assess different aspects of a system's usability, and then, redesign and reassess.
- Support: Emphasize the importance of usability and that of co-creation in User (person) Centred Design approach in research and development [45].

Research and development in this domain is mandatory to actively and consistently involve real end-users, in order to ensure the usability of the product and of the intervention designed. The user's own perspective regarding his own needs and his requirements are the ones defining the user behavior in regards with the technology, no matter how smart and benevolent are the developers.

Solutions, as experts and our own respondents envisioned them, must address:

- First place: increase quality and meaningful social interactivity to prevent and decrease social isolation;
- Second place: ensure safety and fitness of the users (physical, cognitive, emotional and volitional aspects);
- Third place: improvement of the ability to and the performance in activities of daily living.

A big challenge in designing the interactivity between primary user and technology will be given by the fact that primary user's declared goal may be defined

as: “I, primary user, retired elderly, want to be happier, to feel good, to have a better life, a more vibrant one, a worthy life”. They may not be aware of the fact that social isolation is the cause of their lower quality of life/well-being, and a consequence of these, as well. Or, even worse, the primary user may have no more goals, no more motivation. Primary user’s real problem may be defined as: Losing connection with the hive of social life (rhythms, reality orientation, complexity of social networking, stratification, roles). Therefore, a special approach must be used to reconnect the primary user. We must empower him to regain control of his/her own life. His emotional reserve and restant interests and hobbies must be accessed and stimulated. Therefore, functional and nonfunctional requirements must be designed in order to build trust, to negotiate step by step behavioral changes, to safely persuade the primary user on the path of social reconnection in a safe and controlled social and media environment.

In order to ***prevent and decrease social isolation***, smart solutions should be able to:

- Create and stimulate networking in a safe environment;
- Empower participation in formal and informal educational activities (university of old age;
- Create, inform and ease access to events;
- Engage users in social charity activities, community decisions and in contests;
- Provide telemedicine tools for consultations, individual or group cognitive stimulation, training and rehabilitation intervention programs, emotional support, counselling and psychotherapy;
- Offer age friendly and pandemic friendly workshops regarding healthy house and lifestyle adaptations;
- Provide reminders and ensure easy access to events (personal, family, peers, social, cultural, city hall, policy events, including information regarding weather, transportation means, other accessibility details);
- Implement persuasive techniques of coaching which should be applied (to Improve adherence, compliance to recommendations), motivational quotes to improve mood. Use the adequate metaphors, interface design for disabled people should be provided, as well as incentives;
- Provide users with real time feedback;
- Increase trust in the assistive technology and in its providers seriosity and real time reaction and interventions when needed;
- Improve social participation and quality of life of the primary users which will bring gains for all communities (family as well as enlarged community);

Safety and Fitness along with Activities of Daily Living interventions should address:

- Frailty syndrome:
- Sarcopenia (loss of muscle mass and strength);
- Fatigue;

- Poor physical - health prevention and treatment of incipient frailty syndrome, by alerting the user / caregiver if the elderly person forgets or doesn't want to
- Maintain his/her an optimum physical activity (number of steps/day or week, walking distance/day or week);
- Less time in bed, improved sleep schedule.
- Risk of falls: using sensors to alert the user/caregiver/family if the senior develops risk factors that could increase the risk of falls and sensors that could measure them such as muscle strength, gait and balance impairments, visual and hearing disorders, excessive use of assistive devices/hours/day).

In order to develop appropriate interfaces and to construct efficient interactions between user and technology, context of use and usability subjective and objective aspects must be addressed. Personalization of the intervention supported by the new technologies is beneficial.

5.3. To use or not to use? The user behaviour will be determined by a large palette of factors [46]. To improve the acceptance and usability of future technologies, efforts must be done to:

- Improve digital skills of older people;
- Improve intergenerational communication;
- Replace concurrence and judging others with constructive collaborative thinking;
- Increase awareness;
- Sensitise stake holders, including policy makers;
- Train the trainers and facilitators;
- Implement the solutions in the local services and networks.

6. Conclusion

Social interaction has several dimensions. It maintains the cohesion and shapes the present and future of the communities and of the entire human society. Smart solutions were adapted or specially designed to support improvement of social participation of older people during the current pandemic. Progress in this domain, in terms of developing and implementing optimal solutions will be possible only through interdisciplinary team work of software and hardware developers with the users themselves, along with rehabilitation experts, geriatricians, psychologists, architects and ecophysiologists and with the direct support of all stakeholders, in the common effort to support and grow social participation for all in sustainable multigenerational communities.

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Rolul IoT în dezvoltarea administrației publice. Administrația 2.0

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Abstract

De-a lungul timpului administrația publică a trecut prin diverse transformări în vederea optimizării sale pentru a putea oferi servicii publice de înaltă calitate tuturor cetățenilor. Dată fiind situația actuală, în care activitatea instituțiilor publice se îndreaptă către digitalizare pentru a transfera serviciile publice în mediul online. Astfel, la baza administrației 2.0 stă abordarea și implementarea IoT (Internet of things/Internetul obiectelor) în cadrul instituțiilor publice pentru a dezvolta servicii publice online eficiente și eficace.

În cadrul acestei lucrări îmi propun să examinez principalele elemente ale IoT și modul în care acestea pot fi utilizate în optimizarea administrației publice. În plus, trebuie să ne axăm atât asupra avantajelor digitalizării administrației, cât și a dezavantajelor acesteia pentru a stabili bazele administrației 2.0. Cu alte cuvinte, în ciuda importanței mediului online în momentul actual, administrația românească trebuie să aibă în vedere faptul că optimizarea sa nu țină numai de adoptarea instrumentelor IoT, ci și de asigurarea serviciilor publice către cetățenii care nu au acces la internet.

Principalele obiective ale acestei lucrări constau în conturarea instrumentelor IoT și a modului în care utilizarea acestora contribuie la optimizarea administrației publice și identificarea elementelor administrației 2.0. a sistemului administrativ românesc.

În vederea elaborării studiului mă voi axa pe lucrări științifice din domeniul ingineriei pentru a stabili modul în care s-a dezvoltat conceptul de „Internetul obiectelor" și a elementelor sale, dar și utilitatea acestora în spațiul administrativ prin exemple concrete. În plus, voi realiza o analiză SWOT privind digitalizarea administrației publice românești în vederea conturării administrației 2.0. Originalitatea acestui studiu provine din abordarea situației actuale a administrației publice românești (criza provocată de pandemia cu noul coronavirus COVID-19 și situația privind lipsa serviciilor de internet la nivelul statului).

Cuvinte cheie: *digitalizare, avantaje, dezavantaje, administrația 2.0 în România*.

1. Introducere. Dezvoltarea IoT (Internet of Things)

Internetul lucrurilor (IoT) reprezintă „*un sistem de dispozitive de calcul interconectate, maşini mecanice şi digitale, obiecte care sunt furnizate cu identificatori unici (UID) şi capacitatea de a transfera date într-o reţea fără a necesita intervenţii umane sau interacţiunea om-la-computer*".[1]

Cu alte cuvinte, IoT cuprinde acele obiecte (maşini, electrocasnice, sisteme de iluminat, dispozitive mobile, portabile etc.) care sunt conectate între ele prin intermediul Internetului. Principalele caracteristici ale acestora constau în:

- *Capacitatea de a înregistra date prin intermediul senzorilor şi*
- *Capacitatea de a transmite date prin intermediul internetului*. [2]

Termenul „Internet of Things" a fost utilizat prima dată de Kevin Ashton într-o prezentare din anul 1998, în cadrul căreia a precizat faptul că *„Internetul lucrurilor are potenţialul de a schimba lumea, la fel cum a făcut şi Internetul. Poate chiar mai mult"*. Ca atare, Internetul lucrurilor a fost introdus oficial de către Uniunea Internaţională a Telecomunicaţiilor în anul 2005. Astfel, IoT permite oamenilor şi obiectelor să fie conectate oricând, oriunde, cu orice şi oricine, utilizând orice reţea şi serviciu.[2]

Fig. 1. Internet of Things (IoT)
Sursa: https://www.army-technology.com/wp-content/uploads/sites/3/2021/10/Internet-of-Things-Technology-Trends.jpg

Apariţia acestui concept a deschis porţile evoluţiei în ceea ce priveşte eficientizarea schimbului de informaţii şi a furnizării serviciilor publice şi private electronice şi fizice prin intermediul internetului, odată cu cea de-a patra revoluţie industrială.

Internetul lucrurilor poate fi realizat în trei paradigme – orientat spre internet (middleware), orientat către lucruri (senzori) şi orientat semantic (cunoaştere). Ca

atare, IoT cuprinde reţeaua mondială de obiecte interconectate adresabile în mod unic pe baza protocoalelor standard de comunicaţie. În acest context „**lucrurile**" sunt *participanţi activi la procesele de afaceri, informaţionale şi sociale capabili să interacţioneze şi să comunice între ei prin schimbul de date şi informaţii, reacţionând în mod autonom la evenimentele din lumea reală şi influenţând mediul înconjurător prin rularea proceselor care declanşează acţiuni şi creează servicii cu sau fără intervenţie umană directă*.[3]

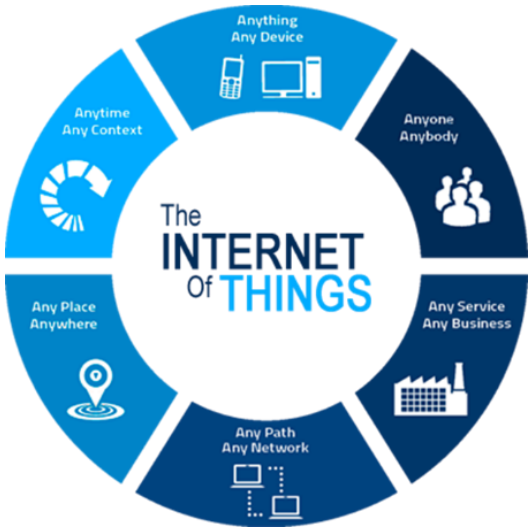

Fig. 2. Internetul lucrurilor
Sursa: https://lh5.googleusercontent.com/fmICqIo3RtVVJci7g154vC2Q7w3sWZnSr7pnTjoV_-rlX3eL5PeJQ_EW7ogbGAU9E-015myi_4zRPHawVrOwUE_yMzjAT8kQXzjxsyv1JICO_PEMbB1PcCp3iMmel3JElyiXEUHu

1.1. Elementele componente ale IoT

Principalele **elementele ale IoT** (Figura 3) constau în:

- „***Identificarea prin radiofrecvenţă RFID* –** utilizată în proiectarea microcipurilor pentru comunicarea fără fir de date pentru a identifica automat orice dispozitiv folosind codul de bare;
- ***Reţele de senzori (Wireless Sensor Network)*** – compuse din *Hardware-WSN13* (noduri de senzori moderne care au capacitatea de a comunica folosind o bandă de frecvenţă), *Stiva de comunicaţii* (nodurile WSN interacţionează între ele pentru a transfera date către o staţie de bază), *middleware* (consolidarea întreţinerea, implementarea, dezvoltarea şi execuţia aplicaţiilor bazate pe senzori) şi *agregarea securizată a datelor*.
- **Modele de adresare** -- *IPV42* ajută la identificarea dispozitivelor din punct de vedere geografic, dar aceste dispozitive nu pot fi determinate ca indivizi şi. *Uniform Resource Name* dezvoltă o copie a resurselor care pot fi preluate prin URL;
- **Stocarea datelor --** datele trebuie menţinute într-un mod sigur şi fiabil şi

- **Vizualizarea datelor** -- Datele trebuie să fie vizualizate şi uşor de înţeles de către utilizator, astfel încât vizualizarea să fie mai uşoară pentru toată lumea. Vizualizarea ar trebui să conţină atât date brute, cât şi date transformate, care sunt utile în special pentru un utilizator final."[4]

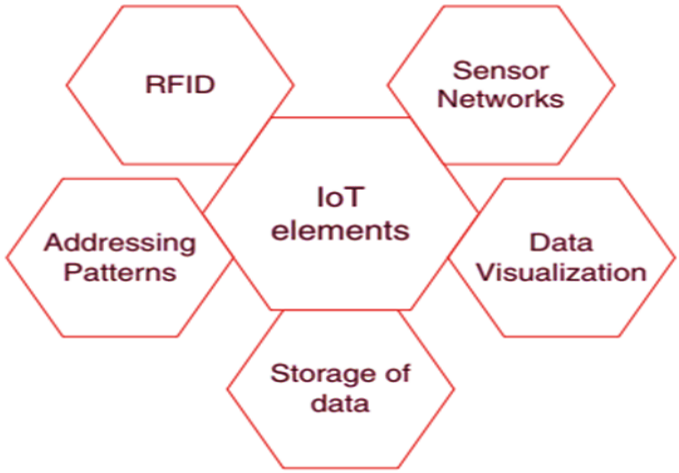

Fig. 3. Elementele IoT
Sursa: S. Dhiviya, S. Malathy, D. Rajesh Kumar, Internet of Things (IoT) Elements Trends and Applications, p.2

În ceea ce priveşte, termenii de bază utilizaţi în IoT întâlnim:

- „***Dispozitiv al Internetului lucrurilor (Internet of Things device):*** orice dispozitiv de sine stătător conectat la Internet, care poate fi monitorizat şi /sau controlat dintr-o locaţie aflată la distanţă;
- ***Ecosistem al Internetului lucrurilor (Internet of Things ecosystem)*:** componentele care permit întreprinderilor, guvernelor şi consumatorilor să se conecteze la dispozitivele dedicate IoT: telecomenzi, tablouri de bord, reţele, gateway-uri, date de analiză, stocarea datelor şi securitatea;
- ***Entitate (Entity)**:* întreprinderi, guverne şi consumatori;
- ***Strat fizic (Physical layer):*** hardware-ul care alcătuieşte un dispozitiv dedicate Internetului lucrurilor, inclusiv senzori şi componente de reţea;
- ***Strat de reţea (Network layer):*** este responsabil pentru transmiterea datelor colectate de către stratul fizic la diferite dispozitive;
- ***Strat de aplicaţie (Application layer):*** protocoalele şi interfeţele utilizate de dispozitive pentru a identifica şi a comunica între ele;
- ***Telecomenzi (Remotes):*** activează entităţile care utilizează dispositive dedicate Internetului obiectelor pentru a se conecta la ele şi a le controla folosind un tablou de bord, cum ar fi o aplicaţie mobilă. Acestea includ smartphone-uri, tablete, calculatoare, ceasuri inteligente, televizoare conectate şi telecomenzi;

- ***Tablou de bord (Dashboard):*** afişează informaţii referitoare la ecosistemul utilizatorilor, permiţându-le acestora să- şi controleze propriul ecosistem al Internetului lucrurilor. Este inclus, în general, într-o telecomandă;
- ***Sisteme software de analiză (Analytics):*** sisteme software care analizează datele generate de dispozitivele dedicate Internetului lucrurilor. Analiza poate fi utilizată pentru o varietate de scenarii, cum ar fi mentenanţa predictivă;
- ***Depozit de date (Data storage)***: locul în care sunt stocate datele provenite de la dispozitivele dedicate Internetului lucrurilor şi
- ***Reţea (Network)***: stratul de comunicare pe Internet care permite entităţilor să comunice cu dispozitivele lor şi uneori dispozitivelor să comunice între ele."[2]

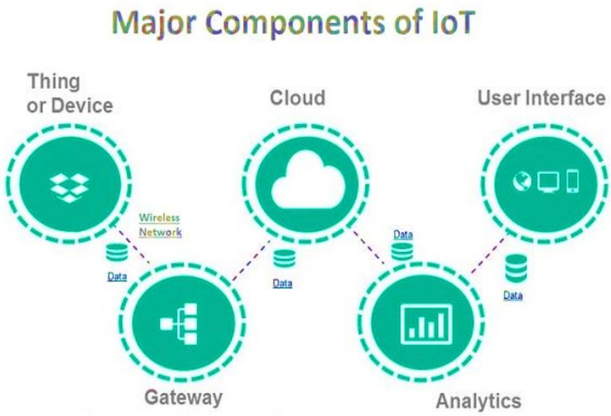

Fig. 4. Componentele IoT
Sursa: http://rfpage.com/wp-content/uploads/2018/01/Key-IoT-Components.jpg

1.2. Avantaje şi dezavantaje în utilizarea IoT în domeniul public

Precum oricare dintre tehnicile utilizate pentru îmbunătăţirea unor proces atât în mediul public, cât şi în cel privat, Internetul lucrurilor prezintă o serie de avantaje şi dezavantaje în aplicarea sa la nivelul administraţiei publice.

Pe de o parte, printre **avantajele** utilizării IoT se numără:

- „capacitatea de a accesa informaţii de oriunde şi oricând pe orice dispozitiv;
- comunicare îmbunătăţită între dispozitivele electronice conectate;
- transferul de pachete de date printr-o reţea conectată economisind timp şi bani şi
- automatizarea sarcinilor care ajută la îmbunătăţirea calităţii serviciilor unei afaceri şi reducând nevoia de intervenţie umană".[1]

Pe de altă parte, **dezavantajele** IoT includ următoarele:

- „odată cu creşterea numărului de dispositive conectate creşte şi numărul de informaţii partajate între dispozitive şi potenţialul ca un hacker să fure informaţii confidenţiale;

- dificultatea întreprinderile de a colecta şi gestiona datele colectate de la un număr mare de -- poate chiar milioane -- de dispozitive IoT;
- posibilitatea coruperii dispozitivelor conectate în cazul identificării unei erori la unul dintre dispositive şi
- lipsa unui standard internaţional de compatibilitate pentru IoT, ceea ce duce la dificultatea de comunicare între dispozitivele de la diferiţi producători." [1]

2. Administraţia publică 2.0.

Spre deosebire de administraţia publică clasică, **administraţia 2.0**. () are la bază conceptul de *e-guvernare/ guvernanţă electronică*, axându-se asupra facilitării serviciilor publice de calitate cetăţenilor prin intermediul internetului (site-uri oficiale ale instituţiilor publice, baze de date şi rapoarte privind informaţiile publice).

Fig. 5. Administraţia 2.0
Sursa: https://www.uni-potsdam.de/fileadmin/projects/up/images/nachrichten/2020-03_Europa-digital_AdobeStock_245637983_Sikov.jpg

Guvernanţa electronică reprezintă *„aplicarea instrumentelor TIC (Tehnologia informaţiei şi comunicaţiilor) pentru furnizarea de servicii guvernamentale şi facilitarea schimbului de informaţii prin integrarea diferitelor sisteme de sine stătătoare între guvern şi cetăţeni (G2C), guvern şi mediul de afaceri (G2B) şi între guvern şi instituţiile statului (G2G)".*[5] Astfel, prin e-guvernare administraţia publică utilizează cea mai nouă tehnologie de comunicare şi transferare a informaţiilor pentru a oferi cetăţenilor servicii publice de înaltă calitate, accesul la informaţii publice de actualitate şi a încuraja participarea acestora la procesul de guvernare prin utilizarea sistemului de feedback.

Cu alte cuvinte, administraţia 2.0 vizează digitalizarea tuturor sectoarelor publice (educaţie, economie, administraţiei publică, politici publice şi sociale etc.) Ca atare, un sistem administrativ ce are la bază e-guvernarea vizează utilizarea unor platforme online de schimb de informaţii, acces al informaţiilor publice şi instrumente de educaţie electronică (E-learning) în vederea dezvoltării societăţii civile şi asigurarea unor servicii publice de înaltă calitate tuturor cetăţenilor.

2.1. Elementele administrației 2.0. în România

Bazele administrației 2.0 în România au fost puse odată cu adoptarea și implementarea Regulamentului UE 2018/1724 privind înființarea unui portal digital unic (single digital gateway) în vederea facilitării accesului cetățenilor la informații, proceduri și servicii de asistență și de soluționare a problemelor. [6]

Fig. 6. Administrația publică digitală
Sursa: https://smartcityblog.ro/wp-content/uploads/2017/12/10-627x376.jpg

Astfel, în 2020 a luat naștere Autoritatea pentru Digitalizarea României, principala structură din cadrul Ministerului Cercetării, Inovării și Digitalizării cu rolul de a realiza și coordona implementarea strategiilor și a politicilor publice în domeniul transformării digitale și societății informaționale.[7]

Ca atare, începând cu luna decembrie 2020 cetățenii români au acces prin intermediul Sistemului Electronic Național (SEN) la următoarele servicii publice online:

- „informații, proceduri și servicii de asistență și de soluționare a problemelor pentru cetățeni și companii din Uniunea Europeană, în cadrul rețelei europene Single Digital Gateway – Portalul Digital Unic, găzduit de e-guvernare.ro
- legăturile de contact ale principalelor instituții publice din România
- registrul național al instituțiilor publice din România
- legătura de contact pentru depunerea declarațiilor la ANAF și
- registrul furnizorilor acreditați de servicii de certificare pentru semnătura electronică."[8]

Pe lângă acest sistem, ADR gestionează următoarele elemente de guvernare electronică la nivelul statului român:

- Sisteme Informatice de tip eGuvernare
- Autorizații Auto

- Sistemul Electronic Național
- Sistemul Electronic de Achiziții Publice
- Sistemul Național Electronic de Plata online cu cardul a taxelor și impozitelor
- Platforma pentru Integrarea Serviciilor de e-Guvernare [8]

Principalele servicii publice electronice disponibile astăzi în România cuprind: **serviciile electronice integrate sau aflate în curs de integrare în sistemul electronic național** (Figura 7), **serviciile electronice independente utilizate de ministere sau agenții ale guvernului central** (Figura 8) și serviciile electronice independente utilizate de administrații publice locale (site-urile oficiale ale primăriilor). [9]

Website	Utilizări:	Status:
Ghiseul.ro www.ghiseul.ro	Plata taxelor și amenzilor, extinzând un mecanism anterior pentru plata TVA	Funcțional și în dezvol-tare, lansat 2006.
e-Guvernare http://www.e-guvernare.ro/	Agregator de website-uri care urmărește să devină punctul de acces unic pentru servicii ca: depunerea declarațiilor, plăți ale unor taxe, achiziții publice, autorizații de transport, etc.	În dezvoltare, lansat 2003
e-Direct Platform https://edirect.e-guvernare.ro	Punct unic de informare pentru firme, inclusiv acces la Registrul Comerțului	Incipient, în dezvoltare
SEAP www.e-licitatie.ro	Licitații și achiziții publice	Funcțional, lansat în 2002, este considerat un succes
Centrul Național de Răspuns la Incidente de Securitate Informatică https://www.cert.ro/	Alerte de malware și vulnerabilități și soluții Servicii de certificare	Funcțional
Poștei Române https://www.posta-romana.ro	Servicii de transfer valutar	Incipient
Proiectul Infrastructură de tip cloud pentru instituțiile publice din România - ICIPRO al Institutul Național de Cercetare-Dezvoltare în Informatică - ICI București www.icipro.ro	Servicii cloud pentru instituții publice	În dezvoltare
e-Academy for Civil Servants http://eacademie.e-guvernare.ro/	Resurse educaționale pentru administrația publică	Website de informare

Fig. 7. Serviciile electronice oferite de Sistemul Electronic Național
Sursa: Costel Stăvărache, E-guvernarea în România: Reforme pentru o guvernare mai bună, p.45

Instituție Publică	Aplicația	Website
ANAF		www.goo.gl/kVTSGB
Guvern		https://goo.gl/50ysg7
Ministerul sănătății	Cardul de sănătate	http://www.cnas.ro/casmb/page/cardul-national-de-asigurari-de-sanatate.html
		www.stopgripa.ro/ministerul-sanatatii-lansat-aplicatie-pentru-mobile-vaccinapp/
		www.stopfumat.eu/campanii/
	CNAS	www.cnas.ro/page/verificare-asigurat.html
MAE	Alerte de călătorie Serviciul Consular	www.mae.ro/travel-alerts www.econsulat.ro/
	Înscrierea în registrul electoral pentru cetățenii români care locuiesc în străinătate	www.registrulelectoral.ro/
MECS		www.anmcs.gov.ro/web/acces-aplicatie-capesaro/
		www.siiir.edu.ro/acces-siiir www.goo.gl/maOFRg
		www.siiir.edu.ro/acces-siiir www.goo.gl/84R0Vj
Ministerul de Interne		www.dsu.mai.gov.ro/descarca-gratuit-aplicatia-dsu/
	Poliția de Frontieră	www.goo.gl/ghleg8
Ministerul Mediului		www.play.google.com/store/apps/details?id=ro.indaco.inspectorapv_public
Ministerul Justiției		www.avocatro.net/forum/civil/193-ce-este-sistemul-ecris
Ministerul Muncii	Revisal	www.reges.inspectiamuncii.ro/Cont/Autentificare?Return
	Casa de pensii	www.cnpp.ro/web/guest/varsta-pensionare

Fig. 8. Serviciile electronice oferite independent de instituții publice centrale
Sursa: Costel Stăvărache, E-guvernarea în România: Reforme pentru o guvernare mai bună, p.46

Cu alte cuvinte, statul român a realizat primii paşi în consolidarea e-guvernării şi dezvoltarea administraţiei 2.0. Însă, trebuie să avem în vedere şi faptul că încă mai există o parte din populaţie care fie nu are acces la internet sau nu ştiu să utilizeze platformele online (fie în scopuri comerciale, fie în scopuri educaţionale).

Conform, rapotului Institiutului Naţional de Statistică privind accesul la internet a cetăţenilor români în perioada 2019-2020 (Tabelul 1), putem observa faptul că procentul populaţiei fără acces la internet a scăzut atât în mediul rural, cât şi urban ceea ce denotă o evoluţie pozitivă în direcţia digitalizării.

Tabel 1. Accesul cetăţenilor la internet în perioada 2019-2020 în funcţie de mediul de rezidenţă

-procente-

	Urban		Rural	
	2019	**2020**	**2019**	**2020**
Total gospodării	100,0	100,0	100,0	100,0
Conectate la internet	82,5	84,8	66,8	69,7
Fără conectare la internet	17,5	15,2	33,2	30,3

Sursa: https://insse.ro/cms/sites/default/files/com_presa/com_pdf/tic_r2020.pdf

În plus, în ceea ce priveşte gradul de utilizare a serviciilor online (Tabelul 2), putem observa faptul că încă mai există o parte a populaţiei care nu a utilizat niciodată internetul (deşi în scădere faţă de anul 2019): 3,4% pentru persoanele cu

vârsta cuprinsă între 16-34 ani, 6,7% între 35-54 ani şi 34,6% între 55-74 ani. Ca atare, în vederea dezvoltării administraţiei 2.0 trebuie să avem în vedere furnizarea serviciilor publice de calitate în mediul fizic pentru aceşti cetăţeni şi nu supunerea acestora la digitalizare.

Tabel 2. Gardul de utilizare a internetului în funcţie de vârstă

Grupa de vârstă	Persoane care nu au folosit internetul niciodată		Persoane care folosesc sau au folosit vreodată internetul	
	2019	2020	2019	2020
16 - 34 ani	4,1	3,4	95,9	96,6
35 - 54 ani	10,5	6,7	89,5	93,3
55 - 74 ani	40,1	34,6	59,9	65,4

Sursa: https://insse.ro/cms/sites/default/files/com_presa/com_pdf/tic_r2020.pdf

În acest sens, următorul pas către desăvârşirea administraţiei 2.0 îl reprezintă instruirea populaţiei în utilizarea serviciilor publice electronice şi facilitarea accesului la internet tuturor cetăţenilor.

Nu în ultimul rând, în vederea conturării administraţiei 2.0 în sistemul administrativ românesc trebuie sa privim asupra analizei SWOT privind digitalizarea administraţiei publice româneşti (Figura 9).

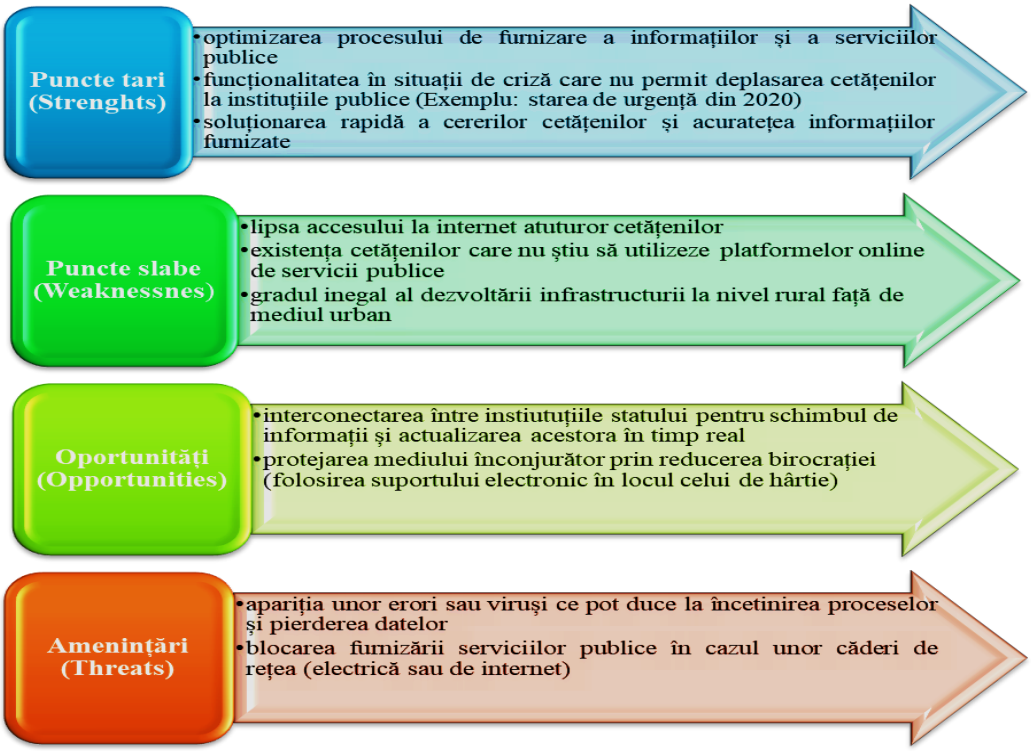

Fig. 9. Analiza SWOT privind digitalizarea administraţiei publice româneşti

3. Concluzii

În concluzie, principalul rol al utilizării IoT în administraţia publică este consolidarea guvernanţei electronice la nivelul instituţiilor publice şi stabilirea unui canal efecient, rapid şi actualizat în timp real de informaţii între instituţiile statului, pe de o parte şi între instituţii şi cetăţeni, pe de altă parte. Astfel, are loc, de asemenea, conturarea şi dezvoltarea administraţiei 2.0 sau administraţia publică digitală.

Deşi în cazul statului român au fost întreprinşi o serie de paşi importanţi în acest demers, încă mai există o serie de piedici în desăvârşirea unei administraţii 2.0, precum lipsa infrastructurii şi a accesului la internet, dar şi existenţa cetăţenilor care nu ştiu să utilizeze această tehnologie pentru accesarea serviciilor publice electronice.

Cu alte cuvinte, consider că administraţia 2.0 în România trebuie să aibă în vedere implementarea elementelor IoT pentru eficientizarea serviciilor publice digitale, dar şi instruirea cetăţenilor în utilizarea acestora şi eficientizarea serviciilor publice la nivel fizic pentru cetăţenii care nu utilizează încă mediul online.

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Vatra Luminoasă, age-friendly-study of intergenerational architecture in a Bucharest neighborhood

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Abstract

Objectives: *In the context of the future challenges of the society in which we live, the ageing process of the population determines requirements to which architecture must respond from now on. In this sense, the students of group 52 (academic year V, 2019-2020, Faculty of Architecture, Ion Mincu University of Architecture and Urbanism, Bucharest, Romania-IMUAU) were challenged in the most complex project in the faculty to experience a new perspective in architecture, the perspective of age, in order to understand and seek contemporary meanings of the concept of "age-friendly" in architecture. In Romania there are no concrete concerns in this regard, although at the research level it has been discussed for over 10 years.*

Prior work: *The study is based on concepts already promoted in previous research of the authors such as age-friendly architecture, intergenerational architecture, Universal Design, inclusive architecture.*

Approach: *Research by design is used as a method. The proposed site is located in the Vatra Luminoasă neighborhood, on the site of the former Zefirul factory. The project took place in 2 phases, phase 1 in 4 teams of 7-8 students, resulting in 4 master plans, phase 2 in teams of 2 students or individually, resulting in 23 projects. The teams of students were coordinated by 4 professors from IMUAU and specialist advice was provided by 4 experts (physician, psychologist, biologist and physical therapist).*
Results: *The 4 master plans highlighted different architectural approaches for the concept of "age-friendly": Street with Garden, Enclosure, 7 Courtyards and Strips. Within the 4 master plans, 23 projects were developed such as: residential centers for seniors, housing for seniors, multi- and inter-generational housing, intergenerational community centers, after-school, medical rehabilitation, wellness and spa centers. All projects were focused on the needs of users, from different age groups. Emphasis was placed on the use of therapeutic architectural tools such as light, shape, color, texture, sound.*
Implications: *The research results reveal the importance of a good theoretical knowledge of the ageing population topic and of the training of young professionals specializing in age-friendly architecture. Teamwork and the interdisciplinary approach are an important key to the success of a sustainable, intergenerational architecture project with a significant impact at the urban level.*
Value: *The research proves the potential of the Vatra Luminoasă neighborhood in an architectural perspective of the ages in architecture.*

Keywords: *ages, intergenerational architecture, inclusive design, research by design, interdisciplinarity*.

1. Objectives

This study of intergenerational architecture started absolutely naturally, from the challenges that contemporary society brings: the ageing process of the population, the increased urbanization and the COVID-19 pandemic that we have been experiencing for 2 years, since the beginning of 2020.

According to UN, worldwide, the percentage of older people (65+) will increase from 9% in 2019 to 16% in 2050 [1] and at the European Level the situation is even more dramatic, 2050 is associated with a percentage of almost 30% of the elderly population. [2].

Romania is no exception to this trend [3], it is a country with a population of 19,53 Mlns of people. [4] Life expectancy at birth was estimated to be 75,83 years in 2020 [1], with proportion of population 65+ being 18,5% in 2019 [5]. It is estimated that the proportion of population 65+ will increase to 21% in 2030 and to 27,7% in 2050. [1] 53,8% of Romanian citizens live in urban areas. [4] Of course, new studies are underway because the COVID-19 pandemic has claimed many lives, especially in the elderly. [6] In high-income countries, 89% of COVID deaths are in 65+ persons. In low-income countries, 45% of COVID deaths are in 65+ people. The big problem is that, in both cases, a lot of people providing professional and informal assistance

and support to the older people, died, too. [7] From the beginning of 2020 until the time of writing this article, globally, there are almost 300 million confirmed cases of SARS-CoV-2 infection, including almost 6 million deaths reported by the WHO and also over 9 billion vaccine doses administered. [8] We are in the midst of the 5th wave of the COVID-19 pandemic and the unforeseen can occur at any time.

We live longer but it is important to live healthy and independently. Gerontologists also talk about a feminization of the aging process and this phenomenon has an impact on the way social programs are designed. The city must take these changes into account, both in terms of urban space and in terms of architectural objects. This research sought to provide architectural answers-but in an interdisciplinary manner- to questions such as:

- How **architecture** can stimulate **Active & Healthy Aging**?
- How **architecture** can support **Ageing in Place & Ageing in Community**, helping to build **sustainable communities**?
- How **architecture** can stimulate **intergenerational communication**?
- How **architecture** can respond to the elderly who need assisted care?

This complex context of demographic change determines requirements to which architecture must respond from now on. In this sense, the students of group 52 (5th year of study, 2019-2020, Faculty of Architecture, IMUAU- Ion Mincu University of Architecture and Urbanism, Bucharest, Romania) were challenged in the most complex project in the faculty to experience a new perspective in architecture, the perspective of age, in order to understand and seek contemporary meanings of the concept of "age-friendly" in architecture. In Romania there are no concrete concerns in this regard, although at the research level it has been discussed for over 10 years.

2. Prior work

The study is based on concepts already promoted in previous research such as age-friendly architecture, intergenerational architecture, Universal Design, inclusive architecture. Designing the built environment for elderly people comes with specific challenges. One needs to understand the manner in which the built space will be accessed and used by real people, to visualize and implement solutions to assist as much as possible through design the ability of the older person to access his home and to perform the activities of daily living with optimal efficiency and in safe manner. Thus, the person will be able to keep him/herself in a virtuous cycle in which activity maintains functioning and functioning maintains activity and social life (including productive aspects), maintaining a higher level of the quality of life for them and their relatives, delaying onset of frailty, disability and decline as long as possible. [9]

In the last 2 years we have developed several studies and we are part of research projects that take into account the impact of the COVID-19 pandemic on the built environment such as housing [10] or healthcare dedicated to the elderly with specific pathologies [11], [12], [13]

Within this research topic, architectural projects dedicated to frail people were studied, such as: homes for the elderly, care centers for the elderly, nursing

homes (*Santa Rita Geriatric Center-2003* [14], *Spain, Ellesmere Nursing Home- 2007* [15], *UK, Graz Nursing Home-2014* [16], *Austria, Dublin Respite Center-Ireland, 2009* [17]; kindergartens (*Kindergarten-2010* [18], *Austria, Monthey Kindergarten-2008* [19], *Switherland*); childcare centers (*Econef Children's Center- 2018, Tanzania* [20]), medical rehabilitation centers for disabled people (*Rehabilitation Center- 2002, Basel* [21], *Sax Rehabilitation Center-2015, Germany* [22])

3. Approach

Fig. 1. The plot of research- Former Zefirul Factory plot
Source: Google Maps
https://www.google.com/maps/place/Zefirul/@44.44105,26.1427044,566m/data=!3m1!1e3!4m5!3m4!1s0x40b1f92a499a1d11:0x850ab6bc899b70df!8m2!3d44.4423413!4d26.1440279

The framework theme of the 10th semester, 5th year of study, as a last step in the educational training of students before the diploma project, proposes, as a general topic, approaching future challenges in which architecture becomes or is an important part of the solution.

Research by design is used as a method. [23] Research by design is used in architecture research, for investigating qualities and issues, potential and possibilities of development of a certain location, by developing and analyzing architectural solutions for a given space. The proposed site is located in the residential neighborhood *Vatra Luminoasă*, on the site of the former Zefirul factory, with double opening, on Iancului Avenue and Vatra Luminoasă Street, plot area ~ 22000sqm (21977sqm). A Zonal Urban Plan [24] was also developed on this site, which was recommended to the students only for informative consultation.

The project took place in 2 phases, phase 1 in 4 teams of 7-8 students, resulting in 4 master plans, phase 2 in teams of 2 students or individually, resulting in 23 projects. The teams were coordinated by 4 professors from IMUAU and specialist advice was provided by 4 experts: 1 physician, 1 psychologist, 1 biologist and 1 physical therapist (P.T.).

The proposed height regime is low, maximum groundfloor+2 - groundfloor+4 according to the design theme. The height regime can undergo changes depending on the Master Plan conducted by each team of students in the first phase of urbanism.

The maximum buildable area will take into account the zonal regulations and will be nuanced in the same way, depending on the urban planning study from the 1st phase.

In the 1st phase, students can propose, in a solid argumentative approach, new regulations that can adjust the regulations in force.

Students were invited to explore the **AGE-FRIENDLY** concept in **ARCHITECTURE.** Age-friendly architecture's goal is to provide users with a barrier-free built environment, with augmented access and embedded comfort capabilities. The idea is to meet the needs and requirements resulting from the functional limitations of the older people, generated by sensory, motor, psychological impairments of older people, from the built solution itself, to avoid the future otherwise-mandatory changes and adaptations. [25] Students' aim was to outline their design theme on the proposed site by opting for one or more of the following options:

- **Assistance in the community with the maintenance of the home**: Elderly

Dwellings / Home based Assisted Living; Senior Clubs, Seniors Centers; Adult Day Care Centers; Medical Rehabilitation Centers.

Ageing in place means maintaining one's residency in time and it is a desideratum for longer independent living. Keeping the ageing person in his/her usual environment ensures maintaining the routines in the activities of daily living as well as maintaining the social network and space coordinates of the older person. [26]

- **Assistance in the community involving a change of place**: Social Dwellings;

Assisted Living Facilities (ALF), Adult Care, Residential Care; Adult Foster Care; Continuing Care Retirement Communities (CCRC).

Ageing in community means expanding the concept of ageing in place in a more complex sense. [27] Ageing in community means the possibility of moving, in time, to a community adapted to the needs of the elderly that can provide assistance on several levels, depending on the needs of its members.

Projects Coordinators:

Team: 4 Professors | Prof. PhD. Arch. Dan Corneliu Şerban, Lecturer PhD. Arch. Mihaela Zamfir, Lecturer PhD. Arch. Ana Maria Vesa (Dobre), Arch. Simina Dron

Experts advice:

Team: 4 Experts | Md. Mihai-Viorel Zamfir, Psych. Andreea Georgiana Marin, Biol. Ileana Ciobanu, P.T. Dragoş-Cristian Bogdan.

PHASE 1 | 4 MASTER PLANS

- MASTER PLAN 1 | *Street with Garden*

Team: 7 Arch. Students | Răzvan Badea Şuţu, Laura Covaci, Teodora Cristache, Teona Dascălu, Alexandra Seregi, Vlad Şomăcescu, Laura Tomşa.

- MASTER PLAN 2 | *Enclosure*

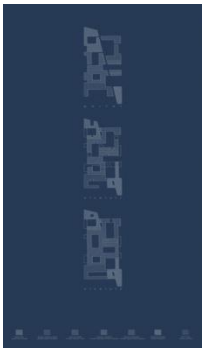
Team: 7 Arch. Students | Andrei Băcău, Anca Băduţ, Mihai Dobre, Andrei Leaşu, Georgian Mirescu, Andra Nicoleanu, Livia Tănasă.

- MASTER PLAN 3 | *7 Courtyards*

Team: 7 Arch. Students | Ioana Cojocaru, Ana Dobrin, Ana-Maria Lakatoş, Irina Lungu, Iulian Pînzaru, Mariana Popescu, Alina Stoica.

- MASTER PLAN 4 | *Strips*

Team: 8 Arch. Students | Alexandru Bălău, Dănuţ Marius Câcu, Teodor Cristian Dascălu, Ionuţ Alexandru Dima, Alice Andreea Georgescu, Alexandru Moldovan, Vlad Răzvan Nicolescu, Ana Sandu.


From left to right: **Fig. 2.** MASTER PLAN 1 | *Street with Garden*; **Fig. 3.** MASTER PLAN 2 | *Enclosure*; **Fig. 4.** MASTER PLAN 3 | *7 Courtyards*; **Fig. 5.** MASTER PLAN 4 | *Strips*
Source: Group 52_2019-2020 Archive

PHASE 2 | 23 PROJECTS

- MASTER PLAN 1 | *Street with Garden*: 1.1 Intergenerational Community Center; 1.2 Elderly Dwellings; 1.3 Wellness Center; 1.4 Occupational Therapy Intergenerational Center.
- MASTER PLAN 2 | *Enclosure*: 2.1 Rehab and Wellness Center; 2.2 Intergenerational Residential Building; 2.3 Elderly Nursing Home; 2.4 Intergenerational Community Center.
- MASTER PLAN 3 | *7 Courtyards*: 3.1 The Magnolias Garden;

3.2. Intergenerational Courtyard; 3.3 Elderly Residential Center; 3.4 Courtyard with School; 3.5 The Square Court_Elderly Nursing Home; 3.6 Community Center; 3.7 After school.

4. MASTER PLAN 4 | *Strips*: 4.1 Community Center; 4.2 After School;

4.3. Nursing Home for Elderly with Neurocognitive Disorders; 4.4 Rehab Center; 4.5 Social Dwellings; 4.6 Elderly Dwellings; 4.7 Multifunctional Adaptable Community Center; 4.8 Community Center for Blind People.

4. Results

The 4 master plans highlighted different architectural approaches for the concept of "age friendly": *Street with Garden* | *Enclosure* | *7 Courtyards* | *Strips*. Within the 4 master plans, 23 projects were developed such as: residential centers for seniors, housing for seniors, multi- and inter-generational housing, intergenerational community centers, after-school, medical rehabilitation centers, wellness and spa centers. All projects were focused on the needs of users, from different age groups. Emphasis was placed on the use of therapeutic architectural tools such as: light, shape, color, texture, sound.

• MASTER PLAN 1 │Street with Garden

The Vatra Luminoasă plot is perhaps the largest area of land in Bucharest drawn and built as a unit [28], in the sense of a common logic of form and habitation. To build now, in the immediate vicinity of a clear geometry, involves responsibility and a kind of negotiation between adapting to the character of the area and the need for landmark architecture within the city. Thus, the 1st team subdivided the constituent elements of the master plan into urban, natural and artificial elements, into gaps and fills, into typologies, which they searched for and identified around, taking over their subtle logic and how to sit in place.

The concept of the MASTER PLAN 1 focuses on the idea of an interspersed pedestrian street, with green spaces that develop in gardens, a central, longitudinal spine that crosses the site from one end to the other, proposing itself as the major compositional axis.

The proposal coagulates, as a system, a network of places with spatial and functional links that connect to the city as an organism of intercalated processes. The proposed public functions take into account the social and health services that the different categories of elderly people need in the proximity of their homes, but also the need to attract other age groups within the community. Housing offers to the elderly the opportunity to remain in the community [27] even if their needs change over time, responding through a variety of housing types, from independent dwelling units to medically assisted ones. The proposed activities ensure inter-generational interactions and connections both at the city and neighborhood level, taking into account the school in the immediate proximity. The activities also organize the outdoor space, generating a diverse spectrum of semi-public and semi-private courtyards and gardens and variously influencing the public area. An elderly-friendly community combines both environmental and social aspects to create living spaces, which increases the quality of housing. These issues need to be complementary and mutually supportive to ensure that the elderly live and participate in the community.

1.1. Intergenerational Community Center │*Street with Garden*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Teodora Cristache &
St. Arch. Vlad Şomăcescu
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 6. Intergenerational Community Center │*Street with Garden*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Vertical community"

1.2. Elderly Dwellings │*Street with Garden*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Răzvan Badea Şuţu &
St. Arch. Teona Dascălu
Tutors:
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Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 7. Elderly Dwellings │*Street with Garden*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Small is beautiful"

1.3. Wellness Center │*Street with Garden*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Laura Maria Covaci
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 8. Wellness Center │*Street with Garden*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Active ageing, relaxation, spa"

1.4. Occupational Therapy Intergenerational Center │*Street with Garden*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St.Arch. Alexandra Seregi &
St. Arch. Laura Tomşa
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 9. Occupational Therapy Intergenerational Center │*Street with Garden*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Unity by diversity"

- MASTER PLAN 2 │*Enclosure*

At this moment, the empty site of the former Zefirul factory represents a dysfunction in the Vatra Luminoasă parceling, but the meaning of the place is captured in its accident value, even before the existence of the neighborhood, as the historical plans reveal. [29]

Team 2 approach is in this sense a conservative one, by choosing to keep the geometry of the vacuum and not to obsessively compartmentalize it, to fit it in the size of the area. Taking inspiration both from the typology of inserting green spaces present in the vicinity, but also analyzing on several levels the local urban fabric, it was found the need for a space that proposes a new composition rule for a future moment of neighborhood restructuring.

MASTER PLAN 2 proposes the concept of enclosure, starting from the most intimate part of the site, from its core in which functions dedicated to the elderly with different abilities and needs are designed, whose privacy and tranquility is ensured from the beginning, through the preferential position.

From the central, private area, the spaces open, with public valences to Iancului Avenue, where the aim is not to complete the front, but to preserve the "break" and mark it through a square dominated by a high accent that responds to the opposite, and semi-public to school, with a meeting place, a common courtyard with fluid circulation. The stake of the project is that of the hortus, the hidden urban garden, protected by the adjacent buildings, whose role is to coordinate the movements of the viewer through space, revealing this precious place in the middle.

Towards Vatra Luminoasă Street, the ensemble is connected by the existing school with a function meant to unite the community with all its participants, regardless of age.

2.1. Rehab and Wellness Center │*Enclosure*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Andra Nicoleanu &
St. Arch. Livia Tănasă
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 10. Rehab and Wellness Center │*Enclosure*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Spa, inclusive design, accessibility"

2.2.Intergenerational Residential Building │*Enclosure*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Georgian Mirescu
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 11. Intergenerational Residential Building │*Enclosure*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Accessibility, different but together, communication by architecture"

2.3. Elderly Nursing Home │*Enclosure*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Andrei Băcău &
St. Arch. Mihai Dobre
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 12. Elderly Nursing Home │*Enclosure*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Facilities for elderly with different abilities"

2.4. Intergenerational Community Center │*Enclosure*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Anca Băduţ &
St. Arch. Andrei Leaşu
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 13. Intergenerational Community Center │*Enclosure*│ Vatra Luminoasă
Source: Group 52*_2019-2020 Archive*

"Dynamic and attractive architecture, full of color"

- MASTER PLAN 3 │*7 Courtyards*

Vatra Luminoasă is a historical monument neighborhood consisting of 2 important interwar plots: Vatra Luminoasă and Iancului. It is a unitary area with a bohemian atmosphere in which the landscaping elements dominate the public space and the scale at which it is built is friendly to man. [30]

From the perspective of circulations, there were dysfunctions in the area related to traffic and accessibility for the elderly and disabled people, for whom this

master plan sought solutions. Through this project, the pedestrian access was done from both streets and the car access only from Vatra Luminoasă Street, a street with a smaller size and less intense traffic.

The project takes into account the abundant vegetation in the area with a defining character for the neighborhood, remarkable are the landscaping with specially chosen plants such as magnolias and firs. The presence in the neighborhood of the parks and gardens as defining elements for the urban composition, [31] generated the concept from which this project was developed.

The concept of MASTER PLAN 3 is born from this urban analysis summarized above and involves the design of spaces similar to gardens and parks in the existing urban tissue. In order to meet the traffic criteria, a spine has been proposed that connects these courtyards with each other, also contributing to the spatial order of what is being built. The proposed functions are carefully interrelated to generate a harmonious, intergenerational community in which the elderly, depending on the degree of (in)dependence, remain connected with the families or community to which they belong. Towards Iancului Avenue, public and community functions are proposed so that, as we move forward into the depths of the site, we will find housing on the model of ageing in place, housing with different degrees of assistance for the elderly. Towards Vatra Luminoasă Street, the ensemble opens again to the community by connecting with the existing school, being developed its related functions through extension: workshops, afterschool. This project also targets harmonious intergenerational relations.

3.1.The Magnolias Garden │*7 Courtyards*│ Vatra Luminoasă

University Year: 2019-2020
Authors: St. Arch. Irina Lungu
Tutors:
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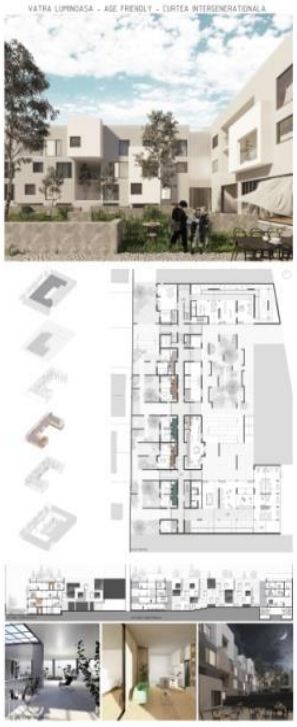
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 14. The Magnolias Garden │*7 Courtyards*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Natural materials,
quiet spaces full of light"

3.2. Intergenerational Courtyard │*7 Courtyards*│ Vatra Luminoasă



University Year: 2019-2020
Author: St. Arch. Ioana Cojocaru
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 15. Intergenerational Courtyard │ *7 Courtyards*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Natural materials, quiet spaces full of light"

3.3. Elderly Residential Center │*7 Courtyards*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Mariana Popescu
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 16. Elderly Residential Center │*7 Courtyards*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Modern way of ageing"

3.4. Courtyard with School | *7 Courtyards* | Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Mariana Popescu
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 17. Courtyard with School | *7 Courtyards* | Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Child-friendly architecture"

3.5. The Square Courtyard_Elderly Nursing Home | *7 Courtyards* | Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Ana Maria Lakatoş
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Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 18. The Square Courtyard_Elderly Nursing Home | *7 Courtyards* | Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Caring for dependent elderly, social medical assistance"

3.6. Community Center │*7 Courtyards*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Iulian Pînzaru
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 19. Community Center │*7 Courtyards*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Enabling community"

3.7. After School │*7 Courtyards*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Ana Maria Dobrin
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 20. After School │*7 Courtyards*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Child-friendly architecture"

• MASTER PLAN 4 | *Strips*

The strip, in the case of this project, is considered a gesture of the natural. Detached from the rigidity of the plot that it is trying to articulate, it becomes an element of language that, through rigorous juxtaposition, together with the newly built fund, configures various community spaces. The site was conscientiously explored, completing a hermeneutic framework, identifying phenomenological meanings of the place and expressing in the project its practical experiences. [32]

The pretext of the subdivision was the spine, the axis, a reflection of the conditionings in the site, the short circuit of two arteries through which a new transversal public dimension is introduced. Towards this attitude, the buildings are articulated, thus creating a public alveolar system throughout the site.

The plots, although very specialized in terms of the assumed architectural program, do not remain indifferent to the immediate vicinity, forming a courtyards system that creates an overall functional synergy.

The architectural programs present in MASTER PLAN 4 are different, respecting a gradation of public access, from the community center in relation to an after-school that connects to Iancului Avenue, going through different types of housing with different degrees of socio-medical assistance, reaching to a nursing home for elderly with neurocognitive disorders or a medical rehabilitation center.

Going back to the natural, Master Plan 4 reminds us of subordination to the free space, open or little arranged, in the spirit of the program but also of the character of the neighborhood that looks like a garden [30] at the level of the Bucharest urban space.

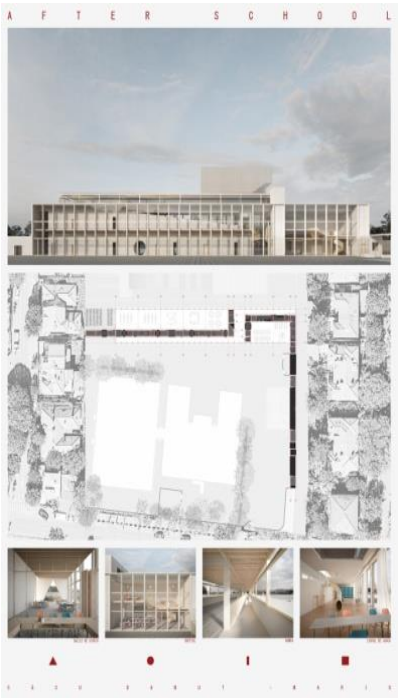
4.1. Community Center | *Strips* | Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Alexandru Bălău
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 21. Community Center | *Strips* | Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Interactivity, learning, communication"

4.2. After School │*Strips*│ Vatra Luminoasă



University Year: 2019-2020
Author: St. Arch. Dănuț Marius Câcu
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 22. After School │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Education by architecture and design"

4.3. Nursing Home for Elderly with Neurocognitive Disorders │*Strips*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Teodor Cristian Dascălu
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 23. Nursing Home for Elderly with Neurocognitive Disorders │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Elderly-friendly architecture, dementia-friendly architecture for frail people"

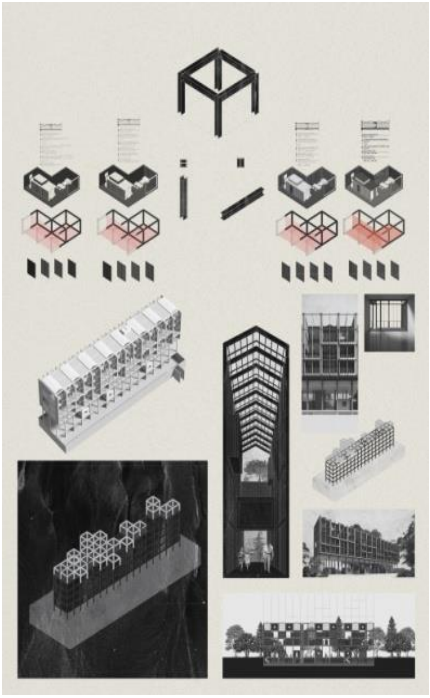
4.4. Rehab Center │*Strips*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Ionuț Alexandru Dima
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 24. Rehab Center │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Therapeutic space"

4.5. Social Dwellings │*Strips*│ Vatra Luminoasă

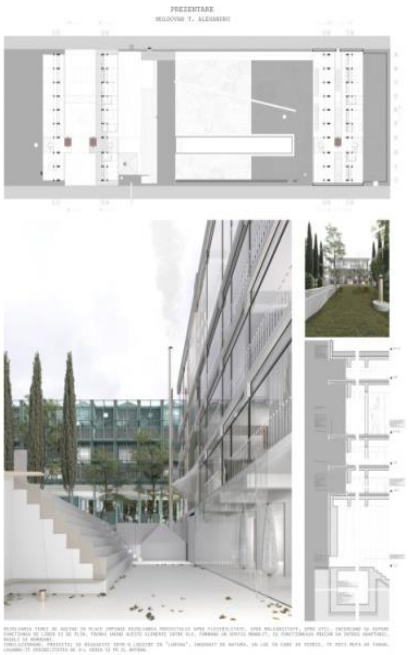


University Year: 2019-2020
Author: St. Arch. Alice Andreea Georgescu
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD. Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana Maria Vesa (Dobre)
Arch. Simina Dron

Fig. 25. Social Dwellings │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Affordable architecture"

4.6. Elderly Dwellings │*Strips*│ Vatra Luminoasă



University Year: 2019-2020
Author: St. Arch. Alexandru Moldovan
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD.
Maria Vesa (Dobre)
Arch. Simina Dron Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana

Fig. 26. Elderly Dwellings │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Elderly friendly architecture, ageing in place"

4.7. Multifunctional Adaptable Community Center │*Strips*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Vlad Răzvan Nicolescu
Tutors:
Prof. PhD. Arch. Dan Şerban
Lect. PhD.
Maria Vesa (Dobre)
Arch. Simina Dron Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana

Fig. 27. Multifunctional Adaptable Community Center │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Communication by cultural activities"

4.8. Community Center for Blind People │*Strips*│ Vatra Luminoasă

University Year: 2019-2020
Author: St. Arch. Ana Sandu
Tutors:
Prof. PhD. Arch. Dan Șerban
Lect. PhD.
Maria Vesa (Dobre)
Arch. Simina Dron Arch. Mihaela Zamfir
Lect. PhD. Arch. Ana

Fig. 28. Community Center for Blind People │*Strips*│ Vatra Luminoasă
Source: Group 52_2019-2020 Archive

"Caring for the disabled people"

5. Implications

The research results reveal the importance of a good theoretical knowledge of the ageing population topic and of the training of young professionals specializing in age-friendly architecture. Intergenerational architecture exercises at the level of contemporary university education in architecture are absolutely necessary in a society where life expectancy is increasing. The young architects must be aware of the necessity of the age dimension of future architecture.

Teamwork and the interdisciplinary approach are an important key to the success of a sustainable, intergenerational architecture project especially when the therapeutic space [33] is a significant part of it, with a significant impact at the urban level.

Fig. 29. Intergenerational Community Center | *Enclosure* |
Vatra Luminoasă
Authors:
St. Arch. Anca Băduț &
St. Arch. Andrei Leașu
Source: Group 52_2019-2020 Archive

6. Value

The research proves the potential of the Vatra Luminoasă neighborhood in an architectural perspective of the ages in architecture. The four master plans were developed on four different and perfectly valid concepts, all four taking into account the age dimension in architecture and the particular value of the Vatra Luminoasă neighborhood. Following this research topic, the students acquired a vocabulary specific to architecture friendly to all age groups and, most importantly, they managed to implement it in feasible projects. The support of the experts in related fields-medicine (geriatrics-gerontology and psychiatry), biology and physical therapy- ensured the assimilation of specialized notions and the detection of the needs of both, different age groups and people with various abilities. The interdisciplinary course of the project, the generative processes proved to be as important as the results. [34] The projects proved what the authors of this paper explored in previous research, namely that a friendly architecture for frail people such as the elderly, children or disabled people is a friendly, inclusive architecture for everyone.

Fig. 30. Community Center for Blind People │*Strips*│
Vatra Luminoasă
Author:
St. Arch. Ana Sandu
Source: Group 52_2019-2020 Archive

Fig. 31. Elderly Dwellings │*Street with Garden*│
Vatra Luminoasă
Authors:
St. Arch. Răzvan Badea Șuțu &
St. Arch. Teona Dascălu
Source:
Group 52_2019-2020 Archive

Fig. 32. Nursing Home for Elderly with Neurocognitive Disorders │*Strips*│
Vatra Luminoasă
Author:
St. Arch.
Teodor Cristian Dascălu
Source:
Group 52_2019-2020 Archive

Fig. 33. The Square Courtyard_Elderly Nursing Home │*7 Courtyards*│
Vatra Luminoasă
Author:
St. Arch. Ana Maria Lakatoș
Source: Group 52_2019-2020 Archive

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Digital democracy in Peril. Safeguarding e-democracy by boosting cybersecurity

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Abstract

New technological developments and the digitalization of public life were not long ago thought to lay the foundation to a new step for liberal democracies all over the world, with the prospects of e-democracy and e-government. However, state-sponsored cyber operations held back progress in boosting e-democracy, and so did online disinformation campaigns, leading to a change in perception that digital technology will actually be detrimental to liberal democracies. Moreover, major illiberal and authoritarian state actors exploited cyberspace and engaged in using and exporting digital authoritarianism. The main objective of this paper is exploring the close relationship between e-democracy and cybersecurity, arguing that without sound cybersecurity policies and practices, digital democracy is in peril. Furthermore, I shall discuss the role of the state in cyberspace, focusing on the European Union, and argue for a set of cybersecurity policies that enhance the level of security while also safeguarding the values and gains of e-democracy, taking into account relevant literature on this topic and also EU's 2020 cybersecurity strategy. Current research and strategic documents suggest three main courses of action for enhancing e-democracy in a safe way in a cyberspace dominated by malicious activities: developing a sort of 'digital autonomy', securing critical infrastructure and maintaining a free and open Internet. The main contribution of this paper is facilitating the discussion on the relationship between e-democracy and cybersecurity, because as close as they are, as little they are linked together in relevant research. Furthermore, this paper should be relevant both for civil practitioners in the fields of public administration and cybersecurity and for academia, as it focuses on an issue that has become to be of utmost importance for liberal democracies. The final argument of the paper is that the whole digital democratic process should be considered critical infrastructure and shielded by proper cybersecurity measures.

***Keywords**: digital democracy, e-democracy, cybersecurity, cyberattacks, European Union.*

1. Introduction

In 2016, the US presidential elections were disrupted by a major campaign of information operations and cyberattacks attributed to the Russian Federation [27], one year later two cyberattacks showed the world how serious the cyber threat is: UK's hospitals had their activity disrupted by a global ransomware (the 'WannaCry' cyber campaign attributed to North Korea) [22] and Ukraine was the victim of the world's costliest cyberattack, 'NotPetya', which produced billions of dollars in damage worldwide, affecting transnational companies too [15]. One year before the cyber operations against US elections, Russian state-sponsored hackers already caused a serious disruption in Ukraine, launching a cyberattack against its electrical grid which caused a six-hour blackout for over two hundred thousand people [27]. This global context does not seem to be appropriate for moving parts of the democratic process online, and it also does not seem to be a proper environment for developing e-democracy on a widescale.

The Internet, or cyberspace more generally, is looking far worse than the cyber-utopian dreams and hopes of the 1990s and 2000s [3], and it looks like digital authoritarianism is actually becoming more popular and common than digital democracy [26]. Nonetheless, this does not mean that liberal democracies should abandon hopes regarding e-democracy, just that the process is actually way more difficult than the cyber-utopia dreams of the 1990s, and hence it should aim at boosting cybersecurity and also protect democracy at the same time – enhancing e-democracy should go hand in hand with consolidating cybersecurity. The answer to authoritarian and malicious attacks on democracies and democratic processes should not be authoritarianism, but actually more democracy.

In this paper, I shall discuss the relation between e-democracy and cybersecurity, beginning the study with the current state of e-democracy and e-government initiatives and with the cybersecurity context. The research will later focus on the European Union, because it is starting to become an important actor in cyberspace, and also because some of its member-states are already major actors in cyberspace. My argument is that e-democracy and cybersecurity should be enhanced and consolidated at the same time, because leaving digital affairs as they are enables tremendous opportunities for malicious cyber operations and so it lowers trust in e-democracy and in 'regular' democracy. In order to do this, I shall take into consideration relevant literature on e-democracy and cybersecurity, and also EU's 2020 cybersecurity strategy, which puts an emphasis on protecting democratic freedoms in cyberspace. Moreover, throughout this paper, I shall be using e-democracy, digital democracy and cyber democracy interchangeably, for convenience (even though it is not consensually accepted that the three names define the same exact concept in the same way). Moreover, I shall consider e-government as part of e-democracy and as a form of digital participation and digital relations between the public and governments.

2. E-democracy – the Internet to the rescue of democratic participation

2.1. Democracy and liberal democracy

According to Robert A. Dahl (1998), democracy, or the democratic process, is based on five key standards: effective participation (all members must have effective and equal opportunities for expressing themselves and making their opinions on public policies known by other members), inclusion of all adults, voting equality (all votes counted as equal, and every member must have the right to effectively vote), control of the agenda (all members must have the opportunity to choose and decide what should be on the public agenda) and enlightened understanding (all members must have effective and equal opportunities of obtaining information about public policies within reasonable limits) [6].

Thus, democracy guarantees its citizens essential rights, a broad range of personal freedom, self-determination, the opportunity to exercise the freedom of self-determination to a great extent, moral autonomy, providing human development and prosperity and political equality [6]. Moreover, it is assumed that liberal democracies are peace-seeking and do not engage in wars against each other, and also that democracy prevents tyranny and autocracy [6]. In addition to this, most of the countries with a high-level of democracy are represented by a particular form of democracy – liberal democracy, a type of democracy based on representation and an elected government (and hence on elections), where the constitution, the legislature, rule of law, political freedoms and individual rights (e.g., freedom of speech, of assembly, property or religion) are essential [16].

2.2. E-democracy, e-government, e-participation

The Internet has been seen as a mean to raise the level of democracy worldwide and deepen it, consolidating the relationship between citizens and between citizens and governments. The 1990s, at the beginning of the World Wide Web, are illustrative for this idea, with the technological and Internet counterculture promoting a utopian 'Internet revolution'. In the 2000s, hopes were that the Internet will facilitate public deliberation on a scale unthinkable before, closing the gap between and citizens and governments and reducing the gaps and divides within societies. Moreover, in the early 2010s the Internet became a space where social movements formed, grew, and coordinated online and offline actions (e.g., the Occupy or anti-austerity movements worldwide, the Arab Spring etc.), leading to renewed hope that the Internet will generate a radical transformation of democracies, for the better. [3]

According to David F. J. Campbell and Elias G. Carayannis (2018), cyber democracy "is connected to democracy by building and by forming IT-based infrastructures and public spaces" [4]. In addition to this, cyber-democracy, given the characteristics of cyberspace, is also understood as "transcending the boundaries of the nation state, as such adding to the building of transnational, in fact

global public space", and hence public spaces in cyberspace have multiple levels (global, national and subnational) [4].

E-democracy, or digital/cyber democracy can be described mainly by the operation of democratic processes through digital means (or ICT), whether it refers to political communication through social media or government websites and platforms or to e-participation through government initiatives or informal platforms. E-democracy refers predominantly to the concepts of participatory democracy, direct democracy or deliberative democracy, as it focuses more on public discussions and deliberations and a more direct public involvement in the decision-making process, even though most progress was achieved only in the 'obtaining information' dimension of e-democracy. Moreover, e-democracy consists both of passive forms of participation, such as governments making documents and information accessible and transparent, and of active forms of participation, such as online voting processes (e.g., voting for local projects) or platforms for public consultation. However, the emergence of digital means has not led to a transformation of liberal democracies, where political participation is still fundamentally done through representation and parliamentarism, and hence the primarily form of participation of the people (or demos) is realised by voting during elections at different levels or during referendums. [20; 21]

However, despite previous hopes that the Internet will enhance democracy, the events of the last two decades have led to the believe that the Internet will actually increase support for populism, increase inequality and that online deliberation will be nothing than superficial. For instance, social media is, unfortunately, a double-edged sword for democracies, while it can provide a more inclusive involvement of citizens in public deliberations, it can also be a mean for malicious activities, such as disinformation campaigns. [21]

E-voting (online voting), e-petitions and various platforms, portals and forums for citizens to engage with their representatives or to discuss among themselves were tried along the years, but their success varied. Nevertheless, these initiatives did not lead to the expected massive renewal of public participation in political processes and not even to a dramatic reform of democracies. Two of the greatest hurdles for massive and effective online public participation are anonymity and distance, which embolden chaotic and uncivil discussions, and also efforts of maliciously influence public opinion. For the most part, e-democracy has only meant traditional democracy done in virtual interconnected spaces so far, without major and radical changes, furtherly maintaining the political status-quo. Moreover, even social movements fuelled by online participation, action and coordination were done outside institutionalised e-democracy platforms. [3]

Despite these rather grim conclusions, it does not mean that academia, democracy activists and governments should abandon hopes regarding digital democracy, just that these drawbacks need to be closely studied and addressed, in order to find a way forward. For the better or the worse, the Internet and all of its platforms will still be around in the foreseeable future, so we should strive to make the best of it and return to the hopes of the last decades that cyberspace will actually improve liberal democracies and that its ability to cross frontiers will promote and uphold democracy all over the world.

Nonetheless, digital technologies have expanded citizens' opportunities to get more involved in political and civic life, such as expressing themselves freely on the Internet, associating, or by holding public authorities accountable. There are also many important positive outcomes of the widespread use of digital technologies, such as uncovering human rights abuses perpetrated in various countries and making them known worldwide. [25]

The Internet's potential to become a tool of boosting democracies relies on its egalitarian nature and openness. Thus, liberal democracies should ensure that people have the ability to express themselves freely in cyberspace and also to continue sharing information regardless of borders and hold accountable leaders, in order to counter digital authoritarianism. Furthermore, upholding and boosting Internet freedom should be a fundamental element of democracy assistance programs. [14]

3. Cybersecurity and the role of governments

According to Thierry Balzacq and Myriam Dunn-Cavelty (2016), cybersecurity is "a type of security that enfolds in and through cyberspace, so that the making and practice of cybersecurity is at all times constrained and enabled by this environment" [2]. Cybersecurity is a collective endeavour in a society, being established by governments, international organisations, private companies, civil society and also by private users of digital devices and equipment [2]. Thus, cybersecurity can be understood as "a multifaceted set of practices designed to protect networks, computers, programs and data from attack, damage or unauthorised access", representing all practices and activities that actors take to secure cyberspace [2].

The central responsibility of the state is to secure its own networks, whether civil or military, against cyber threats and vulnerabilities and against cyber operations, and hence the state operates as a 'guarantor and protector' of central state institutions. Moreover, the state is also a 'legislator and regulator' regarding cyberspace and digital technologies, formulating and implementing policies in these areas. In addition to this, the state also acts as a 'partner' to public and private companies when it comes to protecting critical infrastructures, as producing and ensuring cybersecurity in the area of critical infrastructures is a joint effort that requires close cooperation with other actors. [9]

Regarding cyberspace and cybersecurity, the state can be seen as a 'security guarantor', 'legislator and regulator' or 'security partner' [9]. The role of the state is that of 'owner" of networks', 'problem solver', meaning that it must address and solve issues related to cybersecurity, and also of 'originator of the problem', as the state also creates security gaps in the networks of cyberspace [9].

In some cases, governments implement policies that indirectly reduce the level of cybersecurity globally, even for the same state-actor that enacts said policies, by maliciously and tacitly exploiting vulnerabilities detected in commonly used software or hardware, producing weaknesses inside systems or networks. For instance, governments are actively trying through actions and regulations to exploit and prevent the use of encryption, which can be a hurdle to ensuring cybersecurity

and national security, but by doing this they also affect adversely the exercise of individual rights and human rights, as encryption is crucial to protecting personal data and online user security. However, the global network that comprises cyberspace should be secured for all users, no matter their citizenship or borders. Introducing weakness, 'backdoors' and exploiting vulnerabilities in networks and systems means that cyberspace would be made less secure in the quest of enhancing cybersecurity and ensure national security, but those vulnerabilities can be exploited by malicious state and non-state actors and so leaving them there creates opportunities for cyberattacks, which means that such actions eventually reduce the level of cybersecurity in the long-run. [7]

Intelligence services exploit and create security gaps in software in order to ensure and facilitate infiltration in various locations of the Internet infrastructure. These non-public access points, backdoors and implants can be activated whenever the government that placed them wants, as long as the victim does not detect them, and they serve multiple purposes, such as cyber espionage, surveillance or infiltration points for disruptive cyberattacks. Thus, in a quest for enhancing their own national security and cybersecurity, state actors become responsible for producing vulnerabilities and threats for the same national security they are trying to protect, as this access points can be exploited by other intelligence agencies or other actors against the same government that produced them or against other state-actors. [9]

In contrast to this, a human-centric approach to cybersecurity would place as primary objects of security human beings, regardless of citizenship and borders. State-actors would still be key to producing cybersecurity, but their main objectives would be aimed at protecting human rights, personal freedoms and wellbeing in cyberspace, promoting the integrity of cyberspace worldwide. [7]

4. The state of e-democracy and e-government in the European Union

The EU and its member-states are among global leaders in e-government progress, Internet freedom and cybersecurity levels. Among the first 30 countries ranked by the United Nations (UN) E-Government Development Index 2020, 15 of them are EU member-states. Moreover, only three EU countries rank lower than 50 – Croatia, Hungary and Romania [33]. Furthermore, the 2020 Global Cybersecurity Index, published by the International Telecommunications Union (ITU) measures and scores states' cybersecurity policies and measures. Half of the first 30 countries ranked by the ITU are EU member-states, with Estonia, Spain, Lithuania and France placed in the top 10 countries of the world regarding cybersecurity measures implemented [18]. Finally, the 2021 Freedom of the Net report published by the Freedom House shows that all of the EU member-states taken into consideration by the study have a free Internet [14]. However, the only EU countries mentioned in the report are Estonia, France, Germany, Hungary and Italy.

E-democracy can be considered as a possible answer to EU's democratic deficit but also to democratic limitations at national and local levels. Several EU member-states have initiated e-participation mechanisms on a national or local level (e-initiatives, e-petitions, e-consultations etc.), but most of these online deliberation

platforms lacked where it mattered the most – they had a small impact on decision making. However, introducing such projects on an EU-level is particularly challenging, because regardless of general problems encountered by nation-states, the EU must also address the issues of transnationality, language diversity and large population. [19]

According to the European Commission, the EU is working on the development of cross-border digital public services, based on the idea that e-government can increase the levels of efficiency and transparency for governments, but also foster a greater participation of citizens in political life [10]. One issue regarding the pursuit of building or enhancing e-democracy in the European Union is the disputed existence of a 'EU demos' or a 'European constituency', as it is more challenging for a transnational body like the EU to refer to a public than for a traditional state-actor [17]. Moreover, L Hennen (2021) suggests in a study that online political communication is not expected to build a supranational public sphere [17].

In a study published in 2021 by the European Commission, the authors evaluated the overall e-government maturity scores of the EU and of its member states, ranging from 0% to 100%. EU's overall performance was determined to be only 68%, whilst the most well-evaluated member-states scored over 85% - Malta, Estonia, Denmark and Finland. The leading states have been described as having the most transparent, user-centric digital governments, which are also the most technologically enabled and open to users from other EU member-states. [34]

According to Eurostat, EU's statistical office, almost half of people in the European Union aged 16-74 have obtained information from public authorities' websites during 2020. Denmark, Finland and the Netherlands recorded the highest share of people that accessed information online from public authorities (over 80%), whilst Italy, Bulgaria and Romania rank lowest in the study, having less than 20% of their populations obtaining information online from public authorities (in Romania the share was only 10%). [13]

5. Securing both democracy and e-democracy through strengthening cybersecurity

5.1. Cyber threats against democratic processes and e-democracy

All things considered, when implementing tools and platforms of e-democracy and e-government, institutions must also pay attention to the security risks involved, pertaining both citizens and governments. The first issue is that of privacy, as online public services require and use citizens' data, and in many cases, this is not done in a transparent and well-regulated way. Moreover, e-government and e-democracy mechanisms, as everything digital, have vulnerabilities that can be exploited by malicious cyberattacks for various purposes, whether the attack is about obtaining private information of citizens, disrupting public services or generally undermining democratic processes such as elections. [32]

Elections worldwide, and especially in liberal democracies, have been prime targets of cyberattacks and information operations, and despite measures taken by

governments, their infrastructure is still vulnerable to further malicious digital activities. One of the possibilities of cyberattacking democratic processes is targeting the electoral systems either by hacking into the voting process or into the databases with registered voters, although there are no major reports of such events. In the US, the Department of Homeland Security underlined that election systems and the voting process are part of state's critical infrastructure, and hence making it a top priority for cybersecurity endeavours. [23; 29]

Interference in free and fair elections is becoming an increasing threat against democratic countries as authoritarian states intensify the usage of cyberattacks targeting elections. There are several ways in which cyber operations can influence elections: undermining public confidence in state institutions or in the voting process, manipulating public opinion or influencing it to vote for or against particular parties through a mix of cyberattacks and information operations. In addition to this, malicious actors could also interfere in a more direct way with the voting process, such as hacking online components of voting or voter registration mechanisms or by changing the results, the latter being the most difficult to do, especially on a wider scale. Nevertheless, malicious cyber operations are not only serious threats to elections or democratic processes, as they can also materialise as threats to the physical security of individuals or states. For example, Russia has been using both cyber operations and disruptive cyberattacks alongside information operations in its hybrid war against Ukraine. [23; 25]

One of the most serious and well-known examples of foreign interference in elections by cyber means is the Russian interference during the 2016 US presidential elections. Russia used both cyberattacks and information operations in an effort to influence the elections. Russian state-hackers managed to launch a successful cyber operation against the Democratic National Committee and the campaign of the Democratic Party candidate Hillary Clinton, gaining access to private data, and then using the data and information obtained in disinformation campaigns organised on social media. [27; 35]

A couple of years earlier, Russian state-sponsored hackers managed to infiltrate Ukraine's central election commission during the 2014 presidential elections, the first after the Euromaidan. During the cyberattack, the hackers managed to implant a malware in the election commission's software that would have modified the results of the elections so that a small ultra-nationalist party (Right Sector) would be shown as winners, even though the party managed to get less than 1%. Moscow acted by the same playbook, doubling the cyber campaign by a disinformation campaign. More than this, even though the Ukrainian government had actually detected the malware one hour before announcing the results, Russian state media still reported the doctored results. However, this serious cyber operation was by far one of the less-damaging Russian cyberattacks that Ukraine has suffered. For example, in December 2015, a sophisticated and complex cyberattack targeted Ukraine's electrical grid, leading to a blackout for over 200.000 residents a day before Christmas. [27]

In addition to this, the Kremlin launched other cyber operations and disinformation campaigns in efforts to influence and undermine elections in liberal democracies, targeting the 2017 French presidential elections and then-candidate Emmanuel Macron's campaign and also the Catalan independence referendum in Spain [27].

Online voting is particularly vulnerable to cyberattacks, especially when compared to traditional paper-based voting. No matter how much it can be secured, it is likely that hackers, whether state-sponsored or not, will find a way to infiltrate and penetrate its digital infrastructure and networks. Elections and online voting systems are prominent targets of complex cyber operations given their importance, and hence taking into consideration that cybersecurity can never be completely perfect and bulletproof, moving large parts of the voting process online poses a great security risk for governments [24]. Thus, classic alternatives such as paper-based voting is less vulnerable than electronic/online voting [24]. Furthermore, Park et al. (2021) point out that introducing new digital technologies in the voting process would not make online voting more secure, their conclusion being that even blockchain-based voting systems (an idea that gained popularity both in academia and among governments) are still vulnerable to serious cyber threats [24].

5.2. Digital authoritarianism

Abuse of digital technologies and malicious usage of them varies from cyber espionage, disinformation campaigns, surveillance, cyberattacks to foreign actors interfering in other states' elections. Moreover, authoritarian states have started over the last decade to fragment the global Internet in order to have control of the information flow that occurs in their 'national' part of cyberspace, and even more concerning is that authoritarian states which expanded their authoritarian rule online (e.g., Russia, China, Iran or Saudi Arabia) have also started exporting their tools of digital authoritarianism to illiberal governments and other like-minded regimes. [26]

Both China and Russia underscored their sovereignty in cyberspace and prioritized the strategic engagement both in cyber operations and information operations, whether defensive or offensive. The two countries relate to cyberspace and the information space as being closely interconnected, and act in accordance to this. According to Freedom House, during 2020 global internet freedom declined once again, for the 11th consecutive year, online freedom of expression being the main target of governments worldwide. [14; 30]

5.3. EU's approach to cybersecurity and promoting democracy online

The EU started to focus on the issue of cybersecurity after the 2007 cyberattacks against Estonia and in 2013 the European Commission published the first Cybersecurity Strategy of the EU and the proposal of the NIS Directive. Since then, the European Network and Information Security Agency (ENISA), established in 2004, has been playing a key role in enhancing and safeguarding EU's

cybersecurity. Moreover, since the early 2010s the European Union has promoted the idea of upholding a multi-stakeholder governance model of the cyberspace for a free and open Internet. [8]

According to EU's 2020 cybersecurity strategy, cybersecurity is referred to as an integral and essential part of Europeans' security. Moreover, the strategy highlights from the beginning that the EU's democracy, society and economy rely on secure and reliable digital tools and on connectivity and also that democratic processes depend more and more on increasingly interconnected network and information systems, which makes cybersecurity essential. In addition to this, threats on the democratic process emerging from the area of cybersecurity are mentioned in the strategy, such as disinformation campaigns and cyberattacks on democratic institutions, economic processes and infrastructure. [12]

EU's 2020 cybersecurity strategy sets forth three main instruments to address cybersecurity issues: promoting and consolidating resilience, technological sovereignty and leadership; building the necessary operational capacity to prevent, deter and respond to cyber threats; and advancing a global and open cyberspace both at an international and EU-level. The document stresses on the objective that cybersecurity must become an integral part of all digital investments, innovations and processes developed in the EU, especially in those related to technologies like quantum computing, encryption and Artificial Intelligence (AI). Furthermore, an essential element of the European Democracy Action Plan is strengthening the cybersecurity and the cyber resilience of democratic processes and institutions of the EU and its member states. [12]

For the EU, as stated in its cybersecurity strategy, international cooperation is a core component of the endeavour of maintaining and promoting a secure, stable, global and open cyberspace. Moreover, the European Union should work together with its international partners to advance a rather liberal and democratic political model of cyberspace, as its vision of cyberspace is based on human rights, fundamental freedoms, the rule of law and democratic values. Additionally, the EU aims to continue cyber capacity building in its neighbourhood, especially in the Western Balkans, assisting governments in addressing and overcoming malicious cyber operations that target and damage their societies and the security and integrity of their democratic systems. [12]

For example, the European Commission highlights that digital transition should, at the same time, uphold an open and democratic society, while also protect people from various cyber threats, such as ransomware or hacking [11].

In this context, Brussels started to act more against cyber threats, underlining through its actions that malicious state-sponsored cyberattacks against EU member-states will not be left without consequences. In 2020, the EU imposed its first-ever sanctions in relation to several major cyberattacks used by China and Russia, naming persons involved in the hackings and also publicly identifying several hackers as being officers of Russian intelligence agencies. In May 2021, the restrictive measures against cyberattacks have been prolonged for another year, the sanctions applying to four entities and eight individuals. [5]

Furthermore, a concept proposed and promoted by the EU and some of its member-states is 'digital sovereignty', a so-called 'Third Way' separating the EU from the US and China's approaches to the digital space – the libertarian 'Californian' view of the Internet in the United States (in which companies are allowed by governments to make decisions with important social and economic implications) and the robust digital authoritarianism implemented and promoted by China (in which the state has an almost-complete control of cyberspace and the digital technologies sector). 'Digital sovereignty', a concept mentioned several times by the leaders of France and Germany, especially by the French President Emanuel Macron, refers to the objectives that the European Union will develop a form of self-determination regarding cyberspace and digital technologies, in the way that the EU and its member-states should uphold control over data storage, data processing and over ITC infrastructures. [1; 14; 30; 31]

Digital sovereignty refers to the idea that governments should enhance their authority over the cyberspace, promoting the consolidation of the state's role (alongside with its economy and citizens) in the development and governance of digital technologies and infrastructures [26]. One of the main concerns of the EU and its member states in this regard is the possible interference of foreign states (such as China) in the upcoming widespread rollout of 5G networks. The issue is that the rollout could involve Chinese state-controlled companies (e.g., Huawei), which could lead to a less secure and more vulnerable critical infrastructure.

5.4. A way forward – boosting both cybersecurity and (e-)democracy

In the next years, democratic internet governance has the potential to play a key role both in protecting democracies from abuses of digital technologies, but also for boosting cybersecurity. Thus, liberal democracies should concentrate their efforts to protect democratic processes across the globe, enhancing the cybersecurity of democratic processes, especially of elections. Another key move would be to declare election systems/infrastructures as critical infrastructure, like the policy of the United States. Moreover, liberal democracies should strive to protect and also promote the protection of human rights in cyberspace internationally, while also advocating for an open and democratic internet governance (like the EU and some of its member-states are doing), taking into consideration that the traditional libertarian or 'Californian' way of promoting relations between governments and ITC companies is not likely to still be appropriate and efficient in the current global context, both online and offline. [25]

One possible response and countermeasure against the expansion of digital authoritarianism worldwide is the promotion of a free, open and democratic Internet and of a secure digital communication internationally. Similar to ideas and objectives mentioned in the EU's 2020 cybersecurity strategy, liberal democracies should promote and maintain Internet freedom and refrain from diminishing online privacy and liberties in the quest of counterbalancing digital authoritarianism or other abuses of digital technologies. One of the most important objectives should be strengthening policies regarding encryption, essential both to citizens of liberal democracies and especially to citizens of authoritarian countries. [36]

In order to address threats to major democratic processes which are increasingly relying on digital means, governments should act fast and prioritize their protection and their 'place' in national security policies. Democratic processes (especially elections which nowadays rely more on digital technologies) should be recognised and declared as critical infrastructure in order to ensure a more consolidated protection against cyber threats. Furthermore, the 2020 cybersecurity strategy of the European Union is a great example of how liberal democracies should develop policies regarding cybersecurity, as cybersecurity should not be enhanced whilst democracy, individual freedoms and human rights deteriorated, but on the contrary – cybersecurity should be strengthened alongside the promotion and consolidation of democratic processes, and this policy should also be promoted internationally.

Liberal democracies and their governments should focus more on protecting the democratic and egalitarian potential of the Internet, one of the qualities that could enable a widescale adoption of e-democracy. Focus should be put on protecting and enlarging current policies and initiatives regarding e-democracy and also consolidating public participation in political processes, while also promoting and protecting both on a national and international level individual freedoms and human rights online (e.g., online privacy or the right to encryption). In parallel, cybersecurity policies and practices should go hand in hand with protecting and deepening democracy. Nevertheless, in order to develop e-democracy, governments should also take into consideration and seriously address cyber threats. The more democratic processes move (even partially) in cyberspace, the more vulnerabilities are created, which also means there will be more opportunities for malicious cyber operations, and hence cybersecurity should be a core element of every policy, programme, initiative or activity of anything digital done by governments, whether it is about e-democracy, e-government platforms or political parties campaigning on social media during elections.

6. Conclusion

Despite all of the negative events that occurred in cyberspace or enabled by digital technologies, the project of e-democracy should not be abandoned. It is far from over and it is far too early to simply assume that digital authoritarianism 'conquered' cyberspace and there is no place left for cyber democracy. Liberal democracies should boost their efforts to promote democracy worldwide, both in the offline world and online, and to develop e-democracy in order to achieve greater and meaningful political participation. Regardless of how much e-democracy or e-government is developed, cyber operations will still target liberal democracies, whether they are cyberattacks on electrical grids, spreading ransomware on private users' computers or interfering with political processes.

Nonetheless, without sound cybersecurity policies, cyberspace, alongside digital technologies, social media etc., can actually weaken liberal democracies and enable authoritarian regimes and/or digital authoritarianism. Further developing e-democracy requires proper cybersecurity policies and practices, and also 'regular' democracy requires an enhanced level of cybersecurity in order to avoid threats

from malicious actors. Moreover, as this topic is increasingly dynamic and complex, it also needs a tremendous amount of research in order to fully understand it, and for governments of liberal democracies to implement the most efficient policies. For instance, further research could be made on studying other cybersecurity strategies of important actors in cyberspace (such as the US) and also on the current worldwide state of e-democracy, especially in liberal democracies.

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Artefacts conservation using an IoT system

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Abstract

The Cultural Heritage protection and conservation is a matter of particular interest because every work of art suffers some deterioration over time. Such degeneration depends on the type of material, the action of external weather conditions and human factors. Ideally, works of art

should be preserved in stable and controlled climatic scenarios, which should be monitored and recorded accordingly. This paper aims to present a system for monitoring the factors that influence the degradation of artefacts and maintaining a pleasant environment for museum visitors. The preservation of historical objects can be maintained by detecting the levels of pollutants in museums. The main factors monitored are temperature, humidity, vibrations, air pollutants (CO, CO2, NO2, SO2) and volatile organic compounds. The proposed IoT system will be a cloud-based solution that aims to offer a wide range of functionalities, performing an individual analysis for each type of material (paintings, metals, textiles, etc.). The prototype will consist of monitoring stations, data collection and management server, cloud database, visualization, and alerting platform. The innovative feature of the technical solution is the integration of the sensors in the Cloud, which can provide real-time data in case of exceedances of nominal values. The results obtained from constant monitoring over a long period of time indicate the principal causes of the deterioration of art objects in museums. Thus, with the help of the whole system, immediate decisions can be taken for the conservation of artefacts. The study proved the scalability, reliability and efficiency of the pilot system by reducing the number of events caused by chemical and physical processes that contribute to artefact degradation.

Keywords: *Artefacts, IoT, Cloud, real-time data*.

1. Introduction

Given the technological developments in IoT and Cloud Computing in recent years, new perspectives are emerging regarding wireless microclimate monitoring in museums for art conservation. Lately, wireless sensor networks have been developed to monitor air quality and the materials from which objects are made. These networks have proven to be effective in assessing the conservation conditions of exhibits.

Remote monitoring of factors affecting the condition of works of art can improve their long-term conservation and promote the value of cultural heritage for future generations. According to current technology, remote monitoring is mainly based on the Internet of Things (IoT) concept. An IoT approach to art conservation would involve the installation of sensor nodes and gateways for data transfer to the Cloud. The application of this IoT approach would allow online monitoring and continuous surveillance of each artwork, giving easy access from the Cloud to the data recorded from electronic sensors, improving safety and preventive conservation [1].

The Internet of Things (IoT) involves the ability of objects to communicate intelligently with their environment to provide actual services via the internet. Remote monitoring and management of the environment is enabled by IoT sensors and aims to improve the preservation of cultural heritage. The advantages of using IoT technology are high flexibility of the system, low cost of implementation, ability to monitor real-time parameters within the museum and low energy consumption.

This project aims to document the adverse effects on works of art and historic buildings to mitigate and prevent their deterioration. The architecture presented in the paper presents the key to the realization of a prototype that facilitates the monitoring of museum environmental parameters and the maintenance of an optimal level for the conservation of historical objects. The prototype communicates with a web platform to which the measured parameters are sent and can be visualized as graphs, tables, or charts to be easily interpreted and analyzed. The IoT system consists of two monitoring stations located outside and inside the museum, with low energy consumption. The outdoor station uses a solar panel for power, and the indoor station is programmed to send data at a set time interval to streamline energy consumption.

The paper is structured as follows: Section II presents the main factors influencing artefact conservation, as well as the state of the art of IoT technologies for air quality monitoring in museums, while in section III, we propose and describe a new IoT platform for preventing art object degradation. Section IV highlights the experiments conducted and their results. Finally, Section V comprises the concluding remarks and new approaches to maintain historical objects in the best possible condition.

2. Related work

Today, climate change and air pollution affect many industries and sectors globally. One of the areas affected is museums and heritage buildings, as many artefacts can be damaged or even destructed due to these environmental and climate changes.

To protect art objects [2], we need to have sufficient information about them, one of which is the material composition of the heritage. Heritage can be affected by external pollutants such as gases and particles from vehicle exhausts. These pollutants can enter museums or places where objects are kept and degrade them. Some typical outdoor pollutants are sulphur dioxide (SO2), nitrogen oxides (NO, NO2), hydrogen sulphide (H2S), carbonyl sulphide (COS) and carbon disulphide (CS2), ammonia (NH4) and peroxides such as ozone (O3). Inside, there are also threats such as cleaning products or chemicals. Organic pollutants (formaldehyde), formic acid, acetic acid, ozone, sulphides, and volatile substances threaten art objects.

The air quality inside museums is an essential factor for the conservation of exhibits, as substances in the air can cause degradation of artefacts and valuables whether or not they are in display cases. Chiantore et al. [3] present the role and impact of materials used in the construction of museum display cases, which are considered sources of hazardous substances for the integrity of cultural heritage objects. Acetic acid is a substance that causes corrosion of bronze antiquities, lead artefacts and copper alloys stored in wooden cabinets.

Air quality is also studied in the article [4], as it is a source of pollutants of art objects. The study results show that the contribution of particles (calcite, clays) and substances such as RH, O3 caused by the restoration around historical museums can degrade the objects in the museum over time. Carbon dioxide reflects the human presence in a room and is a gas that has a limited effect on the degradation of materials. Nitrogen dioxide is a primary pollutant emitted from industrial facilities,

leading to the degradation of art objects through oxidation processes. Ozone is a secondary pollutant that degrades materials through oxidation mechanisms.

Azian et al. [5] highlight the air quality in museums to determine if it is acceptable for both museum employees and the visiting public. The parameters measured using a diffusion tube are the levels of NO_2, NO, SO_2 and O_3. The experimental results come from one-month monitoring of the gases listed above in four different museum locations and show that the interaction between the museum and the outdoor environment was well controlled.

In the paper [6], the authors present an Internet of Things (IoT) based system for monitoring and controlling the indoor environment of the museum. Information about the artefacts' environment is collected in real-time and sent to a gateway, then forwarded to a Cloud for storage and analysis. Following the analysis, appropriate decisions are made to set the museum environment accordingly. An ESP32 microcontroller was used in the development of the prototype, and sensors for measuring air temperature and humidity, light, visitor presence.

Regarding the solutions mentioned above and the importance of air quality in preventing the degradation of art objects, the present work consists in implementing a system for monitoring critical factors influencing the deterioration of different materials, thus leading to the preservation of artefacts. The introduced approach uses high-precision commercial sensors and designs a real-time museum monitoring system to alert maintenance personnel if the nominal value limits are exceeded.

3. IoT system for artefact conservation

The degradation rate of any material is generally determined by a limited number of environmental parameters that can be grouped into four categories corresponding to the following agents of deterioration: incorrect temperature (T), incorrect relative humidity (RH), radiation and pollution (Fig. 1).

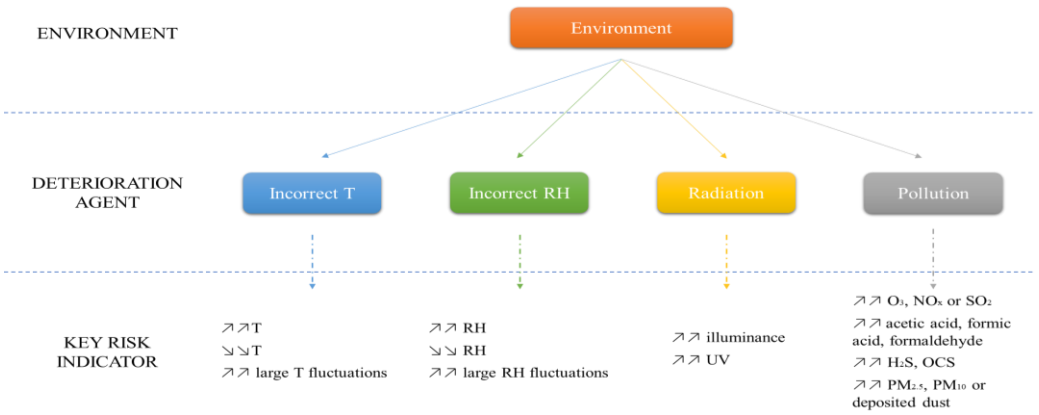

Fig. 1. Schematic overview of the different levels on which the relevance of the environment for heritage conservation is evaluated

3.1. Relevant parameters

Parameter values cannot be too low, too high or with excessive fluctuations without increasing the risk of damage. This means that the level of risk can be estimated by comparing the measurement of an indicator with the corresponding target value found in literature, guidelines, and standards.

After analyzing and assessing the risks to which art objects may be exposed, it was necessary to continuously monitor air quality and other deterioration factors. Therefore, the conservation of art objects can be maintained by detecting the levels of pollutants in museums.

3.2. Architecture of the proposed system

The proposed system will be a cloud-based solution that offers a wide range of functionalities at an affordable price. The solution can be implemented quickly to monitor art objects from the beginning of the project, benefiting from a comprehensive analysis.

A significant advantage of the prototype resulting from the project will be its modularity, making it easy to configure according to the customers' needs, thus fully justifying the cost of the communication services offered.

A functional schematic of the solution realized in the MUSEION project is shown in Fig. 2. The innovative feature of the technical solution is the integration of sensors in the Cloud, which can provide real-time information in case of overshooting of the nominal values.

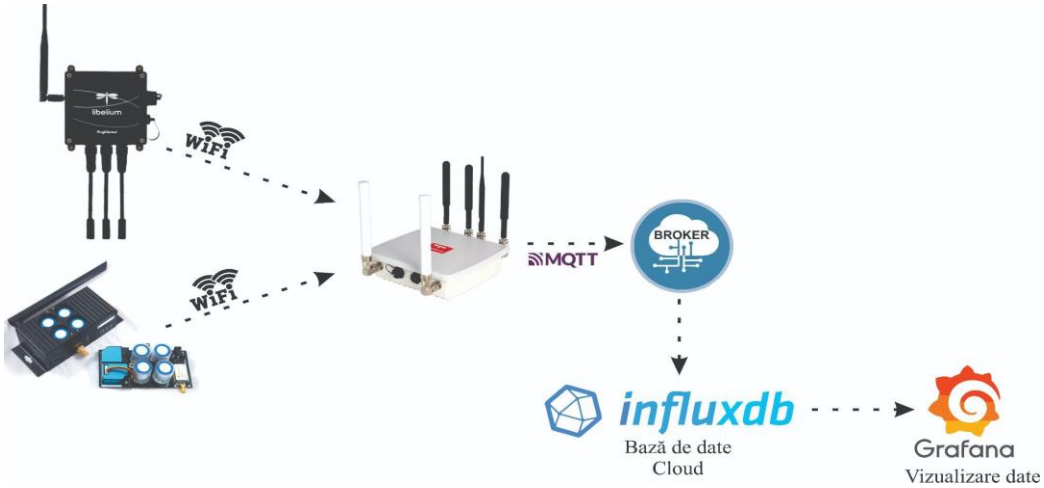

Fig. 2. System architecture
Source: Architecture realized within the MUSEION project

The system architecture consists of two monitoring stations, one located outside the memorial house, which will monitor: carbon dioxide, nitrogen dioxide, sulphur dioxide, temperature, humidity, pressure, and brightness; and a second

station, located inside, to monitor: temperature, humidity, dust particles, volatile organic compounds, ozone, vibrations, ammonia, brightness, carbon dioxide and nitrogen dioxide. The data will be collected in a Gateway via Wi-Fi and then sent using MQTT to a Broker. Once the data is in the Broker, it will be stored in a database, namely InfluxDB.

The database is intended to keep the data for parameter analysis over a long time. Using Grafana, parameter analysis can be visualized in the form of graphs, tables, and charts. Additionally, thresholds can be set in this platform for each parameter. In case of unpleasant events, exceeded nominal values, museum caretakers are immediately alerted to reduce the risk of artefact damage.

4. Results

The evaluation of the IoT system architecture for artefact conservation was carried out by implementing the prototype inside a museum, where it monitored the main damaging parameters of historical objects.

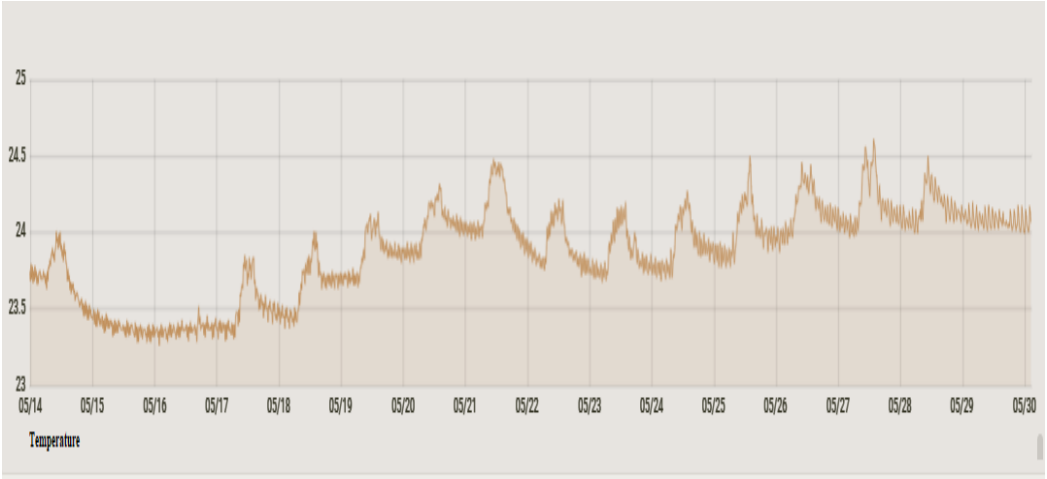

Fig. 3. Air temperature
Source: Grafana own platform

Temperature is critical in the deterioration process of art objects, as it can accelerate chemical reactions, causing artefacts to deteriorate more quickly. Keeping museum objects at a low temperature prevents the growth of living organisms. On the other hand, high temperatures deteriorate objects and accelerate the chemical process. The air temperature (Fig. 3) should be maintained between 20 and 25 Celsius degrees to provide a suitable climate for preserving historical objects.

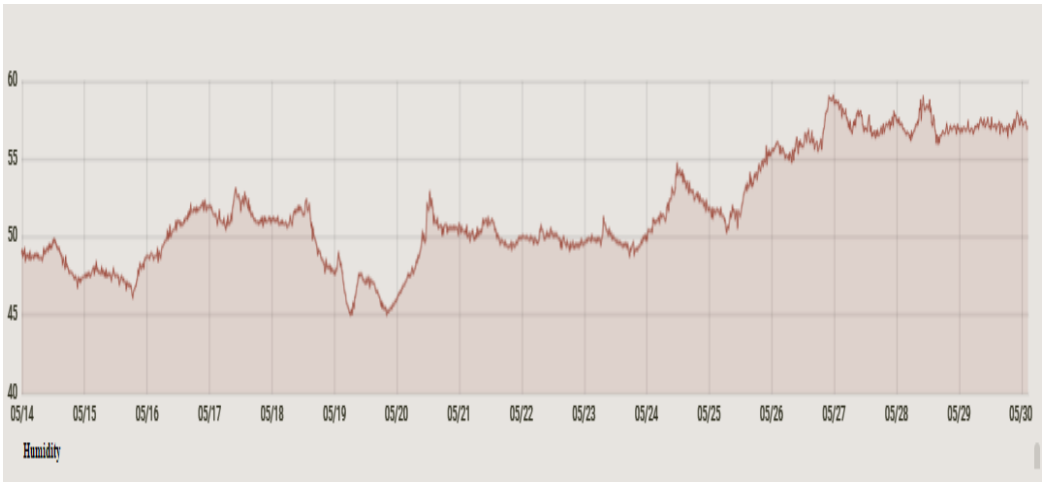

Fig. 4. Relative humidity of the air
Source: Grafana own platform

Humidity (Fig. 4) is the amount of water vapor in the air, expressed as a percentage. High relative humidity causes the expansion of organic materials, promoting biological activity and absorption of moisture and potentially toxic salts into the material's pores. In general, the relative humidity for any museum piece should be between 45 - 60%.

Fig. 5. Light intensity
Source: Grafana own platform

Light is an energy form that can have different colors and causes damage to the surface of fragile objects such as paintings, drawings, textiles, and other organic objects, thus reducing their strength. The most damaging ranges of the light spectrum are ultraviolet waves (due to very short wavelengths, which produce spectral-chemical effects on artefacts) and infrared waves (long wavelengths damage art objects through their heat action). In Fig. 5, we can see the light intensity

values measured by the sensors, which are within the nominal limits for preserving historical objects.

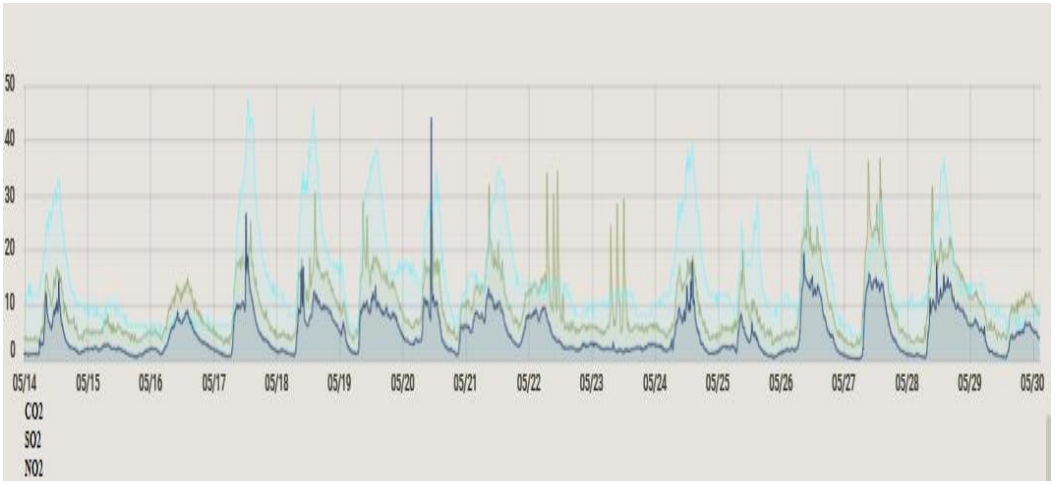

Fig. 6. Air pollutants (CO_2, SO_2, NO_2)
Source: Grafana own platform

The main pollutants hazardous to archaeological objects are carbon oxides, sulphur, and nitrogen (Fig. 6). In addition, in the absence of efficient air-conditioning systems, polluted air from the atmosphere can also enter the display cases, contributing to damage to the objects. The quality of the air inside the museum is also an important element to monitor to improve the visitor experience and provide optimal conditions for visitors to carry out their activities. The values measured by the sensors are within the permissible limits so as not to damage the exhibits in the museum.

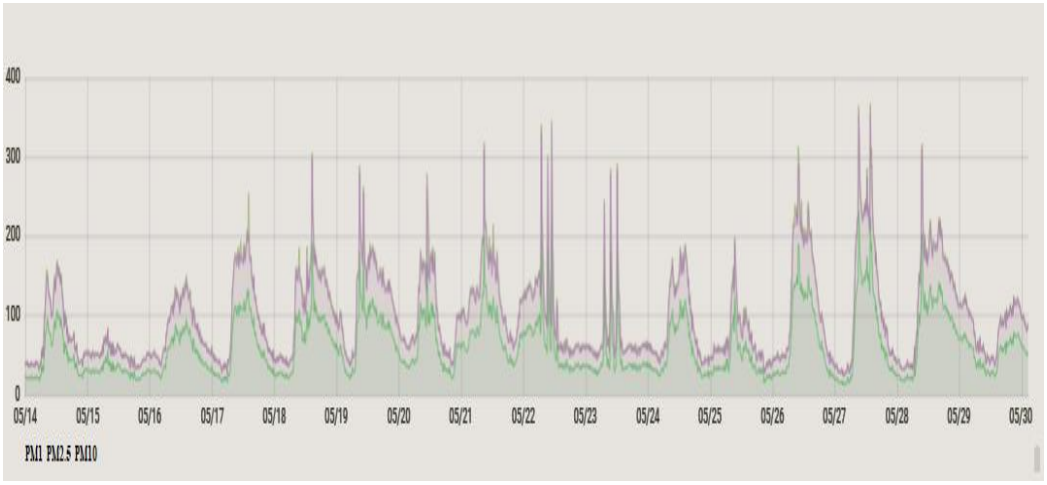

Fig. 7. Particulate Matter (PM_1, $PM_{2.5}$, PM_{10})
Source: Grafana own platform

In Fig. 7, we can see the values measured by the particle matter. Particles can come from mineral substances (limestone, silica), smoke, hair, plant and animal debris, lint, flaking skin. Dust particles can be produced by materials affected by physical-mechanical factors (road traffic, industrial processes, domestic). Because of the processes they cause (condensation, corrosion), dust particles indirectly degrade art objects, providing a favorable environment for the growth of microorganisms. Lacquered surfaces and paintings are particularly affected due to scratches that can occur during improper cleaning processes.

5. Conclusions

Since the solution proposed in this paper is in its infancy, several experiments have been carried out, and first conclusions have been drawn. The aim of the work was to evaluate the relevance and impact of certain parameters on the conservation of art objects in museums. The experimental data are acquired from two Libelium Smart Environment Pro stations located outside and inside the Ion Minulescu Museum in Bucharest. Through the proposed experiments, the values of the factors influencing the degradation of the artefacts were identified, and it was found that the storage condition of the museum collection is under control, with constant temperature and humidity and low or below detection limit of gaseous pollutants. The museum in which the monitoring stations were located contains a mixed collection of artefacts made of different materials, such as textiles, paper, metal alloys, natural organic materials, etc. These objects made of different materials are at risk of deterioration due to environmental factors such as light, temperature, humidity, and indoor and outdoor pollutants.

Based on the acquired data, we can implement algorithms to calculate indoor air quality index (IAQ) specific to cultural heritage applications as a very near future activity. IAQ consists of including a factor related to the "state of preservation" of artefacts in the calculation algorithm. There are still unresolved challenges in implementing the proposed system in multiple locations to compare the factors monitored in museums.

Acknowledgements

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Private initiative and public management - factors in the development of smart cities in Romania

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Abstract

The article aims to establish the factors of influence on the development of smart cities from the perspective of their economic sector. Established concepts related to the functioning of the smart city are used, such as urbanization, smart citizens, smart infrastructure, mobility, technology, communication, open data, innovation, the knowledge economy, but also development-specific ones such as efficiency. In view of the current situation, the trends already shown and the aspirations for the smart cities in Romania, the article analyses possible combinations of factors grouped by sector capable of ensuring the dynamics of social innovation in this field. The study uses the observation method of the phenomenon under study (smart city), the analysis and summary of available data on the combinations of factors that have generated the success of smart city projects, the impact analysis of legislation, public policies and the attitude of administration to processes supporting and converging toward smart communities, mapping attitudes to modernization, technology and sustainability, identifying some success factors of local public administrations along the lines of smart community development, selection of results from scientific research that can guide the likely development of smart cities. The connection between scientific research in the various fields (exact sciences, social sciences, technology), technological development, social innovation and mobility of the population is presented. The method of interviewing or collecting previously expressed views on different media channels, including during various events relevant to the evolution of smart cities, the taking up of available information collected through statistical methods, other specific methods for obtaining the data

needed for a comprehensive analysis of smart cities in Romania, shall be used.
The results of the research are to determine possible combinations at the current stage between economic sectors with potential for smart city development. In order to validate the results of the research, there will be presented the combination of factors that generated some successful projects in the field of smart cities in Romania.
The article will help clarify options for all those who wish to engage in the creation of smart communities and will facilitate the development of strategies.

Keywords: *strategy, scientific research, technological development, social innovation, mobility of the population*.

1. Introduction

1.1. Current state of knowledge of the problem

We may assume that the world is experienced a fourth industrial revolution due to the rapid development of technologies and digital abundance [5]. The problem of smart cities already passed from the stage <a dream for the future>. We have in Romania many smart city projects already completed and tested by their users, citizens. We are in the process of developing smart city components or expanding the number of smart communities. The theory, in turn, has made significant progress. The phase of needs for the synthesis of research related to smart city projects has been reached [28]. Civil society, in turn, has become better organized. Smart city projects are promoted in Romania on the basis of a civic initiative.

The issue of smart cities has long gone beyond the dream stage for the future. We have in Romania many smart city projects already completed and tested by their users, the citizens. We are in the phase of developing smart city components or expanding the number of smart communities. The theory has made important progress in explaining the context in which smart cities are emerging and developing. The phase of the assessment of the state of research available on smart city projects has been reached (28). Civil society has also been better organized. Smart city projects are promoted in Romania on the basis of a civic initiative (1). It is thus possible to summarize good practices in this area. The expansion of the number of smart city projects and communities that are in progress or already benefit from smart technology has led to the emergence of the < smart city industry > concept.

The opinions of practitioners or decision-makers in the < smart city industry> are centralized in Romania in a specialized publication, Smart City Magazine [1]. All those who have had performance or concerns in the smart city industry meet regularly in a regular gala, this being a good time to exchange ideas and improve solutions to follow. The magazine and gala are private initiative events; the public sector is present through writing articles for the magazine by the heads of public

institutions or by the award of the results achieved in the smart city industry by some local authorities.

The operations involved by the smart cities projects are considered as a field of the science. There are available Proceedings of international workshops on science of smart city operations and platforms engineering [22]. We may sure that the smart cities are a future: the field of technological development is already organized [20]. Thus, at the moment, there is the whole flow capable of generating the development of smart city projects: Bottom-line research, technological development and innovative applications.

1.2. Methodology

The dynamics of smart cities can be seen as the algebraic or vector sum of several types of forces acting concurrently but not in the same direction. The aims and aspirations accumulated over time, some of which are kept in the unconscious area transmissible over the generations, are the main engine of change. People don't want anything else, they want to live their dreams. In the face of those dreams, however, there is the fear of change and the fear of adaptation to the new one, even if the new one represents real progress.

1.3. Context

The development of the smart city is considering a warning of the economists about the fundamental problem of the economy, the need to allocate limited resources to virtually unlimited needs. Resources are limited not because they do not exist, but because there are restrictions on accessibility: Ownership, administrative and territorial barriers, insufficient development of technologies capable of discovering and exploiting them [7]. This is precisely what the smart city projects focus on: generate new resources capable of meeting people's needs, remove administrative barriers to allocating resources, find new legal forms of cooperation between people, reducing the waste of scarce resources and sharing the use of resources that are likely to be used efficiently in the shared system. It is clear that in this direction action, the intervention of the State or local authorities is needed to issue appropriate rules.

2. Strategy - a key factor in the development of the smart city

Every big project requires an appropriate strategy. Today we are facing the project of generalizing the life model of a smart city. In addition to the social (population mobility) and technological components, the strategy is a binding link. Depending on the content of the changes needed for the emergence or development of smart cities, it can simulate the public and private sector participation share according to the key factors considered. Neither new forms of urbanization specific to smart cities nor building smart infrastructure can be achieved without a forward-looking vision and a strategy to achieve such complex objectives. When we talk about the strategy, we understand that consistency is needed on the medium or long

term. Briefly, we can consider a certain stability in both the private and public sectors (within the electoral cycle). When projects exceed 4-5 years, the risk of not being ready in their original design is inherent.

A success factor for most of the local public administrations in Romania was precisely the consistency in implementing strategies to set up smart city services. Unfortunately, with current technologies and with due respect for the legal rules currently in force, the time to complete a complex and integrated project of the smart city type is longer than the duration of the electoral cycle. Only the communities that "had patience" with the local public administration and entrusted them at least two mandates benefited from integrated projects of the smart city type.

An important conclusion of experts in strategic management is that the business model needs to be reinvented. The recent spectacular success of major projects at international level or in developed countries has been attributed to innovation in the business model. For success it is necessary to put together innovative products or services through themselves, design or aesthetic elements, as well as new business models [16].

Thus, in order to be able to work toward generalizing or improving the parameters of the smart city, it is necessary to design new business models. But in order to have new business models it is necessary to support the state authorities with changes to existing laws and authorizations, where appropriate. In addition, the behaviour of public administration needs to be changed. The private sector, in turn, will need to respond positively to the challenges posed by the new business model. In order to be applicable, the new business models of the smart city must be called into question through the education system, the instruments of economic and social scientific research, and civil society debates. The smart city will very likely look different also in terms of social or business relations that will take place for it to function properly.

First theory, then legislation must address challenges specific to the intelligent city such as the legal regime of goods placed in the public domain or on a common space (e.g., flowers and trees, communication and transport infrastructure, etc.), of common goods, public-private, public-public or private-private partnership, behaviour in public or common space, including the legal regime for information of various kinds.

The objectives pursued in the development of smart cities are broadly in line with what economic theory calls quality of life: all the economic, social, environmental, spiritual conditions which ensure the integrity and balance of biological life, and the continuous and sustainable development of human personality [9]. Economic theory also shows that the stage achieved by quality of life is the result of both individual and collective effort. Quality of life includes the standard of living, the quality of the living environment, the quality of the working environment, the quality of the social and political environment, the quality of the environment. In addition, the concept of collective well-being is already formulated, which is particularly useful in the philosophy of smart cities. The strategic design of smart cities requires progress on all parts of quality of life. It is acceptable to appreciate that responsibility for each of the components of quality of life has a different structure in terms of the economic sector. For the quality of environment,

for example, the public sector is responsible for the content of the rules and the rigor in their application. The media reported that the same legal rules can have much different effects between local communities depending on the firmness of local public administration and the involvement of civil society in reporting irregularities.

Much information is needed both for the development of the smart city's strategy and for its implementation. In collecting and selecting this information, the advances made by contemporary management are useful. Whenever a decision about acquisition of additional information is to be done, like for decision about development smart cities, the following questions should be considered: what information is needed? is it available? is the time to acquire the information? what is the quality of the information? what is the value of the information? what is the cost of the information? should the information be acquired [25].

The local economy in the smart city may be predominantly private. We really recommend that the maximisation of the private sector be sought in the new stage of urban development of human society. The location and position of the private sector will be designed, at least for the early or pilot phases of the smart city, through the strategy initiated by the local public administration. From experience to date, we know that no matter what proportion of the public and private sectors are in the actual functioning of the smart integrated city, it is usually the public sector that takes up the development and implementation of the strategy to achieve it.

A question is asked about what I have put forward above: Can the hypothesis of the Austrian School of liberal thought be taken into account for a smart city entirely realized by private initiative? The answer is sure to be YES, but it can only be a smart city formed on the basis of a set of smart infrastructure components. These components are designed and delivered to consumers by the private sector. The process of organizing the other parts of the smart city is then taking place. We do not know any such case in Romania, even though the liberal-supported local public administrations were the engine of the smart cities in Romania (Cluj-Napoca, Timisoara, Alba-Iulia, Oradea, Sibiu). In any case, such a development must be based very much on the civic spirit of all concerned, as it remains a difficult to replace public sector area: legislation appropriate to new realities.

3. Scientific research, technological development and social innovation – factors in the development of the smart city

3.1. Science research

In setting the parameters of the smart city, all advances in science (exact, social and technical), technological development and social innovation contribute, in proportions and intensities that are difficult to assess. Here are some contributions from science, technological development and social innovation with a major impact in the development of the smart city in the next phase.

The progress of economic science has provided social practice with a number of useful conclusions, including the design of the smart city. We know today that if

we want to think about a new community, it is not enough to establish only those rules with the potential to generate conflicts. The theoretical generalization of institutional practices leads us to the conclusion that "*the advantages of the new structures do not concern isolated issues, but the entire institutional arrangement. It is about that pattern of rules of behaviour, guidelines, laws, rights, habits that establish interpersonal relationships'* [18]. These theoretical assessments valid for the modern institutional system are in line with the integrated system project in which the smart city is designed.

From the experience of the already existing smart communities, it is shown that interpersonal relationships have a significantly changed content. Trust among members of the smart Community is important. Many leaders of local public administrations believe that we cannot have a smart city without "smart citizens".

From the perspective of psychology studies, the distinction made by D. Kahnman (the 2002 Nobel Prize in Economics), according to which there are two plans for the behaviour of business people and consumer groups: The one based on instincts and intuition, representing level 1, and the one based on logic, without emotional involvement, representing level 2 [4]. Through practical education, through public policies and civil society action, it is possible to increase the weight of the logical component of the behaviour of the private sector (people acting individually or in groups, civil society, business people, etc.). When the logical component is dominant in private sector behaviour, there will always be favourable reactions to incentives and decisions will largely be based on realistic cost-benefit analyses, which give a better chance to smart city projects. We will thus see greater flexibility in social and economic activity toward personal or collective benefits. Public policies and regulations, mainly those in the tax or sanctioning field, will have much more predictable effects according to the intensity of intent or resources committed.

Since the mid-20th century technological revolution, research to predict the future has introduced a number of instruments to measure or assess the likelihood of change. For example, the concept of the total length of movement of social work was proposed. Also then, indicators such as the duration of a given profession or human occupation, the time needed from a discovery to its realization in mass quantities, the speed of substitution or radical change of certain consumer goods (goods or services), the rate of change of certain habits have begun to be used [17]. The use of these indicators over a relatively long period has improved the capacity to forecast the future and establish dynamic correlations to change. Statistics and forecasting have studied developments in a series of data long enough to allow for methodological changes. The new methodologies thus obtained are useful today when we can actually estimate, on the basis of existing trends, the city of the future in terms of nomenclature and content of the professions.

Studies on the evaluation of organizations can contribute to the development of smart cities. The Smart City is essentially a complex organization with an innovative profile. According to current standards, the assessment of organizations takes into account legal factors, research-development, commercial, technical equipment, human potential, economic and financial situation and structural

organization [14]. The inclusion of structural organization in the assessment of organizations is highly applicable in the design efforts of the smart city. The Smart City future relationship scheme must be accepted by both the local authority (public component of the project) and the citizens or associations representing citizens (private component of the project). Obtaining information on citizens' preferences in structural redesign of cities is a difficult task for local public authorities.

The fundamental structure of the smart city has been based and is likely to also be based in the future on the advances made by system theory. Science has shown that the value of a system is greater than the sum of the values of each element of the system. Developments in cyber research based on the concept of the system have greatly supported theoretical studies and practical projects on the smart city. The recent system definition provides attention to some aspects to be studied in new smart city projects. The system is defined as a set of elements in a non-random, more or less logical and stable relationship [11]. From the same study we understand that the relationship of the system with the external environment is important. The smart city will be an open system, closely connected with its region, but also with the national economy or the global economy. Commercial, social and environmental relations of the smart city with its external environment can be treated as external connections in the terminology of systems theory. These connections will be in line with the rules developed by the public authorities, but also with the will of individuals acting in an organized or individual manner.

Recent philosophical studies have called into question the correlation between the progress of society and the general aspiration called human achievement [26]. Because it is the essence of the human being, self-achievement will be an important mobile of human action, including the fulfilment of certain necessities considered legitimate. In explaining human action, it had been established since the 20th century that the principle of causality [27] was applicable. We will thus easily understand the determinism and motivation that explains the human need for better or, more precisely, comfort, which it is defined according to his established subjective needs.

3.2. Technological development

Smart technology, smart infrastructure, and high-performance communications are the minimum conditions for the smart city to run. Smart infrastructure and high-performance communications are the conditions for the emergence of the smart city. These realities are the physical support without which a city cannot be called "smart". In addition, in order to meet real progress requirements, smart infrastructure needs to respond to real needs of the users, mainly "smart citizens".

The development stage called the "knowledge economy" has as its main characteristic the decisive role of technology. It is actually the role of knowledge and experience incorporated in technology. The more valuable ideas and more advanced knowledge are included in the technology, the more its capacity to generate added value and efficiency increases. As a general rule, advanced technology belongs to the private sector. The public sector can facilitate the speed of technological renewal by

funding basic and partially applied scientific research. This will in turn be able to generate high-performance technology.

Through the new phase of smart city technology development, we are aiming for the efficient functioning of smart infrastructure already in operation, being designed or put into service. The functional objective is to close all smart circuits so that resources are no longer wasted in a way incompatible with the knowledge society.

A new trend on the technology is Array of Things. Array of Things is an intelligent urban measurement project that's changing our understanding of cities and urban life. The Array of Things (AoT) is an experimental urban measurement system comprising programmable, modular "nodes" with sensors and computing capability so that they can analyse data internally, for instance counting the number of vehicles at an intersection (and then deleting the image data rather than sending it to a data centre). AoT nodes are installed in Chicago and a growing number of partner cities to collect real-time data on the city's environment, infrastructure, and activity for research and public use. The concept of AoT is analogous to a "fitness tracker" for the city, measuring factors that impact livability in the urban environment, such as climate, air quality, and noise [3].

3.3. Social innovation

An already tested method is motivation communities in the online space. The new studies [23] propose a new stage of this method: crowdsourcing. So, is possible a new starting point for more comprehensive development strategy. Will be created platform dedicated to residents, local authorities and private companies. In this method the state and the private initiative have the same position. We may speak about a new model of city based on connectivity and mobility.

Fast Forward is the first start-up accelerator to focus solely on non-profit-based technology enterprises, it was founded by Shannon Farley and Kevin Barenblat in 2014. The accelerator provides support, mentorship, and access to financial capital for emerging companies that aim to improve the world, by focusing on poverty, education access, improving health, and environmental degradation.

One Greece's project of civil is SynAthina, aimed at finding solutions to urban problems, mainly for support of local municipalities. SynAthina is a social innovation platform set up by Athens in order to engage citizens in such reforms and to bring civil society in contact and dialogue with the city's administration and political leaders. This project maps the local initiatives, increases their visibility, and helps them connect with the private sector, various experts, and local administrations. By evaluating citizens' activities and acknowledging the best practices of civil society, SynAthina constantly informs the municipal administration about the citizens' priorities and pushes for updated regulations, simplified procedures, and creative synergies with citizens in order to enhance the administration's efficiency in responding to citizens' needs. The result is a better collection of information for the future development of the city. In fact is a private action to help the decision of public authorities [21].

Community groups submit ideas with a social impact via the synAthina online platform, which is essentially a map of groups and activities in the city of Athens. SynAthina's website also offers an online tool, which connects citizens' activities with all those stakeholders (city services, sponsors, volunteers, businesses, and knowledge centres) who can offer them support.

4. Mobility of the population– a factor and a result of the development of the smart city

Developments so far have shown that, based on technical progress and the technological revolution, the dynamics of professions are complex: professions are lost, professions are emerging, some professions remain unchanged and others are changing their content greatly. Detailed studies are useful to warn of the actual changes in the digital age to the content of certain professions [30].

A parameter of smart city is urban mobility. In many reference documents when referring to smart city, urban mobility is assumed to be implicit. In principle, a smart city aims to generate better living conditions for its citizens. Access to improved housing conditions requires mobility. Limited improvements can occur on rigid structures, but no revolutionary developments are possible.

The problems of labour and population mobility have started to be very intense since the 20th century. Since then, there have been studies that analyse the factors involved in the mobility-stability binomial. During the period of rapid evolution of industrialization, a distinction was made between the subjective movement of the population called fluctuation and the objective movement called mobility [19]. The conceptual differences between mobility and fluctuation are less significant in the smart city era and in the knowledge society. Knowledge of the main motivation of the mobility of individuals remains important for public authorities and civil society in order to establish causal relationships. Both types of movement must be taken into account when designing urban and rural areas. The views on the relationships between social and territorial mobility remain valid. This must be taken into account in a context of intense social dynamics, which are uncontrollable by the instruments of government or local public institutions.

A problem that has long limited the mobility of people, both social and territorial, has been the emergence of conflicts. It covered all types of conflict: between individuals, between non-organized groups, between organizations, between groups within the same organization, between state structures. The evolution of science has been able to advance knowledge of the coordinates, internal structure and source of conflict. After the conflict classification and the identification phase of the potential concept of conflicts, there have naturally been developments in conflict management capacity, including the scientific basis for conflict prevention and resolution [12]. This has reduced the obstacles previously faced with mobility. Sociology and political science explanations of the concept of tolerance, together with the media pressures related to this concept, will further limit the negative influence of conflicts. Thus, by harnessing tolerance as a basic social principle, it is likely that a barrier to social progress in humanity is removed, including forming smart communities of smart citizens.

Sociological studies on the mobility of the population, with a sufficiently large database, have drawn attention to some of the risks posed by certain types of migration. A sensitive aspect is the risk of gender, age and profession-based structures being unbalanced in both the source and destination communities [13]. Starting from such considerations, the comfortable living solutions of the smart city where the focus of attention is given to the family or household have been generalized. New urban spaces will provide good living conditions for all professions needed for a community. This will allow for competition in smart communities, but the partnership principle will be extended.

Under the pressure of population mobility, the regional economy has developed a great deal, including through a nuance of concepts. We have a difference today in the concepts of local development, urban development, metropolitan development or regional development [8]. If we talk about smart city, then we will take into account urban development and metropolitan development in the narrow sense; if we are talking about smart communities, we will consider local development. Projects that are more forward-looking and wider, with the necessary funds available, will also refer to regional development. However, the development of the smart city must be the core for the creation of smart communities at national level. There are already countries that can be classified under this type of community.

5. Conclusions

A success factor for most of the local public administrations in Romania was the consistency in implementing strategies to set up smart city services. In order to be able to work toward generalizing or improving the parameters of the smart city, it is necessary to design new business models.

The objectives pursued in the development of smart cities are broadly in line with what economic theory calls quality of life. In setting the parameters of the smart city, all advances in science (exact, social and technical), technological development and social innovation contribute, in proportions and intensities that are difficult to assess.

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Can we speak of smart education during the COVID-19 pandemic?

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Abstract

*The **objectives** of this research are: in what way is education in universities smart education during the COVID-19 pandemic, when it comes to teaching and studying online? This is a topic of current concern. **Prior work** includes research done on remote work and online higher education based on virtual labs (Perales et al 2019). Mass online courses can also be considered prior work. Smart education during the COVID-19 pandemic had all these as its basis, and continued from there. The **approach** of this paper uses observation of class activity at the Technical University of Civil Engineering Bucharest, for foreign languages and culture and civilization courses, which the author teaches, using the Microsoft Teams platform. With respect to **results** of the research, the present paper shows that online education in universities during the time of the COVID-19 pandemic fit in the concept of a smart city, where the majority of students and professors have access to smartphones in order to always keep in touch via Microsoft Teams, as well as tablets and laptops. The majority of university staff and students are also familiar with online social media platforms, which makes them easily adapt to the Microsoft Teams platform and to using it for teaching and learning communication purposes. The **implications** of this research are that teaching and learning material should be adapted by taking into account the students' background of knowledge and needs, to the online environment and the facilities it offers. With respect to the **value** of the present research, studying a concrete example of groups of students reacting to the materials and methods used offers feedback regarding the use of the online environment for teaching.*

Keywords: *Microsoft Teams, online platforms, online medium*.

1. Introduction

With the situation of the COVID-19 pandemic, the Technical University of Civil Engineering Bucharest has decided to continue the courses and seminars online, using the platform Microsoft Teams. Professors and students were given access through creating institutional accounts. All communication was done on the

platform, through the use of groups created for students and for professors, regarding information with respect to new rules, current university events such as conferences, vaccination and others. All professors' meetings were held on the platform.

The Technical University of Civil Engineering Buchareest has also held meetings online regarding adapting classes to the online enviornment. Students were given class materials in the Files section in their Microsoft Teams group created for every subject. Laboratories for engineering subjects used a recording of the professor doing practical work, e.g. for the Chemistry laboratory. The foreign languages classes could also benefit more from materials available online, especially audio and video materials, which were more difficult to use in the face-to-face classes, as special equipment was needed and was not always available in all classrooms.

Due to the extensive use of digital resources for the learning process, we could say that, during the pandemic period, universities in Romania have used smart education. "Smart learning environments (SLEs) utilize a range of digital technologies in supporting learning, education and training; they also provide a prominent signpost for how future learning environments might be shaped." (Hoel and Mason 2018).

The topic of online teaching is treated by Perales et al (2019), with respect to virtua labs. The article speaks about what happens in the domain of digital education by discussing the case of a university of La Rioja, with a completely online education system: This paper describes an ongoing educational innovation project focused of improving the practical education of engineering students, in the context of a purely online education model. A rich toolbox of online, virtual and remote labs is described. Using this toolbox, several strategies for providing practical education and their combinations will be evaluated, and a set of guidelines and recommendations for education practitioners will be provided as the main output of this research." The university is projected to function fully online, so it shows a model which can be adapted to the pandemic situation. What we should keep in mind is that "no 'one size fits all' model can cover the needs of all engineering studies. Therefore, we divided our effort in four main approaches: replicating face-to-face collaborative work, remote workstations, simulations of real equipment, and actual remote operation of physical equipment." (Perales et al 2019). Thus, the university of La Rioja could be seen as an example of university using the online medium for helping students actively participate during the classes, using collaborative learning in their online classes. The simulations remind of the virtual laboratories whose setup was discussed during professors' meetings, and which are intended for use for engineering subjects, as well as for foreign languages and translation and interpretation. The Technical University of Civil Engineering Bucharest also has a Department of Foreign Languages and Communication, within which functions a section of Translation and Interpretation. Laboratories for interpretation exist physically, so students could continue their training by using a virtual laboratory during the pandemic, especially since the distancing rules could not allow the physical labs to function properly. Students needed to be present two by two in each interpreting cabin. Even without a virtual laboratory, students could still continue to practice interpreting in the online medium on Microsoft Teams.

The adaptation of classes and professors' meetings, as well as communication in students' groups suggests the idea that we live in a smart city and we practice smart education at the Technical University of Civil Engineering Bucharest during the pandemic.

The concept of smart education is related to the concept of smart city, which was first introduced in 1990 in order to incorporate advanced information and communication technology (ICT) based hardware and software in urban planning (Bibri & Krogstie, 2017). Smart city utilizes ICT to enhance 'citizens' quality of life, foster economy, facilitate a process to resolve transport and traffic problems through proper management, encourage a clean and sustainable environment, and provide accessible interaction with the relevant authority of the government (Ismagilova, Hughes, Dwivedi & Raman, 2019). The increased urban expansion and innovations in urban planning and ICT have encouraged planners to focus on promoting the smart city's concept, which considers the well-being of the urban population by focusing on a combination of human, environmental, social, cultural, energy, information access and usage, and other technological advances. Studies have suggested smart mobility as a dimension in the smart city (Apostol, Bălăceanu & Constantinescu, 2015). (Sharif & Pokharel 2021)

Thus, the concept of smart city refers to the ablity to ofer citizens a proper way of encouraging a certain standard of life offering all online technology facilities. In cases of emergency, such as the COVID-19 pandemic, smart cities can resort to smart education. The digitalized world makes it possible to adapt teaching to the online medium if necessary. With the Microsoft Teams online platform, students and professors could have access from it from all devices, including smart phones, in order to keep in touch at all times regarding questions about assignments, class materials, and due dates. Students could benefit from the possibility of mobility, as sometimes they had to connect to classes while being asked to go physically to the university in order to complete the necessary forms for registering in the new academic year. They could still know what was being discussed during class while standing in queue or walking on the street; otherwise, they would have missed some classes, since the schedule for registering can interfere with the timetable of class activity. Some courses can also be recorded, and kept for future reference on the Microsoft Teams group, or even audited for the first time if students have missed some classes. All due dates can be written down on the group and all materials for study can reach all students. In face-to-face settings, it could happen that some students were not announced about some class materials that were distributed, and about the homework which was due on a certain time. On the Microsoft Teams group, this information is present at all times, and, thus, communication regarding school work is more efficient.

Normally, all cities should have an online infrastructure regarding various functions such as paying taxes, or even online school activity. The COVID-19 pandemic has made such functions the usual reality, and has made them become part of our usual everyday life activity.

After all, technology is a usual part of our everyday lives. Thus, it is usual for teaching and learning activities to continue online during the pandemic period.

2. Methodology

The reaction to the pandemic situation was very fast, as the University of Civil Engineering Bucharest managed to use the online platform as a means to continue classes and communication at the level of the institution. The use of the online platform could be seen as building upon the basis established by remote work, remote learning, e-learning, and mass online courses.

Remote office work is a topic that has been discussed since 1983, by Olson, according to whom "Remote work refers to organizational work that is performed outside of the normal organizational confines of space and time. The term telecommuting refers to the substitution of communications capabilities for travel to a central work location. Office automation technology permits many office workers to be potential telecommuters in that their work can be performed remotely with computer and communications support." This definition could very well be applied to what is happening at the Technical University of Civil Engineering Bucharest during the pandemic period. The university has relied on the computer for communication at all levels. Since "The individuals who worked at home successfully were found to be highly self-motivated and self-disciplined and to have skills which provided them with bargaining power." (Olson 1983), it was normal for professors to keep in mind the fact that students should be motivated to carry on their work. As a result, active participation was stimulated, as it could help keep them focused during the lectures and seminars. This method was also used during face-to-face classes, as students tended to study properly all the materials at once in the last days before the exams. Assimilation of knowledge was more efficient on an every class basis.

Kraut (2002: 137) notices that "Increasingly, collaborating with other people is likely to take place over distance or time as it is face-to-face. An abundance of new communication technologies has been developed to mediate remote collaboration: e-mail, bulletin boards, instant messaging, document sharing, videoconferencing, awareness services, and others." All these advantages are available nowadays for all members of the university staff, as well as for students. They are part of today's everyday life. However, there is an issue to which Kraut (2002: 137) draws attention: "…collaboration at a distance remains substantially harder to accomplish than collaboration when members of a work group are collocated." Thus, devising methods to maintain students active during courses and seminars is a necessity in the online medium. Professors have tried various methods of making students interact with them, as well as among themselves. Pair work and group work can be used through the breakout rooms feature. Visual materials used during class can also help. For instance, the professor can share a PowerPoint presentation of the course, a textbook with exercises where the professor can fill in the blanks live during the seminar, as if writing on the blackboard for all students, while students take turns to answer.

Remote learning is the term used for the continuation of classes online during the pandemic for university students and professors: "In response to the spread of COVID-19, a new coronavirus, many U.S. schools have implemented remote learning. This approach to education can prevent students from experiencing setbacks during

school closures." (Morgan 2020: 135) The universities from Romania have behaved similarly. They have each adopted one platform at the level of the whole university, or each professor has chosen one platform for courses and seminars. Students can adapt for each platform, as has been the case at the National School of Administrative and Political Studies, where the author of this paper has attended the courses and seminars of the master's degree programme Project Management in English, between 2019-2020/ 2020-2021 academic years. There professors have used online platforms such as Zoom, Cisco Webex, Google Meet, and Microsoft Teams. Remote learning was made easy due to the live interaction among teachers and students. Communication was going on normally during classes, as well as supplementary, through private messages, both at the National School of Administrative and Political Studies and at the Technical University of Civil Engineering Bucharest. At the Technical University of Civil Engineering Bucharest, the author of the paper teaches English language seminars, and a Culture and Civilization course and seminar for students at the Engineering faculties. The author of the paper has noticed that more students were present during the online seminars and courses, and also more students were active and willing to do their assignments. What is more, some students were asking for an extension due to the fact that they were connected on their smartphones and were finding it difficult to solve the exercises at the moment of the seminar, so they were allowed to send the assignments until later and to make up for their absences as well.

While e-learning has been a good solution for the pandemic situation to continue classes, the Technical University of Civil Engineering Bucharest has preferred, since December 2, 2021, a mixed, or blended learning, system, which had been applied during the first week of the beginning of the academic year 2021-2022. The rector of the University has argued in favour of the necessity of returning to the face-to-face classroom, especially since the students in a technical university need to see some experiments done in a practical way, while in a lab or classroom. Topography classes were held, usually, in the park opposite the campus, where measurements could be taken. Students needed, thus, to work practically themselves, and to use the respective tools, and it was not enough for them to watch the professor on the platform. The rector of the university decided to have seminars done in the face-to-face classroom, while courses could be done online, since for a course of lectures there would be several groups of students and not enough space for safe distancing. Such a system reminds of blended learning, which "is more favorable than pure e-learning and offers many advantages for learners like producing a sense of community or belonging." (Tayebinik and Puteh 2012). This could be a reason why having a mixed system could be though of as more efficient when the number of COVID-19 cases is going down.

The digital culture also matters, as the ease of using the platform comes from the fact that it provides a familiar environment. It recalls features from social media, such as private messages, private video calls, emoticons, files section, public messages, which are similar to Facebook groups.

By resorting to the observation method, activities at the Technical University of Civil Engineering Bucharest have been converted to the online medium

intuitively. Professors have tried to adapt to the way that students perceive the class activities regarding various subjects. With respect to practical classes, such as labs, students have expected propfessors to show them practically various experiments, so the professors have done this by filming and recording themselves doing, for example, Chemistry experiments. With respect to foreign languages and culture and civilization classes, students have expected more audio and visual materials, as well as easier access to class materials and more use of Internet papers and sites. Since some students could not attend classes at some point due to personal or administrative reasons, they expected to be given alternative solutions for access to class materials, as well as to alternative means of sending the assignments when ready.

Culture and Civilization courses have benefitted, due to the online platform, from easier communication regarding the links to documentaries or sites that students should consult as the basis of discussions. Since the video resources were quite old and could not support at all times didactic material, having an online platform available eased the process of making use of documentaries from youtube related to discussions during seminars and lectures. What is more, for the foreign language learning classes, sometimes cassette recorders were not available for all materials that could be used and in all classrooms, so the platform provided the best space for sending mp3 files and links to youtube videos and other sites for students to solve various tests and listening comprehension exercises. Sometimes, students could also come in late in the classroom and could not solve some listening comprehension exercises from the beginning. The advantage in using listening comprehension exercises on the platform is that students can play for themselves the file as many times as needed, without the background noise from the classroom.

3. Results

By using the online platform, some students felt safer to respond during class exercises and more motivated to solve the assignments and to post them, since they enjoyed the online environment more than the classroom environment. Students enjoyed that they could interact online, for group and pair work, and in this way know each other more, especially if they had never met, if they were first year students. They felt that the online medium was more attractive in terms of resources, and also in terms of the quality of the video and audio materials. They could also use again the audio and video resources at any time for self-study, in order to practice some aspects of the lesson. They could also make up for a lost course of seminar easier in the online environment, since all they had to do was to connect and check the group resources, and find them there, instead of asking colleagues that may not have attended the classes either.

The information regarding the professor's assignments and due dates for every course and seminar is always available on the online platform, and thus students could become more efficient in organizing their activity. Students can also spend less time by going to register at the university library, especially when the resources are not electronic and are limited for photocopying. On the platform,

everything is made available in electronic format in the files section. Thus, there is a stronger tendency towards a life in the smart city and towards smart learning through the use of platforms.

Even during the brief periods of blended learning, materials and announcements on the online groups on the platform dedicated to the respective subject are still present, for those students that are absent from the face-to-face class. For alternative situations, the administration of the Technical University of Civil Engineering Bucharest has made available classrooms with a desktop computer and web camera for live broadcast of the course or seminar that professors believed were important to attend, at least partially, in a face-to-face system. Some students could attend live, while others could watch from the online platform if they chose not to attend live, or if they did not have this possibility.

4. Discussion and conclusions

The blended learning system could be a solution for the future of universities. Partially, some classes could be broadcasted live or some information will still be spread through the online group dedicated to the respective seminar or lecture through Microsoft Teams. Information regarding the course or seminar contents and requirements could be still sent on an online platform in the future. This could be more efficient than sending it by email, as any student, at any time of registering for the new academic year, could access it and find out all the necessary information.

Online resources are also considered easier to access by students, and are thus preferred. Most students also prefer social media platforms for communication, instead of email communication, and thus the Microsoft Teams platform could be considered as suiting their needs.

The universities could decide in the future to keep an online platform for students, even if they return to theface-to-face teaching system. Such online platforms could help in various situations when students cannot attend classes, or need to retake an exam and should access all resources. In the face-to-face teaching and learning system, making up for an unattended lecture or seminar is often not possible; however, through the online system it could be made possible, when necessary. There are also cases of foreign students that cannot come to Romania until they get their permit, and thus miss lots of classes. Through the online platform, they could be helped to make up for the lost seminars and lectures, and thus to adapt faster.

There are also drawbacks to the online teaching and learning system. For instance, there could be technical issues with the platform, or students and teachers may not have the latest technology that supports the use of the platform. The Internet connection may also not be strong enough in all areas, as has been reported by some students. However, the university has offered, in some cases, laptops for students with limited resources and classrooms for professors where they have astable internet connection, for various activities, such as exams.

Another drawback to the use of online teaching and learning is the lack of feedback from the whole class. Sometimes, professors holding lectures may not know for sure if students are actually paying attention, since some of them may say

that they have issues with their web camera and cannot open it. It can also happen that at home students can get distracted by what is going on, for example by neighbours renovating their house, and may not have proper concentration at all times. Sometimes, students may become distracted by listening to classes while driving. They may also not have the possibility to write in a file to solve exercises easily if they access the class from a parking spot using their smartphone.

However, by posting materials in the Files section, with the necessary information, students can make up for the drawbacks and still go on with the class activity like their colleagues. Professors will take all cases into account.

The way that Engineering, aswell as foreign languages and Culture and Civilization classes are held during the pandemic at the Technical University of Civil Engineering Bucharest may remind of mass online classes, due to the way that resources are present in electronic form and all sorts of media are used. They also remind of the concept of smart cities, through the use of the electronic devices, and of the concept of smart education, which refers to the use of technology applied to the particular case of universities continuing their classes online.

Technology can be seen as a reliable means of help during the pandemic to help continue usual activities before the pandemic, such as work, collaboration on projects, exams, classes at all levels, shows, workshops, exhibitions, book fairs, conferences, and others.

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Registrul secţiilor de votare din ţară

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Abstract

Registrul secţiilor de votare este o bază de date centralizată privind delimitarea, numerotarea, sediile şi dotarea secţiilor de votare. Delimitarea secţiilor de votare din ţară şi stabilirea sediilor acestora se actualizează de către primari, prin dispoziţie, numai cu avizul conform al Autorităţii Electorale Permanente.

Delimitarea secţiilor de votare se realizează utilizând următoarele niveluri: a) comună, oraş, municipiu; b) sector, în cazul municipiului Bucureşti; c) localitate componentă, sat aparţinător sau sat component; d) arteră; e) număr administrativ; f) număr/denumire imobil; g) număr/denumire scară; h) număr apartament.

Obiective

1. stabilirea unui set unitar de reguli pentru realizarea activităţilor privind delimitarea şi numerotarea secţiilor de votare, stabilirea imobilelor în care se desfăşoară votarea, precum şi realizarea evidenţei acestora, înfiinţarea/desfiinţarea secţiilor de votare;

2. detalierea procedurii de acordare a avizului conform pentru modificarea delimitărilor sau a sediilor secţiilor de votare, pentru înfiinţarea/desfiinţarea unor secţii de votare;

3. stabilirea modului de aducere la cunoştinţă publică a delimitării şi numerotării secţiilor de votare, precum şi a imobilelor în care se desfăşoară votarea;

4. autorizarea operării în Registrul secţiilor de votare din Registrul electoral;

Studii prealabile *Lucrarea se bazează pe date din cadrul rapoartelor elaborate de către Autoritatea Electorală Permanentă cu ocazia organizării şi desfăşurării alegerilo de la nivel naţional din anii 2019 şi 2020.*

Abordare *Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, stabilită prin hotărâre a Autorităţii Electorale Permanente.*

Rezultate

a) *realizarea unei evidenţe adecvate în ceea ce priveşte: delimitarea secţiilor de votare (arondarea la o secţie de votare, după caz, a localităţilor*

*ori numai a unor părţi componente ale acestora, a arterelor or*i a unor secţiuni ale acestora, a imobilelor, arondarea alfabetică a alegătorilor în localităţile cu artere fără denumire sau fără numere administrative atribuite imobilelor); localurilor secţiilor de votare (numărul secţiei de votare, denumirea şi tipul unităţii administrativ-teritoriale, datele de contact şi alte detalii privind localul secţiei de votare); evidenţa numărului secţiilor de votare şi al circumscripţiilor electorale.

b) informarea alegătorilor, a competitorilor electorali, a autorităţilor publice cu atribuţii în domeniul electoral;

c) realizarea unor estimări corecte a resurselor necesare, respectiv alocarea din timp a fondurilor destinate procesului electoral.

Implicaţii stabilirea responsabilităţilor privind operaţiunile de administrare, precum şi întocmirea, avizarea sau aprobarea documentelor necesare activităţilor menţionate.

Valoare. Lucrarea are in vedere asigurarea informaţiilor necesare pentru fundamentarea propunerilor de îmbunătăţire a condiţiilor logistice, precum şi pentru elaborarea politicilor de management a operaţiunilor electorale şi posibilitatea fundamentării unor soluţii fiabile pentru implementarea unor sisteme informatice specifice procesului electoral.

Cuvinte cheie: *delimitare, evidenţă, condiţii logistice, procedura de acordare a avizului*.

Introducere

Registrul secţiilor de votare din ţară reprezintă o colecţie organizată de date şi informaţii (bază de date) privind delimitarea, numerotarea, sediile şi dotarea secţiilor de votare.

Datele şi informaţiile cuprinse în Registrul secţiilor de votare au caracter public.

Registrul secţiilor de votare din ţară este administrat[38] de către Autoritatea Electorală Permanentă.

Actualizarea datelor şi informaţiilor cuprinse în Registrul secţiilor de votare presupune următoarele:

- actualizarea (modificarea) delimitării secţiilor de votare;
- actualizarea (modificarea) sediilor secţiilor de votare
- actualizarea (modificarea) numerotării secţiilor de votare;
- actualizarea (modificarea) denumirii locaţiilor secţiilor de votare
- înfiinţarea sau desfiinţarea, după caz a secţiilor de votare.

Delimitarea secţiilor de votare din ţară şi stabilirea sediilor acestora se actualizează de către primari, prin dispoziţie, numai cu avizul conform al Autorităţii Electorale Permanente.

Delimitarea unei secţii de votare reprezintă evidenţierea elementelor utilizate în organizarea administrativ-teritorială a teritoriului (imobil/nr. administrativ, artere, localităţi, etc.) ce permite arondarea alegătorilor în mai multe grupuri, în

[38] Conform art. 20 alin. (1) din Legea nr. 208/2015, cu modificări şi completări ulterioare, coroborat cu art. 16 lit. h) din Ordinul Preşedintelui Autorităţii Electorale Permanente nr. 726/2020 privind stabilirea atribuţiilor compartimentelor Autorităţii Electorale Permanente .

funcţie de mărimea localităţii, în aşa fel încât aceştia să îşi poată exercita dreptul de vot în condiţii corespunzătoare.

1. Criterii pe care trebuie să le îndeplinească secţiile de votare

a) Criterii spaţiale privind secţiile de votare

- aria teritorială a secţiei de votare trebuie să se încadreze între limitele unităţilor administrativ-teritoriale;
- aria teritorială a secţiei de votare trebuie să fie, de regulă, compactă;
- aceeaşi adresă a unui alegător nu poate fi arondată la mai multe secţii de votare;
- distanţa dintre sediul secţiei de votare şi domiciliul/reşedinţa alegătorului să nu depăşească, de regulă, 3 kilometri;
- în delimitarea unei secţii de votare din ţară pot fi incluse[39], după caz:
  a) unităţi administrativ-teritoriale întregi;
  b) un sat/mai multe sate în cazul comunei; localitate componentă/mai multe localităţi componente şi/sau un sat aparţinător/mai multe sate aparţinătoare, în cazul municipiilor şi oraşelor;
  c) artere întregi ori numai segmente ale acestora;
  d) imobile izolate ori grupate în diferite moduri (case, blocuri).

b) Criterii privind dimensionarea secţiilor de votare în funcţie de numărul alegătorilor

- numărul de alegători arondaţi unei secţii de votare nu poate fi mai mic de 50;
- numărul de alegători arondaţi unei secţii de votare nu poate depăşi cifra de 2.000.

Statul conferă primarului, conform art. 155 alin. (1) din Codul Administrativ, cu modificările şi completările ulterioare, calitatea de reprezentant al statului şi în acest sens îi acordă atribuţii privind organizarea şi desfăşurarea alegerilor şi a referendumului.

2. Situaţii care impun solicitarea avizului conform pentru modificarea delimitării*[40]*

Avizele conforme pentru modificarea delimitării secţiilor de votare sunt emise în următoarele cazuri:

a) apariţia, desfiinţarea sau redenumirea arterelor;
b) emiterea de acte de identitate cuprinzând adrese de domiciliu noi;
c) emiterea de dovezi de reşedinţă cuprinzând adrese de reşedinţă noi;
d) modificarea limitelor unităţilor administrativ-teritoriale;

[39] Nu pot fi incluse alte elemente faţă de cele prezentate mai sus, în delimitarea secţiilor de votare decât dacă:
– nu au fost atribuite tip sau denumiri de arteră, numere administrative;
– atribuirea tipului sau denumirilor de arteră, a numerelor administrative au fost realizate necorespunzător.
[40] Art. 4 din Hotărârea AEP nr. 19/2017 pentru aprobarea Metodologiei de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora

e) rectificarea unor omisiuni/erori privind elementele teritoriale arondate secţiei de votare;
f) rectificarea sau modificarea menţiunilor privind domiciliul sau reşedinţa din actele de identitate ale alegătorilor;
g) emiterea unor acte de identitate noi.

2.1. Criteriile ce trebuie avute în vedere la stabilirea sediilor secţiilor de votare

A) Principii ce stau la baza stabilirii sediilor secţiile de votare sunt: eficienţa (amenajarea şi dotarea la costuri minime); predictibilitatea (să fie cunoscut cu cel puţin 30 de zile înaintea alegerilor, atât de alegători, cât şi de către organizatori din punct de vedere al naturii juridice a imobilului, precum şi a condiţiilor pe care le oferă indiferent de anotimpul în care se organizează procesul electoral; sustenabilitatea (resursele alocate trebuie să permită utilizarea sediilor la mai multe procese electorale); accesibilitatea să asigure accesul facil al alegătorilor, inclusiv al celor cu dizabilităţi); responsabilitatea (localul secţiei de votare trebuie amenajat astfel încât să asigure condiţii decente, corespunzătoare, pentru exercitarea dreptului de vot şi de asemenea, să asigure respectarea caracterului oficial şi solemn al procesului electoral)

B) Setul de condiţii pe care trebuie să le îndeplinească sediile secţiilor de votare sunt următoarele:

- să aparţină, de regulă, domeniului public sau privat al statului ori al unităţilor administrativ-teritoriale; În cazul în care primarul solicită un aviz conform pentru organizarea şi dotarea unei secţii de votare cu sediul într-un imobil aparţinând unei persoane fizice sau juridice private trebuie să motiveze în scris alegerea (spre ex. că nu deţine în localitatea respectivă alte sedii/spaţii aparţinând domeniului public sau privat aparţinând statului care să îndeplinească condiţiile legale de organizare a unei secţii de votare, că pot fi alocate fondurile necesare etc.).
- să se afle la parterul clădirilor. Poate fi amplasat la etaj numai dacă sunt asigurate condiţii pentru accesul persoanelor cu dizabilităţi (în acest caz reprezentanţii UAT vor formula în scris precizări privind faptul că în ziua alegerilor vor asigura toate condiţiile necesare accesului facil al alegătorilor cu dizabilităţi inclusiv prin prezenţa unor persoane la sediul secţiei de votare în intervalul votării care vor asigura acesul alegătorilor;
- să fie amplasate în locuri publice accesibile; configuraţia şi amplasarea acestuia să permită: o cât mai bună organizare şi desfăşurare a operaţiunilor electorale; afluirea şi defluirea corespunzătoare a alegătorilor; să faciliteze asigurarea măsurilor de pază, de protecţie şi securitate stabilite pe baza unor planuri de protecţie; să dispună de dotările prevăzute de legislaţia privind prevenirea şi stingerea incendiilor, precum şi de planul de evacuare în caz de urgenţă; să permită deplasarea normală, neobstrucţionată, pe coridoare, holuri, culoare, vestibuluri şi alte asemenea locuri de trecere şi, de asemenea, să fie marcat corespunzător;
- spaţiile identificate vor fi utilizate la toate tipurile de scrutin;

- să existe mijloace de comunicaţii, precum şi posibilitatea asigurării conexiunii la reţeaua internet;
- să beneficieze de echipamente şi instalaţii în stare de funcţionare;
- să fie racordate la reţelele de utilităţi publice de energie electrică, apă şi canalizare, precum şi la reţelele de telecomunicaţii şi internet;
- să existe energie electrică, precum şi surse suplimentare de energie (generatoare de curent, lanterne, felinare etc.);
- să existe cel puţin un grup sanitar igienizat şi aerisit;
- încăperile trebuie să fie uscate, să aibă lumină suficientă, să fie bine ventilate şi menţinute în stare de curăţenie, urmând ca în funcţie de condiţiile atmosferice să se asigure confortul termic necesar;
- să existe rampe speciale pentru accesul persoanelor cu handicap locomotor care intenţionează să îşi exercite dreptul de vot şi să asigure accesibilitatea în conformitate cu prevederile Legii nr. 448/2006 privind protecţia şi promovarea drepturilor persoanelor cu handicap, republicată, cu modificările şi completările ulterioare, respectiv Ordinului MDRAP nr. 189/2013 pentru aprobarea reglementării tehnice „Normativ privind adaptarea clădirilor civile şi spaţiului urban la nevoile individuale ale persoanelor cu handicap, indicativ NP 051-2012 - Revizuire NP 051/2000";
- să dispună de o suprafaţă utilă suficientă pentru: asigurarea unor zone de staţionare pentru persoanele autorizate în condiţiile legii să participe ori să asiste la operaţiunile electorale desfăşurate în secţia de votare, astfel încât acestea să nu îngreuneze sau să împiedice desfăşurarea normală a operaţiunilor electorale; asigurarea unor zone de lucru pentru operatorul de calculator; amplasarea cabinelor şi urnelor de vot, a pieselor de mobilier necesare desfăşurării activităţii membrilor biroului electoral al secţiei de votare (masă, scaune, dulap etc.); asigurarea controlului accesului alegătorilor în sala de vot, în serii corespunzătoare numărului cabinelor; depozitarea în condiţii de siguranţă a buletinelor de vot, a tipizatelor şi formularisticii electorale, precum şi a altor materiale necesare procesului electoral. să existe fonduri alocate în buget şi logistica necesară.

Este interzisă amenajarea de localuri ale secţiilor de votare în spaţiile din unităţile de asistenţă medicală cu paturi sau de asistenţă medicală primară şi ambulatorie de specialitate, precum şi în cele în care se servesc băuturi alcoolice.

În ziua alegerilor este interzisă închirierea sau utilizarea în alte scopuri a spaţiilor în care se desfăşoară votarea, a căilor de acces la acestea şi a spaţiilor tehnice aferente.

Localurile în care sunt amenajate secţii de votare şi care au fost înregistrate în Registrul secţiilor de votare pot fi schimbate numai cu **avizul conform** al Autorităţii Electorale Permanente şi doar pentru situaţiile prevăzute de Hotărârea nr.19/2017 a Autorităţii Electorale Permanente pentru aprobarea metodologiei de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora

3. Avizele conforme pentru înfiinţarea unor secţii de votare noi sunt emise în următoarele cazuri:

a) numărul de alegători din unitatea administrativ-teritorială a crescut, fără a exista posibilitatea rearondării acestora, conform legii, la secţiile de votare deja existente în unitatea administrativ-teritorială respectivă;
b) distanţa dintre sediile secţiilor de votare dintr-o unitate administrativ-teritorială şi domiciliile/reşedinţele a mai mult de 50 de alegători arondaţi acestora depăşeşte 3 kilometri, cu condiţia formulării unor cereri scrise motivate de către aceştia privind înfiinţarea unei noi secţii de votare.

Avizul conform se semnează de către preşedintele Autorităţii Electorale Permanente, acesta fiind însoţit de un Raport de emitere a avizului conform, întocmit de către personalul Departamentului logistică electorală, pe baza documentaţiei întocmite de personalul filialelor şi birourilor judeţene ale Autorităţii.

Numerotarea secţiilor de votare din ţară se actualizează de către Autoritatea Electorală Permanentă la nivelul fiecărui judeţ, respectiv al municipiului Bucureşti, începând cu localitatea reşedinţă de judeţ şi continuând cu cele din municipii, oraşe şi comune, în ordinea alfabetică a acestora. În municipiile cu subdiviziuni administrativ-teritoriale, numerotarea se face cu respectarea ordinii acestor subdiviziuni.

4. Avizele conforme pentru schimbarea sediului unei secţii de votare sunt emise în următoarele cazuri[41]:

a) în cazul în care acestea nu mai îndeplinesc condiţiile prevăzute în Hotărârea Autorităţii Electorale Permanente nr. 44/2016;
b) în cazul în care primarul poate asigura condiţii şi dotări de o calitate superioară în alte imobile decât în cele existente;
c) când este necesară reducerea distanţei dintre sediile secţiilor de votare şi domiciliile/reşedinţele alegătorilor arondaţi la acestea şi există cereri scrise motivate din partea acestora privind schimbarea sediului secţiei de votare.

Avizele conforme pentru desfiinţarea unei secţii de votare sunt în situaţia în care la secţia de votare sunt arondaţi mai puţin de 50 de alegători şi există cereri scrise motivate din partea acestora privind acceptul de a fi arondaţi la o secţie de votare mai îndepărtată de 3 km decât domiciliile/reşedinţele alegătorilor respectivi.[42]

5. Elaborarea documentaţiei, comunicarea şi înregistrarea solicitării

Solicitarea primarului de emitere a avizului conform al Autorităţii Electorale Permanente pentru modificarea delimitărilor, de schimbare a sediului secţiilor, de înfiinţare/desfiinţare a secţiilor de votare se transmite structurilor teritoriale ale Autorităţii Electorale Permanente (Birouri judeţene ori Filiale – în cazul judeţelor în

[41] Art. 6 din Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, aprobată prin Hotărârea AEP nr. 19/2017
[42] Art. 5 din Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, aprobată prin Hotărârea AEP nr. 19/2017

care funcţioneză doar Filialele). Structura teritorială înregistrează solicitarea de emitere aviz conform şi realizează o primă verificare a acesteia şi a documentelor anexate în ceea ce priveşte îndeplinirea condiţiilor de fond şi de formă şi propun Filialei cărora sunt arondate, emiterea avizului conform sau după caz refuzul emiterii avizului conform.

Solicitarea primarului, transmisă către Autoritatea Electorală Permanentă (birouri judeţene/filiale), prin poştă, fax sau e-mail, constând într-o adresă de înaintare care va indica documentele transmise precum şi *descrierea situaţiei* care reclamă modificările, trebuie să fie însoţită de următoarele documente:

- proiectul de dispoziţie privind modificarea delimitării secţiilor de votare şi a sediilor acestora,
- fişa tehnică conform Anexa A sau Anexa B la Hotărârea AEP nr. 19/2017, după caz, şi
- alte documente justificative privind îndeplinirea condiţiilor legale,.
- proiectul de dispoziţie şi fişa tehnică sunt semnate de către primar;
- întocmirea fişei tehnice se face atât pe suport de hârtie cât şi în format electronic editabil (.doc,.docx,.xls,.xlsx);
- se verifică existenţa altor documente justificative. Prin **documentele justificative** se înţelege, cu titlu de exemplu: fotografii, schiţe, note, avize tehnice, planuri urbanistice, planuri cadastrale, declaraţii sau liste de inventariere şi hotărâri ale consiliilor locale, sau alte acte administrative emise de instituţii sau autorită publice necesare analizei întregii documentaţii.

Elaborarea de către primar a proiectului de dispoziţie privind modificarea delimitării secţiilor de votare şi a sediilor acestora, trebuie să aibă în vedere atât elementele prevăzute de art. 7 alin. (1) din Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, aprobată prin Hotărârea AEP nr. 19/2017, cât şi dispoziţiile art. 22 din Legea nr. 208/2015.

Proiectul de dispoziţie trebuie să cuprindă:

- *temeiul legal* în baza căruia se solicită modificarea delimitării secţiei de votare şi/sau a sediului acesteia, dacă este cazul;
- *descrierea situaţiei* care reclamă modificarea delimitării secţiei de votare sau a sediului acesteia, dacă este cazul;
- *numărul şi codul unic al secţiei de votare*[43] pentru care se solicită modificarea, conform înregistrărilor existente în Registrul secţiilor de votare la data solicitării;
- *menţiuni referitoare la încadrarea în criteriile legale*[44], respectiv dacă:
- secţiile de votare nu depăşesc limitele unităţilor administrativ-teritoriale;
- aceeaşi adresă a unui alegător nu a fost arondată la mai multe secţii de votare;
- numărul de alegători arondaţi unei secţii de votare nu depăşeşte cifra de 2.000;
- numărul de alegători arondaţi nu este mai mic de 50;

[43]În cazul secţiilor propuse spre înfiinţare se utilizează sintagma „secţie de votare nouă".

[44] Prevăzute de art. 21 alin. (5) din Legea nr. 208/2015, cu modificările şi completările ulterioare.

- distanţa dintre sediul secţiei de votare şi domiciliul sau reşedinţa alegătorului nu depăşeşte 3 km;
- aria teritorială a secţiei de votare este compactă.
- *noua delimitare a secţiei de votare*, precum şi numărul alegătorilor arondaţi la secţia de votare, în cazul în care acesta se modifică;
- să se utilizeze tipul şi denumirea oficiale ale unităţilor administrativ-teritoriale, ale localităţilor componente sau ale satelor aparţinătoare, ale arterelor, ale numerelor administrative, ale numerelor sau denumirilor blocurilor, cu respectarea nomenclatoarelor şi a codificărilor utilizate de către autorităţile şi instituţiile publice;
- să utilizeze, pe cât posibil, indicativul de stare al arterelor;
- să includă toate arterele existente nearondate, conform nomenclatorului stradal aprobat prin hotărâre a consiliului local;
- să includă toate arterele desfiinţate nearondate care sunt menţionate în actele de identitate sau în dovezile de reşedinţă.

Fişa tehnică este întocmită şi transmisă către AEP atât pe suport hârtie precum şi de orice alte documente justificative privind îndeplinirea condiţiilor prevăzute de Hotărârea Autorităţii Electorale Permanente nr.19/2017.

La Fişa tehnică privind modificarea delimitărilor compuse din localităţi componente şi/sau sate aparţinătoare (la municipii şi oraşe), respectiv sate (la comune), se verifică următoarele:

- corectitudinea menţiunilor privind unitatea administrativ-teritorială şi după caz, a componentelor acesteia precum şi codul SIRUTA aferent judeţ, municipiu/oraş/comună precum şi localitatţilor componente/sate aparţinătoare/sate;
- corectitudinea menţiunilor privind numărul şi codul secţiei de votare unde este inclusă delimitarea şi unde va fi inclusă delimitarea, dacă delimitarea este nouă sau dacă se impune ştergerea acesteia.
- *corectitudinea informaţiilor privind elemente din delimitare (localităţi, artere sau segmente ale acestora, numere administrative şi imobile etc.),astfel încât să nu fie incluse eronat, omise sau transcrise eronat.*

Filialele realizează o nouă verificare a propunerilor primite din partea birourilor judeţene, a solicitării primarului şi a documentelor ataşate în ceea ce priveşte îndeplinirea condiţiilor de fond şi de formă a documentelor justificative înaintate de primar şi comunică prin e-mail Direcţiei resurse electorale din cadrul Departamentului logistică electorală prin intermediul structurilor teritoriale ale AEP, solicitarea primarului, documentele ataşate şi propunerea Filialei de emitere a avizului conform/refuzul emiterii avizului conform, inclusiv prin întocmirea draft-ului avizului conform, sau refuzului emiterii avizului conform, duopă caz.

Solicitările comunicate direct la sediul central al Autorităţii vor fi redirecţionate către structurile teritoriale în vederea înregistrării şi a verificărilor preliminare.

Teritoriul este structurat în mai multe tipuri de unităţi administrativ - teritoriale:

Dacă solicitarea respectă condiţiile de fond şi de formă conform dispoziţiilor legale şi a procedurilor operaţionale sau de sistem aprobate, biroul judeţean va comunica directorului filialei AEP o propunere de emitere a avizului conform.

În vederea accelerării procesului de avizare, în cazul în care structurile teritoriale AEP la care se depune pentru prima dată documentaţia de avizare constată că aceasta este incompletă, poate solicita completarea acesteia, exercitându-şi în acelaşi timp funcţia de îndrumare a autorităţilor administraţiei publice locale.

Se verifică documentaţia privind emiterea avizului conform primit de la biroul teritorial sau de la nivelul judeţului în care funcţionează filiala (reverificarea documentelor, a datelor şi informaţiilor comunicate de către primar precum şi a constatărilor biroului teritorial). Trebuie respectate termenele prevăzute de Hotărârea AEP nr. 19/2017.

Filialele AEP transmit către Direcţia resurse electorale din cadrul Departamentului logistică electorală, prin poştă electronică, la adresa de e-mail deblocare.rsv@roaep.ro, documentaţia scanată, verificată şi însoţită de propunerea de emitere a avizului/refuzul emiterii avizului conform sub forma unei note proprii, semnată de directorul filialei, precum şi draft-ul avizului conform sau refuzului de emitere aviz, după caz.. Fişele tehnice se comunică şi în formă editabilă. Totodată, în solicitarea filialelor se precizează şi dacă, având în vedere complexitatea, volumul, dificultatea şi urgenţa operaţiunilor ce urmează a fi efectuate, intervalul de timp prevăzut de către art. 9 din Hotărârea AEP nr. 19/2017 este suficient. În caz contrar se propune un timp estimat necesar pentru realizarea operaţiunile de modificare prevăzute în avizul conform de modificare a delimitării şi/sau sediilor secţiilor de votare, respectiv de înfiinţare/desfiinţare a secţiilor de votare.

6. Înfiinţarea unor noi secţii de votare

În cazul înfiinţării unei noi secţii de votare procedura este identică cu cea a modificării delimitării cu următoarele diferenţe:

- proiectul de dispozitie, va menţiona temeiul legal: art. 3 alin (1) din Hotărârea AEP nr. 19/2017
- Fişele tehnice utilizate: conform Anexei C şi Anexei A sau B la Hotărârea AEP nr. 19/2017, după caz;

Avizarea este condiţionată de realizarea unei verificări la noul sediu, respectiv întocmirea, unui proces-verbal semnat de reprezentantul AEP şi reprezentantul[45] autorităţii publice locale, prin care se certifică efectuarea verificărilor la faţa locului de către filiala sau biroul AEP în a cărei rază teritorială se află sediul propus şi să se constate îndeplinirea de către locaţiile în care funcţionează secţiile de votare a tuturor condiţiilor prevăzute de Hotărârea AEP nr. 44/2016.

[45] În cazul în care sediul propus aparţine unei persoane fizice/juridice private este necesar ca aceasta să ia la cunoştinţă despre modul de derulare al operaţiunile electorale, organizarea şi desfăşurarea alegerilor şi să semneze procesul verbal. Reprezentantul AEP va recomanda întocmirea unui document între persoana fizică/juridică privată şi autoritatea administraţiei publice locale pentru a consemna punerea la dispoziţie a spaţiului respectiv în vederea organizării procesului electoral (spre exemplu, contract de comodat). De asemenea, este necesar ca primarul să certifice în scris că nu dispune de alte spaţii aparţinând domeniului public în care să organizeze secţii de votare.

Conformitatea îndeplinirii condiţiilor se realizează şi prin intermediul unui documentar foto care prezintă sediul, atât din interiorul cât şi din exteriorul acestuia (acces la intrare din arteră, captură cu intrarea în sediu, accesul până la sala votării, sala votării, toaletă, mijloace de asigurare a confortului termic, mijloace PSI, plan evacuare)

Secţiile de votare noi, pot fi înfiinţate, de regulă, până cel mai târziu cu 30 de zile înaintea datei votării.

Verificarea celorlalte documentele justificative

- verificarea existenţei unor Cereri scrise motivate, formulate de mai mult de 50 alegători pentru înfiinţarea unei noi secţii de votare (când distanţa dintre sediile secţiilor de votare dintr-o unitate administrativ-teritorială şi domiciliile/reşedinţele acestora depăşeşte 3 kilometri
- verificarea existenţei unui Print-screen de pe Google maps, care dovedeşte distanţa sau a unui Print-screen din Registrul Electoral care arată faptul că numărul de alegători din unitatea administrativ-teritorială a crescut la peste 2000 de alegători, fără a exista posibilitatea rearondării acestora, conform legii, la secţiile de votare deja existente în unitatea administrativ-teritorială respectivă;
- dovada apartenenţei sediului propus la domeniul public sau privat al statului: HCL, Liste inventar etc., sau dovada deţinerii spaţiului de către persoane private fizice sau juridice, dacă nu a fost identificată o altă instituţie, fapt care trebuie menţionat în adresa de înaintare: Contract de comodat, închiriere etc. În cazul în care spaţiul aparţine persoanelor private fizice sau juridice, iar acesta nu este pus la dispoziţie în mod permanent în contract trebuie să se regăsească precizarea:„spaţiul va fi pus la dispoziţie de fiecare dată când se organizeaza consultari electorale (atât alegeri locale, parlamentare, europene si prezidentiale, cât şi referendumuri locale sau nationale), cu cel putin 7 zile lucrătoare înaintea datei organizării fiecărei consultari electorale şi până la finalizarea tuturor operaţiunilor electorale aferente fiecărei consultari electorale”;
- existenţa acordului conducerii instituţiei în care urmează a se organiza secţie de votare in cazul in care imobilul aparţine domeniului public sau privat al statului dar este administrat de altă entitate decât primăria (ex. instituţiile de învăţământ).
- avizul Serviciului de Telecomunicaţii Speciale privind posibilitatea asigurării de comunicaţii de date si voce pentru buna funcţionare a SIMPV în sediul propus.

7. Modificarea sediului secţiei de votare[46]

În cazul organizării secţiei de votare într-un nou sediu procedura este identică cu cea modificării delimitării cu următoarele diferenţe:

- proiectul de dispozitie, va menţiona temeiul legal: art. 6 din Hotărârea AEP nr. 19/2017

[46] Art. 6 din Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, aprobată prin Hotărârea AEP nr. 19/2017

- fişa tehnică utilizată: conform Anexei C la Hotărârea AEP nr. 19/2017
- avizarea este condiţionată de realizarea unei verificări la noul sediu, respectiv întocmirea, unui proces-verbal semnat de reprezentantul AEP şi reprezentantul[47] autorităţii publice locale, prin care se certifică efectuarea verificărilor la faţa locului de către filiala sau biroul AEP în a cărei rază teritorială se află sediul propus şi să se constate îndeplinirea de către locaţiile în care funcţionează secţiile de votare a tuturor condiţiilor prevăzute de Hotărârea AEP nr. 44/2016. Conformitatea îndeplinirii condiţiilor se realizează şi prin intermediul unui documentar foto care prezintă sediul nou şi cel vechi, atât din interiorul cât şi din exteriorul acestuia. Schimbarea sediului unei secţii de votare, cu mai puţin de 30 de zile înaintea datei votării, se poate realiza numai în cazuri de forţă majoră.

8. Desfiinţarea secţiei de votare[48]

În cazul desfiinţării unei secţii de votare procedura de analizare este identică cu cea modificării delimitării cu următoarele diferenţe:

- proiectul de dispozitie, va menţiona temeiul legal: art. 5 din Hotărârea AEP nr. 19/2017 şi va preciza situaţia care reclamă desfiinţarea unei secţii de votare şi detalii despre rearondarea la alte secţii de votare a tuturor elementelor teritoriale ale secţiei desfiinţate;
- detalii cu privire la numărul total de alegători arondaţi la secţiile de votare ce vor fi afectate ca urmare a rearondării elementelor teritoriale (max. 2000 alegători/secţie)
- fişa tehnică utilizată: conform Anexei C la Hotărârea AEP nr. 19/2017
- Documentaţia va cuprinde şi un Tabel conţinând elementele teritoriale ale secţiei desfiinţate, pentru a asigura cuprinderea acestora în delimitarea celorlalte secţii de votare.

9. Numerotarea secţiilor de votare

- Numerotarea secţiilor de votare din ţară se actualizează de către AEP la nivelul fiecărui judeţ, respectiv al municipiului Bucureşti, începând cu localitatea reşedinţă de judeţ şi continuând cu cele din municipii, oraşe şi comune, în ordinea alfabetică a acestora.
- În municipiile cu subdiviziuni administrativ-teritoriale, numerotarea se face cu respectarea ordinii acestor subdiviziuni, prevăzută de lege.

[47] În cazul în care sediul propus aparţine unei persoane fizice/juridice private este necesar ca aceasta să ia la cunoştinţă despre modul de derulare al operaţiunile electorale, organizarea şi desfăşurarea alegerilor şi să semneze procesul verbal. Reprezentantul AEP va recomanda întocmirea unui document între persoana fizică/juridică privată şi autoritatea administraţiei publice locale pentru a consemna punerea la dispoziţie a spaţiului respectiv în vederea organizării procesului electoral (spre exemplu, contract de comodat). De asemenea, este necesar ca primarul să certifice în scris că nu dispune de alte spaţii aparţinând domeniului public în care să organizeze secţii de votare.

[48] Art. 5 din Metodologia de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora, aprobată prin Hotărârea AEP nr. 19/2017

- Actualizarea numerotării secţiilor de votare se realizează cel puţin anual şi cu 30 de zile înaintea alegerilor. În cadrul unităţii administrativ-teritoriale primarul poate asigura numerotarea dorită în intervalul oferit de Registrul electoral cu condiţia ca: primul număr din şir să aparţină localităţii componente/satului de reşedinţă; secţiile de votare aflate în acelaşi imobil se numerotează consecutiv.

Numerotarea se realizează cel mai târziu cu 30 de zile înaintea alegerilor.

10. Aducerea la cunoştinţă publică a delimitării şi numerotării secţiilor de votare[49]

Are în vedere asigurarea informării corecte şi eficiente a cetăţenilor asupra datelor de contact a birourilor electorale, a delimitării şi numerotării secţiilor de votare.

Aducerea la cunoştinţă publică a delimitării şi numerotării secţiilor de votare se realizează până cel mai târziu cu 30 de zile înaintea datei votării:

- de către AEP prin postarea pe site-ul instituţiei;
- de către instituţiile prefectului prin postarea pe site-ul instituţiei (reprezentatul AEP recomandă dacă este cazul postarea delimitării şi numerotării secţiilor de votare);
- de către primar, cu sprijinul prefectului, în condiţiile stabilite de Autoritatea Electorală Permanentă, prin hotărâre.

Primarii au obligaţia de a asigura la loc vizibil, în zone publice frecventate de către cetăţeni montarea de indicatoare, panouri sau a altor mijloace de orientare către sediile secţiilor de votare.

Este interzisă folosirea unor însemne sau a unor îmbinări ale culorilor care fac trimitere la denumirile şi semnele permanente sau electorale ale partidelor politice, ale alianţelor politice, ale alianţelor electorale şi ale organizaţiilor cetăţenilor aparţinând minorităţilor naţionale.

11. Modalităţi de aducere la cunoştinţă publică a informaţiilor cuprinse în Registrul secţiilor de votare (a delimitării şi a numerotării secţiilor de votare, precum şi a sediilor acestora)[50]:

A) prin afişare pe site-ul primăriei, acolo unde acesta există, precum şi pe site-ul instituţiei prefectului;
B) publicaţii afişate la sediul primăriei, la sediile altor instituţii publice locale şi în alte locuri publice frecventate de către cetăţeni (obligatorie) [51];
C) prin publicaţii afişate la sediile secţiilor de votare (obligatorie);

[49] Hotărârea AEP nr. 16/2016 privind condiţiile de aducere la cunoştinţă publică a delimitării şi a numerotării secţiilor de votare din ţară, precum şi a sediilor acestora

[50] Este interzisă folosirea unor însemne sau a unor îmbinări ale culorilor care fac trimitere la denumirile şi semnele permanente sau electorale ale partidelor politice, ale alianţelor politice, ale alianţelor electorale şi ale organizaţiilor cetăţenilor aparţinând minorităţilor naţionale

[51] Pot conţine numai extrase aferente zonei teritoriale sau secţiei de votare unde se face afişarea.

D) prin mass-media scrisă şi audiovizuală, precum şi prin orice alt mijloc de publicitate,
E) prin mijloace de publicitate amplasate, conform legii, în interiorul incintelor centrelor comerciale, ale supermarketurilor, ale hipermarketurilor, în parcuri sau în alte zone publice.

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[2] Legea nr. 370/2004 pentru alegerea Preşedintelui României, republicată, cu modificările şi completările ulterioare;
[3] Legea nr. 115/2015 pentru alegerea autorităţilor administraţiei publice locale, pentru modificarea Legii administraţiei publice locale nr. 215/2001, precum şi pentru modificarea şi completarea Legii nr. 393/2004 privind Statutul aleşilor locali, cu modificările şi completările ulterioare;
[4] Legea nr. 3/2000 privind organizarea şi desfăşurarea referendumului cu modificările şi completările ulterioare;
[5] Legea nr. 33/2007 privind organizarea şi desfăşurarea alegerilor pentru Parlamentul European, republicată, cu modificările şi completările ulterioare.
[6] Ordonanţa Guvernului nr. 119/1999 privind controlul intern/managerial şi controlul financiar preventiv, aprobată prin Legea nr. 301/2002, republicată, cu modificările şi completările ulterioare;
[7] Hotărârea Birourilor permanente ale Camerei Deputaţilor şi Senatului nr. 4/2020 privind aprobarea Regulamentului de organizare şi funcţionare a Autorităţii Electorale Permanente;
[8] Ordinul Preşedintelui Autorităţii Electorale Permanente nr. 726/2020 privind stabilirea atribuţiilor compartimentelor Autorităţii Electorale Permanente;
[9] Hotărârea Autorităţii Electorale Permanente nr. 19/2017 pentru aprobarea Metodologiei de avizare a actualizării delimitării secţiilor de votare din ţară şi a stabilirii sediilor acestora;
[10] Hotărârea Autorităţii Electorale Permanente nr. 44/2016 privind setul de condiţii minimale pe care trebuie să le îndeplinească locaţiile în care funcţionează secţiile de votare, precum şi dotarea minimală a acestora.

The implementation of smart government of Iraq and its impact on the transportation

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Abstract

This study target the understanding of what does mean the smart government and how we can use this system to improve better service in the transportation environment which lead the country to be one of the developing countries in the middle east, going same time to classify the problems in the transportation and how can put and develop strategies help and support the government to go forward and lead the country to the success in that area, all that will prove and develop the economy, education and other fields in Iraq. The road system in Iraq is in dire need of the smart transportation system, which has been applied in many countries for years, but in Iraq the government has been late in applying this type of technology, and it is a technology that needs a system similar to mobile technology in its creation and use in terms of infrastructure in addition to specialized units. The increase in the number of vehicles around the world prompted the developed countries to find scientific mechanisms to solve the congestion called the smart management of transport because the construction of new roads is excluded because it is very expensive.

Keywords: *smart Government, smart cities, transportation. Intelligent transportation system.*

1. Introduction

New concepts for urban planning have emerged that have become necessary for many countries in line with the needs and continuous changes in those cities. These concepts have been adopted by many governments, including in European, American and Asian countries. These concepts depend on the introduction of communication and information technology in the planning process through the formation of a database that includes all sectors of the city, where this data is relied upon to keep pace and control the continuous changes. This type of thinking emerged to overcome the old and traditional system in many countries, which requires long-term planning and does not respond to the rapid changes in our time. Working on the development of transportation and bringing it to the level of development in developed countries requires those countries to have an electronic government, which in turn leads to smart governments. There are many researchers who explained the concept of smart government and what its advantages are and basic elements that lead to success and efficiency in the application of the service to the final beneficiary, accepting and analyzing the feedback and working on studying it and benefiting from it in improving performance.The growing role of technologies in the functioning of urban systems is making governments rethink the role they must have in a knowledge-based society. This role has been referred to as "Smart governance" in prior research (1). The purpose of this paper to explain how we can clarify the impact on the transportation as last step of smart government steps to classify this country as one of the developing countries in the world.

1. Smart Government:

There are big different between the smart government and the electronic government, It is the natural development of the e-government model that we have experienced during the past decade, and at a time when e-government was generally seeking to endorse government public services on the Internet through web applications and electronic portals and formulate them in a way that usually reflected the life events of the citizen and the basket of business services (Life Events & Business Episodes) The smart government comes in order to complete what has been built and invest in it by getting closer to the citizen on the one hand and direct and simultaneous interaction with (data) spread in society and its economic, social and security components on the other hand.(2)

1.1. The benefits of smart government

The smart government has many benefits which is much known in the countries which they have this kind of government (3).

1. Increasing the productivity of employees in the country by working twenty-four hours.
2. Raising the efficiency of work in government sectors.
3. Reducing administrative errors as much as possible, which are often caused by the human element.
4. Strengthening cooperation between mixed government institutions and the private sector

Contribute to supporting the economy and development

5. Raising competitive capabilities in various fields of work.

6. Economic integration between the public and private sectors

7. Reducing operating expenses by saving time and effort on all parties dealing with the smart government

8. When facilities are shared between information and communication technology (smart government) and other facilities, this technology can be used to support facilities at a low cost instead of using a separate infrastructure, and this is what happens when using smart transportation(4).

9. Achieving citizens' satisfaction with the least effort and cost

1.2. Challenges to smart government in Iraq

1. The extent to which government agencies have completed electronic transformation processes, as many government organizations still do not have websites on the Internet.

2. Competencies: The extent of human resources' ability and willingness to manage the various activities of the smart government.

3. Supporting the political leadership for the transformation process, as most of the first-line leaders are still not aware of the role that the smart government plays in supporting the economy and development.

4. Infrastructure: (networks, servers, applications, contracts, automated methods, satellites) and the extent of its spread constitutes an obstacle to completing the establishment of the smart government.

5. Societal culture and the extent of the citizen's ability to deal and use smart technologies that the percentage of users of this technology is still weak.

6. The inability of the Ministry of Communications (telecom companies) to meet customers' requests for mobile phone delivery, which is the most important channel for communication via the Internet.

7. Electronic financial transactions are still in their infancy, as they are still stumbling, due to the many errors caused by the electronic device and the great delay in the work of electronic banks, as it does not exceed the use of the smart card.

8. The challenges of regulations, legislation and information security, which can be called legal and administrative challenges such as taxes and methods of protecting them and border crossings (5).

2. Methodology

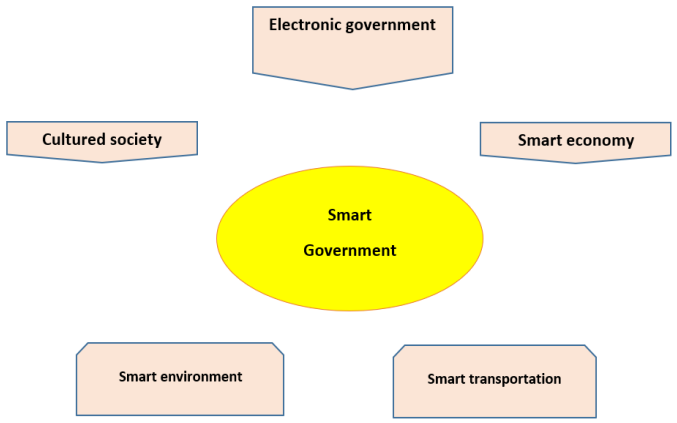
2.1. Concepts

There are many steps (elements) to reach the final results in this government to be a Smart Government. Smart governance includes e-services and social media in order to enhance citizens' empowerment and involvement in public management and transparent decision-making processes leading to smart governance(6), before

all that should present these steps to help us to imagine the vision to any country want to implementation this strategy or we can call it a plan, these steps are:

A. Electronic government.
B. Cultured society.
C. Smart economic.
D. Smart environment.
E. Smart transportation.

Figure (1): present the elements of the smart government.



This figure (1) explain the elements of smart government, the following are include all of these concepts:

A.E-Government is the use of information and communication technologies (ICTs) to improve the activities of public sector organization (7), that means the government should connect through network system between the government itself and the sectors such as business, transport, education sectors in this country and figure (2) present the e-Government

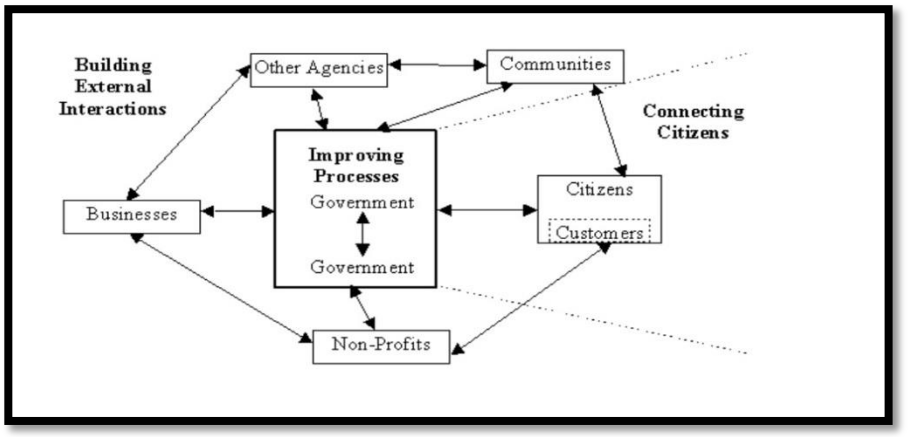


Fig. 2. present the e-Government
Source: https://driveschool.ro/chestionare-auto/chestionare-auto/categoria-b

Iraq needs to prepare development programmers to advance its socio-economic and environmental potential. Despite the large-scale technological development in countries around the world today and the benefit of such development programmers, Iraq's cities have much to do to achieve sustainable development (8). The other steps required in this government to be classify as smart government is a culture society

B. culture society: this mean the country should has very good educational environment provide high education system which help and support the people to develop themselves by study or work in these organizations because they will present as a feedback to educational system, The first is to note that our very models of cultural shape will have to alter, as configurations of people, place, and heritage lose all semblance of isomorphism. Recent work in anthropology has done much to free us of the shackles of highly localized, boundary-oriented, holistic, primordia list images of cultural form and substance (9). Societal culture is part of the accumulated culture inside the country and its only place is the behaviors and thoughts of individuals belonging to this country, nation or civilization, and it carries within it a lot of knowledge accumulation and solid maturity through generations and their continuous inheritance from parents to children and includes in its nature all negative and positive behaviors. However, there are ways on which the state can establish a coherent culture capable of facing many foreign or perverse interventions, and these methods are educational schools, social centers and cohabitation within mixed institutions of all types of society and it's resulted by factors(10):

1. Social experiences bring together and pass them on between generations.
2. Direct state intervention in building a specific culture.
3. The country works to consolidate a specific culture by setting and implementing a general policy towards this culture.
4. There are other means that build societal culture that vary from one state to another and from one society to another according to the social and legal nature of societies.

C. Smart Economy

Economic growth can only be qualitative or focused on issues of income, health and education (basic needs), in situations that relate to wellbeing or environmental compatibility. In these conditions, the development of the concept of eco-sustainable efficient distribution becomes crucial because the accomplishment of needs involves the production of goods, production interferes, inevitably with the marginal allocation and distribution generated by the market and / or the price dynamics, covered by the concept of "smart economy". The concept of "smart economy" brings together a number of features of the new economy in an innovative sustainable and eco-economic approach: high productivity economy, global economy growth, competition, economic progress, economic prosperity, innovation, sustainable jobs, and digital economy (11).

"Smart economy remains one of the key drivers of the smart city and one of the smart city indicators, because the city, characterized by high economic

competitiveness, is assigned to smart cities" (12), and there are other concept consider the Smart economy is a growing and sustainable economy (13).

D. Smart environment

Smart Environmental Solutions aims to build an integrated system of sensors that measure various environmental readings, such as pollution rates from carbon and toxic gases, levels of harmful radiation and water pollution.

Intelligent environmental solutions are able to measure and monitor the height of torrential rains, and sensors to monitor building infrastructure such as tunnels and bridges and the effect of vibrations on them. Measuring noise rates in addition to climate monitoring stations, environmental warnings and early warning stations. A number of projects target elderly and physically disabled people, for example with electronic "memory aids," reading aids, and navigation systems (14)

The benefits:

- Monitoring the environmental situation of the city.
- Provides alerts about the weather situation and generates automatic reports for each geographical location
- Increase the level of health of the population
- Providing information to be used in urban development plans

E. Smart (intelligent) transportation

Intelligent transport is one of the most important pillars of the smart government. Intelligent transport systems are defined by using modern technologies for communication and information technologies to confront many challenges in various fields of transport such as improving safety, utilization, and productivity, mobilization, and media levels.

It also employs intelligent transportation systems to obtain information on the performance of transportation facilities, transportation demand, weather and environmental conditions, and provide that information and disseminate it for circulation between institutions and travelers.

Intelligent transport systems contribute to rationalizing the use of infrastructure and providing more capacity and higher efficiency without resorting to the establishment of new facilities.

The main goals of intelligent transportation systems:

- Improving the current and future economic productivity of individuals, institutions and the economy in general.
- Energy saving and environmental protection.
- improving the level of traffic safety.
- Improving travel standards and the well-being of travelers.
- Increasing the operational efficiency of the transmission system and increasing its capacity.

The main objectives of intelligent transportation:

Each country has objectives when they decide to make this kind of system these objectives are (15):

1. Increasing the operational efficiency of the transmission system and increasing its capacity.
2. Increase speeds and reduce stops.
3. Reducing delays at transfer points between means of transportation.
4. Increasing occupancy for private vehicles and increasing the use of public transport.
5. Raising the level of road network management by adopting the effectiveness of the road network's absorptive capacity.
6. Improving the level of movement and comfort for commuters.
7. Reduce the trip, increase its reliability and reduce the cost.
8. Increasing the level of personal safety and security.
9. Improving the level of traffic safety.
10. Reducing the number, severity and cost of accidents. Reducing vehicle theft.
11. Reducing energy consumption and reducing environmental impacts, as emissions and consumption of wastes are reduced.
12. Reducing noise pollution.
13. Coordination and integration of network operations, management and investments.
14. Improving adaptation to changes in system performance requirements and technologies.
15. Intelligent transportation systems help to provide greater capacity and efficiency without total dependence on the establishment of new transportation facilities, and studies indicate that the combination of smart systems and new constructions is able to accommodate future traffic growth by providing a capacity of 35% of what needs to be equipped to meet the same traffic demand through New construction road only (16).

3. **Conclusions**

The rapid and radical changes in the world and changes in transportation systems are noticeable. In the coming years, it is expected that the country's problems will increase rapidly when looking at the increase in population and economic activities, and the lack of transportation in our country differs from what it is in Western countries. Therefore, the needs and problems must be identified and possible solutions identified. Systems for measuring, collecting data, and determining statistics should be established. A smart system must be established in various sectors, especially in the transportation sector, to urge the country to move to the smart transportation system, which is an integral part of the smart government systems. Advanced programs should be created and employees trained on them. Dynamic solutions should be offered according to the changing conditions. Institutional cooperation should be established. Applications in other cities should be examined, data should be exchanged and their experience and mistakes made use of. We should not forget that the priority is the safety of people, so policies must be

determined accordingly, and work to benefit from the experience of developed countries in this system, and these applications must be open to development and modernization, in order to provide them and the required services more efficiently, there is a need for serious planning and applicable standards.

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Risk management in Palestine in the small insurance industry

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Abstract

The insurance sector is one of the most important sectors within the Palestinian economy, in light of the complexity in the Palestinian economy resulting from the occupation. This study focuses on risk management in Palestine and the provision of insurance services to small projects in dangerous areas, as the aim of the study is to clarify the Palestinian vision of danger as an entry point for providing new services. risk management
In an attempt to build a more modern insurance sector through sustainable access to insurance services in a modern and modern way and keep pace with the status quo on the ground in light of reducing the existing political solutions by the occupation and trying to control all Palestinian economic resources,
Developing aspects of the economy in particular in rural areas, assisting risk management steps, and trying to identify the most common risks in Palestine.
We will use the descriptive approach to describe the case of the study in order to know the most common risks and treat them and develop the insurance sector
The results are expected to help increase knowledge of the most common risks for small projects and try to develop the insurance sector in Palestine in a modern way that deals with the economically complex environment of risks until the risks are addressed and with the help of modern steps to manage risks for the development of the Palestinian economy.

Keywords: *risk management, insurance industries, development.*

Jel*:* G32, G22, *O1.*

1. Introduction

The insurance sector is one of the most important economic sectors, and it works to stabilize the Palestinian economy alongside the banking sector, and helps manage the risks of the Palestinian economy, by protecting savings, property, individuals, institutions and companies, and it is the basis of the development process in a sustainable economy, as the insurance sector in Palestine has witnessed a number of Events through the development of the insurance sector and the services provided by the Palestinian insurance sector to customers and from the side of the size of this sector (Capital Market Authority).

Where the sector was started by Jordanian insurance companies operating in the Palestinian territories between 1948 and 1967, after the withdrawal of Jordanian forces from the Palestinian territories and the control of Israel, the Jordanian insurance companies left work in Palestine, and the first Palestinian insurance company obtained a license to operate under the law of the occupation authority After the occupation authority signed the Oslo agreement with the Palestine.

Liberation Organization, it relinquished some of its service powers to the Palestinian side. In 2005, the first law was enacted by the Palestinian Authority, as the supervisor of insurance companies, a body called the Palestinian Capital Market Authority to supervise the work The insurance industry, and the Palestinian Federation of Insurance Companies was established. It includes all companies operating in Palestine. It receives a percentage of 1 dollar from the sale of any car insurance policy and annual subscription fees from each insurance company, as the law that was established in 2005 is a mixture between the new Jordanian, Israeli and Palestinian law, and is Dealing in many jobs in the insurance market, the shekel, the dollar, the Jordanian dinar, and despite the weakness of the insurance sector in Palestine, it does not have an impact on the economy Especially in the last crisis that deals with the Corona crisis, where the percentage of profits in 2020 was (18.6) and in 2019 (16.9), as with an increase of 15.10% returns.

Mainly, the decrease in the number of accidents during the year 2020 due to the precautionary measures taken by the Palestinian government, which led to reduced movement and reduced number of working days for employees

The Capital Market Authority has played an active role in the stability of the insurance sector during the pandemic, through a number of procedures and measures that it has taken with the aim of mitigating the negative effects and risks on the insurance sector, in addition to the insurance companies providing their services and insurance disbursements to those who are entitled to compensation on an ongoing basis. He deserves it and the government's support through social allowances and the adoption of precautionary measures for workers in the insurance sector (Capital Market Authority).

With regard to providing insurance services to small projects in rural areas, it is weak for a number of reasons:

Most of these risks in rural areas, according to the standards, are not subject to insurance, and cannot be insured. These risks include:

Seasonal risks that accompany boom in summer and stagnation in winter resulting from small agricultural projects, as they are accompanied by costs in winter and the lack of revenue for projects.

Injuries and diseases

The dangers arising from the Israeli occupation represented by the checkpoints that may impede the transport of goods, leading to goods being damaged or goods damaged by the occupation as a result of the rift, or the inability to access lands as a result of the apartheid wall that separates farmers' lands and their inability to reach their lands.

As the dangers arising from the perspective of the Palestinians in rural areas represented in the oppression practiced by the Israeli occupation and the accompanying dangers of the occupation represent a danger to trade resulting from inspection and road closures at checkpoints, as the occupation is more one of the reasons that increases unemployment as it restricts Citizens to reach their jobs and reduce commercial mobility.

Based on the foregoing, the risks mentioned are not subject to the insurance process by the insurance sector in Palestine, which results in going to the informal insurance process resulting from borrowing from friends as a result of the danger, which is the most widespread, which weakens the culture and role of micro-insurance in rural areas in Palestine.

In the context of seeking access to micro-insurance within the Palestinian market in rural areas, it must be noted that the life of the Palestinian in these areas is more dangerous, as it is possible that the Palestinians may be helped to experience a new type of insurance and financial services to improve economic stability in these areas.

By creating health insurance commensurate with the regions, property and life insurance, and agricultural activity insurance that reflects the challenges and opportunities available in this environment to create small insurance.

2. Literature review

(Basir, 2021) The reality of small projects in light of the emergency (Corona pandemic) an applied study on the Bethlehem Governorate.

It aimed to get acquainted with the reality of the micro-enterprise sector in Palestine in light of the situation of Corona and the various obstacles it faces under the state of emergency. Support for small projects.

The study (Murad, 2020)" The repercussions of the Corona pandemic (Covid-19) small and micro-enterprises led by women In the Gaza Strip "

This study indicates the importance of small projects in Palestine, as small projects constitute an important tributary to the Palestinian national economy, especially at the level of contribution

Small and micro businesses in the gross domestic product. In addition to absorbing small and micro enterprises manpower and reducing unemployment rates, especially among

Young. Small and micro enterprises represent an opportunity for the poor and low-income people to provide a source of income in addition to being considered the most important tools for economic development.

(Afoun2014) study indicates that insurance companies play the role of insuring risks for other financial institutions, and this means that the risks of these companies are managed in light of the complex conditions they face, and insurance companies need to take practical steps. And relying on a set of models that enable them to manage in a more modern way so that insurance companies can adapt to the existing situation and thus reduce the risks that cause harm to other financial institutions, we can say from this research that in light of the conditions experienced by the Palestinian people, especially in rural areas and practices that reduce the encouragement of the use of insurance in those areas, the insurance industry is important in reducing disasters and maintaining the economy in those areas so that this economy becomes more sustainable.

A study conducted by Crovini et al. (2020):

reviewed the main role of risk management (RM) in small and medium enterprises SMEs by identifying, analyzing and clarifying the most important international business and finding out why risk management is not progressing. Improving the quality of literature reviews can be done through incorporating systematic review of quantitative papers and meta-synthesis of qualitative critical research and explanatory analysis. Based on the study, I note that the article focused on the study of risk management, but there was a complex way of collecting literature and did not explain in more depth why risk management is not continuously improved.

The current study is different from the former and only wants to raise awareness of RM, nonetheless, in this study I explain that risk management is important for the organization and members like managers or stakeholders who need to know all the details of risk management, the importance of risk management and to also work on improving them constantly.

Furthermore, the study tackles the importance of technology in addressing risks. For instance, modern technology and digital media has proved themselves to be part of the solution during the situation of the current COVID-19 pandemic along with the accompanying risks. The focus of the current study is on whether risk management has an impact on the performance of the organization in a competitive atmosphere and on the financial situation, and whether it leads to an increased profit.

The Shaheen et al.'s (2020):

study aimed at clarifying the relationship between sustainable risk management and risk management of the institution and Palestinian insurance companies. The results showed that there is a positive relationship between risk management and the use of corporate risk management with an increased profitability, where profits increase with the use of improved risk management strategies. The study also shows that there are many risks, including risks affecting the profit due to the political instability and the unsuitable prices that does not correspond with the current economic situation.

Therefore, there is a relationship between the application of risk management and profits, especially in the Palestinian insurance sector.

3. Estimated results

Risk management is very important in improving the economy at the local as well as international level. During the rapid change of variables in the field of economy, risk management has proven to be one of the most required variables in which companies invest to ensure their existence and continued survival and use risk management in the insurance sector in Palestine to ensure that businesses remain in the face of any challenges.

The study recommends creating products that adapt to the existing situation in these areas, focusing on building trust. In addition, the success of micro-insurance in these areas is through

Use microfinance institutions and banks to deliver products from the most dangerous areas in this politically complex environment

Taking some measures in order to try to help in light of the current political situation (such as covering the damages of the occupation)

- Establishing an awareness program on the basis that insurance is appropriate and inexpensive, and the residents of these rural areas in Palestine are advised to use it.

In order to facilitate the successful launch of the microinsurance market in Palestine, it is necessary to focus

Donor efforts on the following three points:

In order for the insurance industry to continue under difficult circumstances, it must

- Training and capacity building of partners, in all its aspects, employees, the insurance union and those in charge of the government to develop this sector in an advanced and modern way, so that citizens in rural areas can have a deep understanding of insurance
- Building confidence and increasing public awareness by supporting awareness campaigns by sales departments, especially in the case of targeting rural areas and the poor class.

After examining the previous literature that examined risk management in rural areas of Palestine and in insurance companies, it was noted that there was insufficient interest in this field. Therefore, this study here directs efforts to raise awareness of the role of risk management in rural areas to improve the economy, reduce poverty and resilience.

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The impact of using electronic audit programs on auditing during the Corona crisis

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Abstract

Today the world is witnessing a remarkable development in the role that technology plays in all areas of economic and social life. Information systems are also considered one of the basic factors in progress, development, that help private and public companies to perform their activities effectively, fast, and accurately. They are also considered one of the competitive advantages of companies in achieving their goals, so the audit process witnessed an increasing response to keep pace with developments in information technology because the volume of information that must be processed and stored is big.

The Coronavirus crisis has affected companies significantly, some companies have expanded in their electronic operations and e-commerce enabled them to increase their sales via the Internet by benefiting from the advantage of electronic transactions, which required provision software for control and audit for financial for ensuring the preservation, protection of company's assets, these software help auditors to do audits, and auditing companies can audit without visiting company's site.
Last 2 years all countries around the world witnessed one of the worst crises affected economies, which is the Coronavirus crisis. This crisis needs rapid development of information technology by using computers through developed administrative and accounting systems for companies, which led to a fundamental change in the methodology of work through and change in methods of control necessitated a shift to electronic audit programs compared with the traditional, as information technology supports supervisory role by relying on innovative means such as electronic auditing, which enables audit companies to provide best control services and achieve company goals, that will be reflected in the reliability of financial statements.

Keywords: *auditing, electronic audit, accounting information system, corporate governance.*

Introduction

The world today is witnessing a remarkable development in the role that technology plays in all areas of economic and social life. Information systems are also considered one of the basic factors in progress, development, that help private and public companies to perform their activities effectively, fast, and accurately. They are also considered one of the competitive advantages of companies in achieving their goals. So audit process witnessed an increasing response to keep pace with developments in information technology because the volume of information that must be processed and stored is bigger.

The concept of the audit was narrowly aimed at protecting cash as it is the most traded asset for the company. Therefore, companies set procedures and controls were put in place to monitor cash, it was called “internal control” to protect the company's funds and assets from theft or loss but the role of audit change to improve accuracy and reliability of accounting data, development of productive efficiency, ensuring implementation of administrative policies, and organizational plans developed by management.

Last year all countries around the world witnessed one of the worst crises affected on economies, which is the Coronavirus crisis. This crisis needs rapid development of information technology using electronic computers through developed administrative and accounting systems in companies, which led to a fundamental change in the methodology of work through and change in methods of audit necessitated a shift to electronic audit programs compared with the traditional operation, as information technology supports supervisory role by relying on innovative means such as electronic auditing, which enables audit companies to provide best control services. So audit systems needed to adapt to technological

information systems to achieve company goals, which will be reflected in the reliability of financial statements.

The Coronavirus crisis has affected companies significantly, some companies have expanded in their electronic operations and e-commerce enabled them to increase their sales via the Internet by benefiting from the advantage of electronic transactions, which required provision of software for control and audit for financial and logistical operations to ensure the preservation, protection of company's assets, these software help audit companies and auditors of remote audits without visiting company's site.

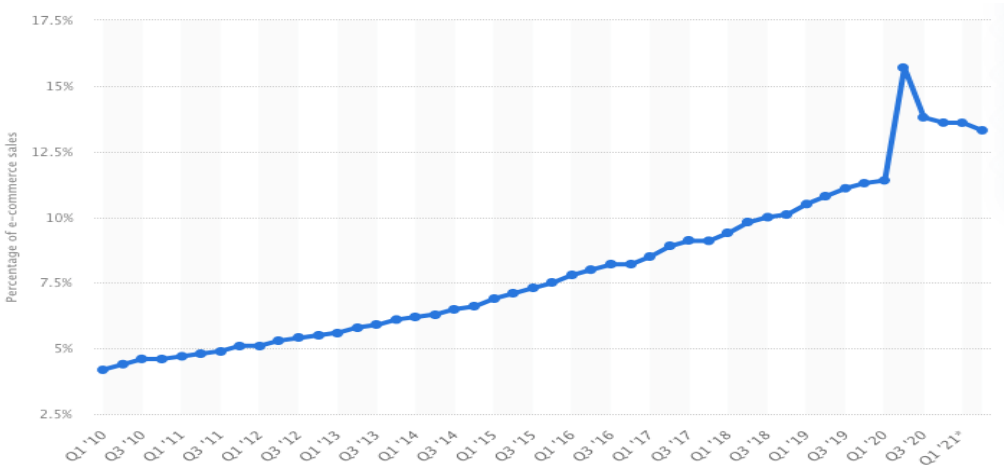


Fig. 1. Shows the percentage of increase in electronic commerce during the period Quarter 1/2010- Quarter 1/2021.
Source: https://www.smartinsights.com/digital-marketing-strategy/online-retail-sales-growth/

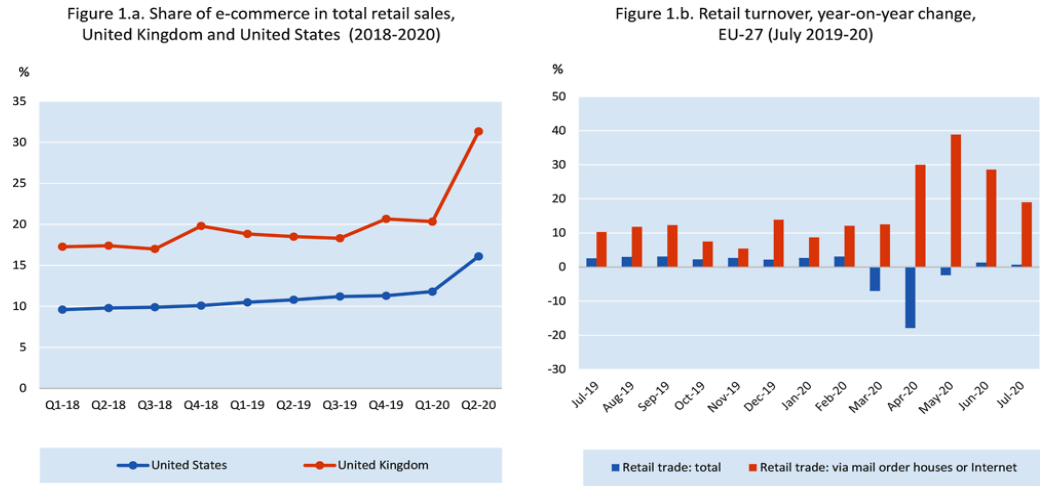


Fig. 2. A comparison between electronic and traditional commerce in the USA and Britain for the period Quarter 1/2018-Quarter 2/2020.
Source: OECD's elaboration based on data from the US Census Bureau, the Office for National Statistics in the United Kingdom, and Euro state.

The use of information technology has become one of the urgent needs and one of the basics for the success of the Audit in performing its tasks with the required speed, accuracy. Where auditor processes data electronically, this requires the auditor to be good in the use of available electronic programs and processing systems, which provides a great profit in time and effort, this digital transformation has an impact on the audit sector to ensure effective auditing, the success of their companies. However, audit companies in many countries face difficulties in implementation; most important is the high cost of audit tasks, limited human, financial resources, and their inefficiency in some cases, which negatively affected quality, the efficiency of the audit function, to reach the desired goal.

The emergence of electronic auditing has led to the need for auditors to keep pace with continuous technological changes, and move from manual operation to electronic operation so that the audit profession achieves its objectives and expresses its opinion on financial statements fairly to achieve goals for all parties.

Professional organizations have more attention to the professional performance of audit function, due to the importance of services performed by this function, it became necessary to develop the performance of auditors for verification, improve the quality of auditing after financial scandals that occurred as a result of fraud in financial reports, the Financial reports must be issued up under laws, controls, regulations, and ethical principles to ensure its integrity and transparency, preserve rights of concerned parties and achieve accountability and control, these controls are called corporate governance, as the audit is one of the basic pillars of corporate governance, the auditors must raise the quality of audit activities to achieve good corporate governance.

Study Problem:

We ask through this study the following question: How do electronic audits contribute to improving the quality of auditing? How does the quality of audit contribute to maximizing the value of parties benefiting from corporate governance?

To achieve the objectives of the study, we discuss the following:

Defining electronic auditing, the quality of auditing the extent of the importance of using electronic auditing in improving the quality of internal auditing.

How does the quality of practicing the audit profession maximize the value of the parties benefiting from corporate governance?

Study Approach:

To answer the last questions, a descriptive approach was used to identify the concepts of audit quality, electronic auditing, corporate governance, the importance of using electronic auditing in improving the quality of auditing, highlighting the role of improving audit quality in maximizing value for all parties benefiting from companies final reports.

Where an audit is affected by electronic audit because of challenges and difficulties it faces, including the absence of documentary, the difficulty of tracking

processes, and absence of qualified staff, which necessitated adaptation, development of audit to keep pace with this development using electronic auditing, with attention to monitoring security, the safety of information, inputs and output of data, as the impact of electronic auditing.

The audit system will affect the outputs of the audit process and reliability of financial statements, thus it will affect the economic, accounting, financial decisions, and confidence of users of these financial statements used by external parties.

Research importance

We find the importance of using electronic audits in audit processes will improve the quality of its outputs, but how electronic audits work to solve problems and challenges that occur and affect the quality of audit, its inputs, and outputs, with knowledge of obstacles that companies face when using or applying electronic auditing.

The importance of this research stems from the importance of information technology, especially electronic auditing, its impact on increasing the quality of auditing for companies. The research will also contribute to knowing the extent of adaptation to electronic auditing, the extent of trust in outputs, and knowledge of the efficiency of the auditors when dealing with electronic auditing, its impact on increasing quality, and reflection of internal auditing to improve overall quality especially under the Coronavirus crisis.

Previous studies

1. Khaddash and Siam study, (2003) "The extent to which auditors accept the use of information technology in auditing. A field study on major auditing offices in Jordan". It indicated that there must be a physical investment in information technology, human qualification, and a need for a legal reference to encourage this use. The study found that auditors in Jordan have a great conviction of the importance of using information technology in auditing and the necessity of moving from a manual system to electronic auditing.

2. Al-Shanti Study (2011) "The Role of Information Technology in Evolution of Auditing Profession: An Empirical Study". This study aimed to demonstrate the importance of using information technology in the audit process and changes resulting from the use of information technology in the audit process, the extent of using electronic auditing in Jordan. The study highlighted the importance of information technology in the profession of auditing, the need to keep abreast of recent developments, especially in areas of auditing accounts, internal control systems, and training those in charge of those working on them, with an emphasis on holding training courses.

3. Al-Aroud study et al. (2011) "The effect of auditor's application of information technology methods on completion of the electronic audit process in Jordan". The study aimed to identify the impact of the auditor's application of information technology on the completion of the electronic audit process in Jordan.

The results of this study are that level of auditors' use of information technology methods, the completion of the electronic audit process is moderate, as there is an impact of the application of information technology on the completion of the electronic audit process.

4. Moorthy et al. study 2011 "The impact of information technology on internal auditing". The study aimed to identify the impact of information technology on the internal audit process in companies, as it was concluded that accounting information system is a major source of information in the organization as the administration relies on it to provide the necessary information on time, so all institutions seek to develop and update this system continuously with great development that it is witnessing. This requires the internal auditor to study, understand well the environment in which data is processed to facilitate understanding of the accounting system and internal control system to use modern methods, procedures to help him to achieve goals in a better way.

5. Khasawnah study (2013) "The role of digital auditing in achieving competitive advantages in auditing companies in Jordan". The study examined the role of digital auditing in achieving dimensions of competitive advantage in audit offices and obstacles that limit the use of electronic auditing to achieve competitive advantages in Auditing companies in Jordan, the study concluded that the use of digital auditing contributes to achieving competitive advantages such as reduction in cost, quality, flexibility, and market share, but there are obstacles of limit use of electronic auditing, including the cost of specialized software for auditing, its inadequacy for all business establishments, in addition, to need for scientific qualification and practical for auditors.

6. Othman and Jamil study, (2015) "The extent of the possibility of using artificial intelligence techniques in controlling the quality of internal auditing in Jordanian public joint-stock companies". There is an impact of using artificial intelligence techniques in controlling the quality of internal auditing, emphasizing the possibility of using it in public joint-stock companies, and developing technological devices and equipment to develop internal auditing processes.

First: Study Concepts:

A- Audit:

1. Definition of Auditing: is "A systematic process of objectively obtained and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between those assertions and established criteria and communicating the results to interested users". (American Accounting Association), the objective of the ordinary examination of financial statements by the independent auditor is the expression of an opinion on the fairness with which they represent the financial position, results of operations, and changes in financial position in conformity with generally accepted accounting principles. (American Institute of Certified Public Accounting 1972).

A. **Consulting activity**: providing advisory services, as "a means to effectively contribute to the institution's continuity in conducting its business while adding value, and improving the institution's operations".

B. **Assurance services**: It is a concept that "provides other new services related to new areas of assurance related to risk management and governance processes the audit function is carried out according to an organized, sequential systematic process based on scientific, technical foundations through the issuance of professional standards".

2. **Electronic auditing**: It is defined as "the process of examining, evaluating automated information operating systems, related non-automated processes, the interaction between them, with aim of providing reasonable assurance of internal control meet requirements of information technology". (Richard, 2008). Therefore, the objective of auditing in light of the electronic operation of data should be focused on verifying the existence of appropriate electronic accounting information systems that provide information to prepare the right lists, and reports with high efficiency.

3. **Electronic accounting information system**: "It is a computing system with a networked environment of personal computers linked or converging with servers or host computers, which are built on basis of processing systems and distributed databases in Most of the time".(Yassin, 2000).

The theoretical framework for audit quality:

There has been an increase in interest of professional organizations at the international level to verify the quality of internal audits, due to many financial failures, hardships that affected major companies, and collapses of financial markets in some countries.

1. The concept of the quality of the audit profession:

The quality of the auditing profession is defined as "the performance of audit services with high efficiency, effectiveness by standards, provisions of the profession with independence in disclosing, reporting errors, and discovered fraud to meet expectations needs of all parties benefiting from audit services" (Rahmani, 2014),

2.The importance of quality of audit profession:

The importance of audit quality lies in the fact that it is a requirement of all users of financial statements for the following reasons: (Morshed, 2013)

A. The auditor aims to implement the audit process with the highest possible quality to add the highest degree of credibility to his report.

B. The company seeks to ensure that its financial statements are reliable, which requires carrying out an internal audit process of the highest quality.

C. Professional organizations consider that implementation of the audit process at the highest level of quality is in the interest of all users of the financial statements.

The effect of using electronic operating systems for accounting data on audit methods.

The use of electronic data processing has revealed the existence of several methods of auditing through three different entrances to the auditing process and can be discussed in the following (Hamdouna, 2008)

First: Computer auditing: It is done based on the auditor's interest, auditing for inputs, and outputs only, assuming that operating control systems are effective. It is the simplest approach to electronic auditing, it does not require high costs, not require high computer expertise and skills, but it is not effective in light of

increasing reliance of establishments on the use of computerized systems, the complexity of methods of operating, processing data, the variety of fraud methods, and the inability of this entry to control them.

The methods used according to this approach are:

1. Auditing of inputs: When auditing inputs auditor examines operations from beginning to end by obtaining original documents for these operations to manually process them from beginning to end, in sense of comparing manual and automatic operations to ensure correct operation.

2. Output auditing: When auditing outputs auditor compares outputs obtained through electronic processing with results of some operations whose original documents were manually processed, meaning reviewing results in light of electronic and manual operation.

Second: Auditing through computer: This method is based on tracking steps of auditing through the electronic computer in the stage of its internal operations to electronically operate data in addition to auditing each of the input and output processes of electronic accounting information systems if the input data are correct, this method is used in two fields:

1. **Scope of verification of operational aspects**: to ensure compliance with monitoring means, the validity of programs that are used in the treatment process in same authorized programs that no unauthorized modifications have occurred.

2. **Scope of verification of operating results**: This means ensuring the correctness and accuracy of results generated from operating data by using the computer to perform basic tests.

There are many methods according to approach to auditing about computers available to the auditor, but the two most important methods are:

A. **Method of electronically testing data**: This method aims to test the safety of institution's programs, determine its capabilities to differentiate between correct operations, dummy operations, and discover errors, as internal auditor performs a limited number of fictitious operations that are similar to actual organization's operations and then runs them through institution's programs and computers.

B. **Parallel simulation method**: According to this method, the auditor selects some processes or data that have been selected for testing from the reality of actual data then runs them with a special program for the auditor dedicated to simulating the organization's operation of actual data, then compares its results with the results of the client, and this method requires the auditor to have procedure has sufficient, and necessary experience with this type of program.

Third: Computer-based auditing: It means that computers and programs are used as a tool of auditing. This method aims to verify the accuracy of data processing operations, control methods necessary for these operations. The auditor can also use the computer to help him perform some steps of audit task, as he uses some auxiliary programs, some require skill, and experience in the computer field. They are programs that aim to help the auditor in their work, and they are divided into:

1. **Special audit programs**: which serve in carrying out some audit tasks by the client's system, are prepared with the help of experts in this field.

2. **General audit programs**: which are not specific to a specific application or client. They are generally intended to assist auditors may be used in many applications, and for many clients.

Stages of electronic audit of accounts:

The electronic audit process can proceed in several stages, namely (Gabbayn, 2012)

A. **Organizational audit stage**: It is the first stage of the audit system, it depends on the inventory of the elements of this system, including equipment, documents, documents, personnel, procedures, instructions, jobs, and reports.

B. **The applied audit stage**: It is the stage of auditing steps of developing an accounting information system, to ensure that system has achieved its objectives and requirements in all its technical, economic, operational, and legal aspects,

C. **The detailed audit stage**: It is the stage of auditing the accounting software that handles transaction data in the accounting information system, by ensuring integrity, the accuracy of inputs, and ensuring that their processing is subject to effective and independent control.

Benefits of using modern electronic audit programs

Modern software provides great facilities for the internal audit department to enable it to improve its performance, quality of its outputs. Among the most important of these benefits:

1. Collect data from entity subject to audit independently and without any prejudice to its data or programs.
2. Analyze extracted data in line with the preset objectives of the audit process.
3. The speed of data collection and processing, which improves the cost-effectiveness of audit work by reducing the duration of audit tasks.
4. The ability to deal with a large volume of data at the same time and dynamically.
5. The possibility of detecting exceptional cases in data.
6. Helping to uncover weaknesses and defects in internal control systems.
7. Saving the expenses of the internal audit department, especially transportation expenses, in the case of companies that have branches that are geographically far apart.
8. Economics in human resources.
9. Recording of all stages of the audit process from planning to writing the report, which represents documented evidence to protect the auditor and the possibility of programming those stages to be re-executed automatically in future tasks.

The most important electronic audit programs:

There are two types of electronic programs that auditors use in their work, they can be divided into:

A. General audit programs that include:

1. Microsoft Excel (MS Excel): It is considered one of the most important electronic programs used by auditors due to its ease of use, available on all computers, and it provides many functions to its users, the most important of which are:

- It enables the user to perform a personal analysis of the data: especially for complex data and summarizes it according to the user's options.
- Arranging data and organizing numeric or textual data into spreadsheets or workbooks help auditors in making better decisions.
- Re-formatting and arranging data: according to the auditor's need, with the ability to complete remaining data automatically without the need to change the format

2**. Microsoft Access (MS Access):** It is one of the important electronic programs used by auditors due to its ease of use and this program offers many functions to its users, including:

- Quick start-up when using database templates: such as creating a custom application or an idea from a set of new application templates that are distinguished by their designs.
- Data integration between Access and business suite applications: It provides different ways to integrate data from applications, and data sources used to run your company.
- Data storage capability in SQL Server to enhance long-term reliability, robust security, scalability, and manageability.

B. Special audit programs: These are some internationally acclaimed electronic programs in the field of auditing, risk management, which help in improving the efficiency and effectiveness of auditing. It is one of the computer technologies that assist in audit work (ready-made electronic programs) Computer-assisted audit techniques (CAATs) or computer-assisted audit tools and techniques (CAATTs).

First: "Team Mate" program:

It is considered one of the programs of audit departments in the world where the "Team Mate" system has revolutionized the field of auditing, development of audit departments of all sizes in reducing the time of documentation, review in addition to providing value-added services. This program uses by more than 85 thousand auditors from more than two thousand organizations around the world. It provides an integrated electronic system for audit departments, removes barriers related to classic documentary work, and focuses on electronic files to increase the efficiency of leadership in all aspects of audit workflow from beginning to end, so "Team Mate" is considered one of the most important electronic systems that affect all stages of audit process through the system It consists of five specialized, and integrated programs, namely:

A. **Team Risk**: It is an advanced risk assessment system that enables audit departments to develop an audit plan to assess risks.

B. **Programming auditing Team Schedule**: It enables users to program the available tasks and methods in a way that enables the distribution of employees and follow-up tasks within an annual program. Among the most important tasks are the following:

1. Allocating available resources for auditing and distributing those.
2. Creating a schedule for projects according to criteria defined by the auditor.
3. Searching for resources which are defining audit tasks by selecting team members according to the needs of the required audit task.

C. Follow up on timing and expenditures Team (TEC): It helps the auditor to determine time and expenses for audit tasks. And follow-up of the task's progress by the audit, associated costs, and a summary is made to determine the percentage of progress and expenses of the task.

D. **Team Electronic Working Papers (EWP) Audit Documentation System**: Assists the auditor in structuring coherent databases, creating necessary data, increasing efficiency of documentation, auditing process, determining programs, differences, notes, approvals, and history of changes in databases registered electronically for future reference.

E. Follow-up on audit process and differences Team Central: It is a strong coherent database to follow up an audit process, differences through Internet, it collects all data of recorded tasks, results that have been reached, follow up on the implementation of recommendations submitted by the concerned departments, and higher management. (http://www.teammatesolutions.com)

Second: IDEA program for auditing and data analysis:

It is considered an important leading program in the field of dealing with financial data issued by CASEWARE and provides great facilities in dealing with, analyzing, and processing databases accurately and quickly and increases the efficiency and quality of internal audits:

A. Facilitate the process of importing data from any database,

B. Facilitate the process of converting data to Data Export after processing it in any format (.PDF,.XLS, and.TXT)

C. The possibility of implementing several common audit functions.

D. The audit stages are recorded and deal with data easily, and this helps to use it in subsequent audit assignments.

E. Provides facilities such as IDEA add-ons, IDEA Script, Forums, Webinar, and Support Portal portals. Source (https://www.casewareanalytics.com/products/idea-data-analysis.)

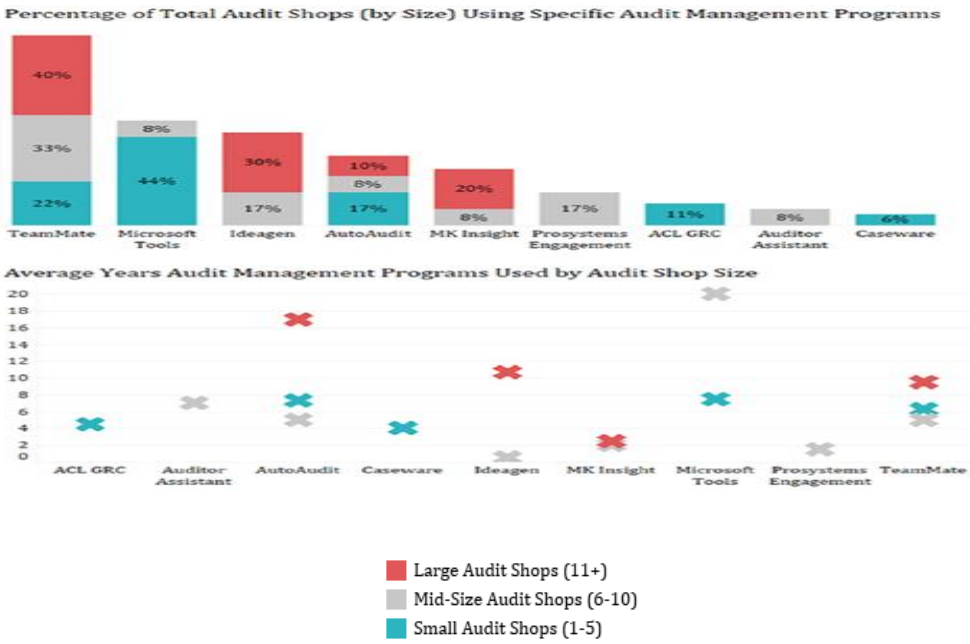
Third: Audit Command Language (ACL):

It is one of the programs, the most widespread in the world in the field of dealing with financial data through ACL company, this program provides great facilities in dealing with databases, their analysis, and processing with the required accuracy, speed, enabling an increase in efficiency, quality of work of Audit, among the most important functions of the program are the following:

1. Aging data according to its history.
2. Detect duplication in numbers, duplication identification,
3. Export data from the program to other programs.
4. Extract data of exceptional nature in Extraction files.
5. Discovering gaps in the digital sequence of data, Gap Identification.
6. Combining and merging data from two separate files into one file, Joining & Relation.
7. Classification of data on specific layers based on a factor commensurate with the purposes of Stratification.
8. Sampling.
9. Classifying and sorting data according to any field within the file Sorting.

10. Summarizing and grouping data according to summarization control purposes.

11. Collect the data values in the Total file fields. (https://www.acl.com)



Percent of Total Audit Shops (by Size) Recommending Specific Audit Management Programs

		Yes	Yes, but only for budget reasons	No	Undecided
Large Audit Shops (11+)	AutoAudit	100%			
	Ideagen	67%		33%	
	MK Insight		50%	50%	
	TeamMate	75%		25%	
Mid-Size Audit Shops (6-10)	Auditor Assistant	100%			
	AutoAudit		100%		
	CCH Prosystems Engagement	50%		50%	
	Ideagen	100%			
	Microsoft Tools		100%		
	MK Insight	100%			
	TeamMate	100%			
Small Audit Shops (1-5)	ACL GRC	50%			50%
	AutoAudit	67%		33%	
	Caseware	100%			
	Microsoft Tools	38%	25%	25%	13%
	TeamMate	75%			25%

	Management Recommendation Tracking	Data Analysis	Staff Time Reporting	Work Paper Review Notification
ACL GRC	Y, N (100%)	Y, N (100%)	Y, N (100%)	Y, Y (100%)
Auditor Assistant	Y, Y (100%)	N	Y, Y (100%)	Y, Y (100%)
AutoAudit	Y, Y (100%)	Y, N (100%)	Y, Y (80%) Y, N (20%)	Y, Y (80%) Y, N (20%)
Caseware	N	IDEA (separate product from manufacturer) – Y, Y (100%)	N	Y, Y (100%)
Ideagen	Y, Y (100%)	N (40%) – Older versions; Y, Y (20%) Y, N (40%)	Y, Y (80%) Y, N (20%)	Y, Y (80%) Y, N (20%)
Microsoft Tools	N	Excel – Y, Y (44%) Y, N (56%)	N	N
MK Insight	Y, Y (100%)	Y, Y (33%) Y, N (67%)	Y, Y (100%)	Y, Y (67%) Y, N (33%)
Prosystems Engagement	N	N	N	N
TeamMate	Y, Y (75%) Y, N (25%)	N (50%) – Older versions; TeamMate Analytics (separate product from manufacturer) – Y, Y (8%) Y, N (42%)	Y, Y (83%) Y, N (17%)	N (50%) – Older versions; Y, Y (33%) Y, N (17%)

Y, Y= Yes, the program has this function and it is utilized
Y, N= Yes, the program has this function, but it is not utilized
N= No, the program does not have this function
Source: https://acua.org/College-and-University-Auditor-Journal/Fall-2018/Connect-Further-Audit-Management-Software-Programs

The role of electronic auditing in improving the quality of practicing the internal audit profession:

The goal of the auditing profession is to impart confidence, credibility, and transparency to financial statements, due to the large volume of activities and increase in the volume of information that must be processed and stored. This requires keeping up with technological developments by the auditor and using technological means to complete the audit process.

Objectives of electronic audit of accounts:

The objectives of the auditor did not change between checking data manually or using the computer but he found some differences in audit methods and procedures used to obtain sufficient evidence for the audit process, and audit and evaluate the internal control

The effects of electronic operating systems' use of accounting data on internal audit methodology:

First: The use of electronic operating systems for accounting data affects auditor's methodology: as follows:

A. Change in culture and knowledge of auditors (scientific and practical qualification). B. Reconsidering the audit plan and program. C. Reconsidering the nature of the evidence, and making use of electronic data checking to obtain more evidence. D. Reconsidering the mechanism of internal control systems, and enhancing the control procedures applied to strengthen the internal control systems for data and information, and the validity of audit tests. E. Reconsidering methods of preparing and presenting internal audit reports in line with the needs of senior management. F. Determine the rules that must be followed to provide the safety and security of information systems and to maintain them, and raise their efficiency and effectiveness.

Second: How does an internal audit work under electronic operating systems for accounting data: The auditor focuses his attention on the following aspects: (Abu Ghaya, 2009)

1. Pre-audit of inputs
2. Auditing data entering the computer:
3. Checking computer programs used to run data, download, and display the information
4. Auditing information outputs, how to present, and interpret them

Third: The stages of auditing under the electronic operating systems for accounting data:

The auditor carries out internal audit tasks under the electronic accounting information system through the following stages:

1. The task order: The task order is the mandate given by the organization's general management to the auditor; it informs the officials concerned with the auditor carrying out the audit task, as the auditor obtains information related to the institution in terms of the strength of its financial position and its financial trends.

2. The planning stage of the audit process: The auditor at this stage increases the depth of information in areas he obtained while expanding the information base which helps the auditor to discover errors and risks that are difficult to notice.

3. The implementation stage of the audit process: The audit team implements the instructions in the audit program so that they can collect sufficient and appropriate evidence, by examining the integrity of the database, and copying the appropriate parts of the database to use audit programs and obtaining information. **At this stage, two main types of tests are carried out:**

First Compliance tests: These are tests to obtain adequate evidence of the efficiency and effectiveness of the internal control system to ensure that there is no weakness in the internal control system. It includes the following:

1. **General control systems test**:

A. Prohibitive control (input control); B. Discovery control (control over processing operations); C. Corrective Control (Control of Outputs).

2. **Detailed tests:** After verifying the reliability and confidence of the control procedures by conducting detailed tests and examining the confidence in the operation of the data.

3. **The reporting stage:** This stage is the last stage of the audit process, and the auditor at this stage collects the evidence obtained to evaluate it and draws conclusions to ensure that the level of audit risk is at an acceptable low level, then Prepare an audit report that expresses the opinion of the auditor in the light of the findings reached by using electronic audit programs, and gives an opinion on the outputs of the electronic operating system, and enables him to provide many forms of reports according to the needs of users and to retain data and information that enables the auditor to process it again in any time. (Khalaf, 2002)

Most researchers have found that electronic systems are an effective way to transfer knowledge of more experienced auditors to junior auditors, and the auditors 'perception of using programs during the next five years:

- Most auditors believe that their use of automated media technologies will increase over the next five years.
- The contributions of technological technologies to increase the added value of auditing.
- Controlling these technologies may lead to an expansion of audit tasks.

Conclusion

The auditing profession has gained great importance in society and the business environment because of its role in imparting confidence, credibility, and transparency to the financial statements, and due to the large volume of activities and the increase in the volume of information that must be processed and stored, information technology has been developed to implement these activities, and it became to keep abreast of technological developments by the auditor and use Technological means in completing the audit process, which led to increased attention to the quality of auditing and its role in activating and improving corporate governance, and thus maximizing the value for parties benefiting of financial statements.

This led to the difference in each of the objectives and procedures of auditing, and the emergence of different methods that enable the auditor to perform his job easier, and in a suitable time because The use of electronic systems by the auditor enables him to collect the required information easily and quickly, and It helps in auditing and analyzing a large volume of data and recording all the auditing processes that he carries out, which contributes to improving the quality of the work of audit for companies in addition to their compliance of IFRS because all companies must apply it in work to still their stocks in Amman stock exchange and reach their goals.

The Coronavirus crisis has affected companies significantly, some companies have expanded in their electronic operations and e-commerce enabled them to increase their sales via the Internet by benefiting from the advantage of electronic transactions, which required the provision of software for control and audit for financial and logistical operations to ensure the preservation, protection of company's assets, these software help auditors of remote audits and auditing companies can audit without visiting company's site.

Through the above, the following results were reached:

- There is a role for using electronic audit programs in the audit system its role in improving and increasing the quality of internal audits.
- The use of electronic audit systems in the field of audit helps the auditor to plan accurately and expand control, which helps him discover errors timely.
- The use of electronic audit systems in auditing increases the ease of obtaining information with a degree of confidence and impartiality and provides accuracy, confidence, reduction of cost, and time.
- The use of electronic auditing leads to improving the quality of the audit service, by making use of the advantages of information technology in the auditing process and contributing to the development and advancement of

the audit profession and its keeping pace with technological developments related to the audit profession.

- The internal audit activity adds value to the organization through the functions it performs within the framework of governance, maximizing the value for the beneficiaries, protecting their rights, evaluating the internal control system, managing risks, and the institution's commitment to corporate governance.

Most researchers have found that electronic systems are an effective way to transfer knowledge of more experienced auditors to junior auditors, and the auditors 'perception of using programs during the next five years:

- Most auditors believe that their use of automated audit technologies will increase over the next five years especially after the Corona crisis.
- The contributions of technological technologies to increase the added value of auditing.
- Improving these technologies may lead to an expansion of audit tasks.

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Managementul deşeurilor medicale şi gestionarea acestora în timpul pandemiei Covid -19

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Abstract

În lucrare prezint importanţa pentru societate a administrării prin colectare, transport, depozitare şi neutralizare a deşeurilor medicale periculoase, având în vedere şi contextul actual al pandemiei. România nu a avut o tradiţie în domeniul colectării deşeurilor medicale netoxice/ sau toxice, mai ales ca sistemul său sanitar era redus. Concomitent cu dezvoltarea infrastructuri medicale (spitale de stat şi private, cabinete private, medici de familie, cabinete medicale din şcoli şi universităţii), administraţia publică prin Ministerul Sănătăţii a trebuit obiectiv să soluţioneze legislativ şi prin norme de aplicare cantităţile în creştere de materiale sanitare periculoase, a modului de manipulare, colectare selectivă, depozitare, transport, raportare şi neutralizare.

Obiective: *Deşeurile medicale periculoase şi gestionarea acestora reprezintă una din problemele majore ale politicii strategice de sănătate publică care este reglementată atât la nivel naţional, cât şi la nivel UE. Se au în vedere consecinţele posibil dezastruoase asupra sănătăţii populaţiei şi afectarea mediului.*

Studii prealabile: *Utilizarea sondajelor care au fost realizate până în prezent, a rapoartelor, a datelor statistice de la nivel national şi european.*

Abordare: *Administrarea deşeurilor medicale impune proceduri, chiar standarde obligatorii legiferate de factorul politic pentru protejarea populaţiei şi a mediului.*

S-a impus crearea unor organisme de studii şi cercetări care să elaboreze periodic situaţiile din sistemul medical naţional, să elaboreze propuneri pentru rezolvarea urgentă a crizelor care pot apărea în sistemul medical, cum este actuala pandemie de COVID-19, organisme de control a modului de implementare şi control a măsurilor adoptate si mai ales, asigurarea finanţării lor.

Rezultate: *Inventarierea măsurilor legislative care au fost luate şi ce măsuri se mai impun având în vedere situaţia actuală cât şi efectele economice pe termen mediu si lung.*

Implicaţii: *Pandemia cu noul coronavirus a scos în evidenţă lipsurile materiale şi a resurselor umane de specialitate din sistemul medical, sistemele de management cu funcţionare ineficientă, legislaţia incompletă, necesitatea actualizării şi modernizării raportărilor de cazuistici, posibilităţile de adaptare la situaţiile de criză în sistemul medical naţional etc.*

S-a constatat că, din lipsă de cadre de specialitate la nivel politic şi profesional, s-au adoptat măsuri provizorii cu consecinţe nefaste, când

unele unităţii sanitare publice, nespecializate au fost obligate să preia cazurile de persoane afectate de noul coronavirus.
Valoare: *Consecinţele sanitare, economice, sociale, politice asupra populaţiei cu o posibilă repetitivitate impugn o abordare detaliată de către factorii de decizie pentru prevenirea, combaterea si diminuarea efectelor.*

Cuvinte cheie: *sistenm sanitar, recipient special, prevenire şi măsuri de combatere a virusului, cadru legislativ, efecte economice, costuri*.

Introducere

Gestionarea deşeurilor rezultate din activităţile medicale este în prezent reglementată de Ordinul Ministrului Sănătăţii şi Familiei nr. 219/2002 care aprobă Normele tehnice privind gestionarea deşeurilor rezultate din activităţi medicale şi Metodologia de culegere a datelor pentru baza naţională de date.

Unul dintre serviciile publice care s-a evidenţiat, ca o necesitate obligatorie, la nivel internaţional, în ultimele decenii, în politicile publice şi fost reglementat atât la nivelul Uniunii Europene cât la nivelul statelor membre este *managementul deşeurilor medicale şi gestionarea acestora.*

Deşeurile medicale sunt gestionate având în vedere două categorii principale: [52]

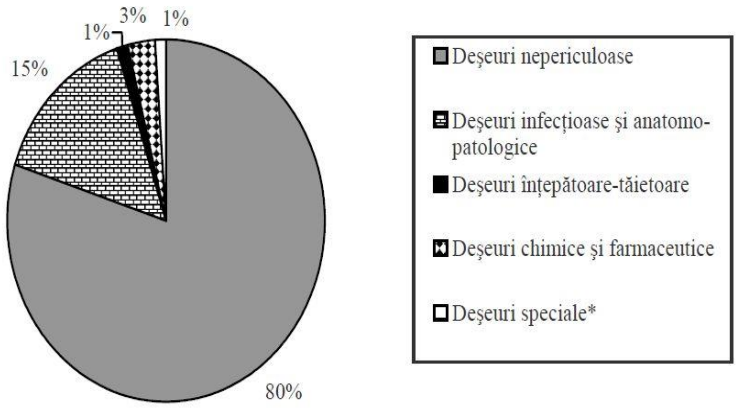
- *deşeuri medicale nepericuloase,*
- *deşeuri periculoase cu subcategoria deşeuri infecţioase.*

Deşeurile periculoase sunt acelea care în timpul diverselor proceduri medicale au intrat în contact cu sângele sau alte fluide biologice de la pacienţi, în vreme ce deşeurile nepericuloase fac referire la deşeurile care nu au luat contactul cu fluidele biologice sau cu pacienţii diagnosticaţi cu boli contagioase: scutece de unică folosinţă, folie împachetări corporale, medicamente nepericuloase, dezinfectanţi etc. Deşeurile infecţioase sunt acele deşeuri medicale care includ substanţe şi preparate cu conţinut de microorganisme viabile sau toxine ale acestora care sunt cunoscute ca producând boli la om ori la alte organisme vii"; aceste deşeuri sunt considerate deşeuri periculoase.

După anul 2013, o dată cu schimbarea metodologiei, raportul dintre deşeuri nepericuloase şi cele periculoase s-a modificat, sub influenţa noilor epidemii şi pandemii care au apărut (noi instrucţiuni şi ordonanţe, noi echipamente şi proceduri etc). Deşeurile periculoase se întâlnesc nu numai în unităţile spitaliceşti, ci şi în unele laboratoare de cercetare şi/ sau analize. În ultimele decenii, s-au construit ca o necesitate anexe de spitale şi laboratoare noi, dintre care unele specializate pe boli infecţioase transmisibile, ceea ce a determinat crearea unor companii specializate care să colecteze materialele periculoase, dar şi locuri şi metode de neutralizare a acestora. Legislaţia în vigoare reglementează şi instruirea personalului pentru colectarea, depozitarea selectivă, manipularea, transportul şi neutralizarea materialelor sanitare periculoase.

[52] ORDIN nr. 1226 din 3 decembrie 2012 pentru aprobarea Normelor tehnice privind gestionarea deşeurilor rezultate din activităţi medicale şi a Metodologiei de culegere a datelor pentru baza naţională de date privind deşeurile rezultate din activităţi medicale publicat în Monitorul Oficial Nr. 855 din 18 decembrie 2012.

Structura deşeurilor medicale



* Citostatice, recipiente sub presiune, termometre sparte, baterii uzate, deşeuri rezultate din activitatea laboratoarelor de medicina nucleară etc.

Sursa: Departamentul Inginerie Sanitară , Institutul de Sănătate Publică, Bucureşti

Fig. 1. Structura deşeurilor medicale

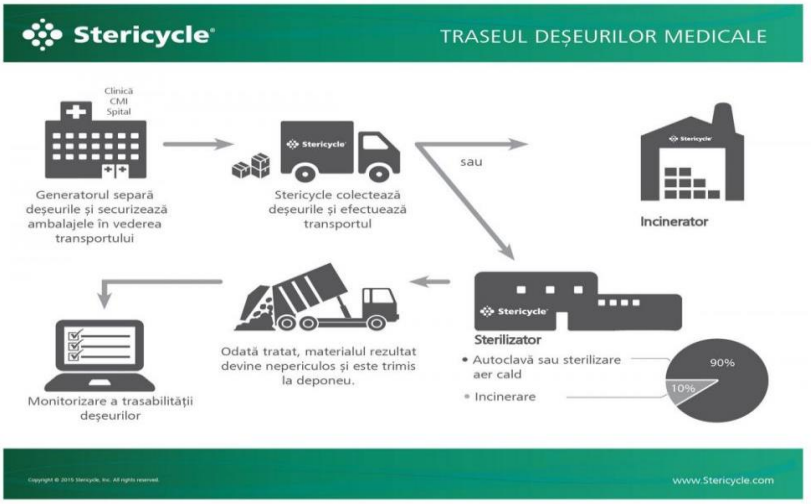


Fig. 2. Transportul deşeurilor medicale[53]

Legislaţia internaţională în domeniul deşeurilor medicale îşi găseşte originile în acordul internaţional cunoscut sub denumirea de Convenţia de la Basel, semnată

[53]https://www.google.ro/search?q=transportul+deseurilor+periculoase&hl=ro&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjM5Ouh-tXwAhWOgf0HHZexBnoQ_AUoAXoECAEQAw&biw=1366&bih=654#imgrc=EvE-kVEsTDEwfM ora 18:40

în anul 1989, coordonată de Programul de Protecţie a Mediului al Naţiunilor Unite (UNEP). Aceasta face primele referiri şi la transportul transfrontalier al deşeurilor periculoase.

Principiile internaţionale de bază care guvernează domeniul protecţiei mediului şi implicit gestionarea deşeurilor periculoase sunt:

- Principiul "poluatorul plăteşte" ce implică responsabilitatea legală şi financiară a celui ce produce deşeurile (poluatorul). Unitatea sanitară răspunde de îndepărtarea şi eliminarea finală în siguranţă a deşeurilor produse.
- Principiul "precauţiunii" se referă la necesitatea de a lua măsuri de precauţie împotriva apariţiei riscurilor ce pot fi generate de gestionarea necorespunzătoare a deşeurilor rezultate din activitatea medicală.
- Principiul "proximităţii" recomandă ca eliminarea finală a deşeurilor să se realizeze cât mai aproape posibil de sursa de producere, în scopul reducerii riscurilor pentru mediu şi sănătate legate de transport. Principiul devine aplicabil doar atunci când există posibilităţi tehnice, iar mediul înconjurător nu este afectat.

Cadrul legislativ european care reglementează colectarea, transportul, tratarea şi depozitarea deşeurilor este reprezentat de patru acte normative:

a. Directiva 2008/98/CE privind deşeurile şi de abrogare a numitor directive.
b. Directiva 99/31/EC privind depozitarea deşeurilor.
c. Directiva 2010/75/UE privind emisiile industriale.
d. Decizia nr. 955/2014 de modificare a Deciziei 2000/532/CE de stabilire a unei liste de deşeuri în temeiul Directivei 2008/98/CE a Parlamentului European şi a Consiliului.

Pentru susţinerea şi menţinerea consecventă a măsurilor arătate, investiţiile nu sunt neglijabile şi ca urmare, se scumpeşte actul medical şi de cercetare, care afectează bugetul Ministerului Sănătăţii şi al Mediului. Unităţile medicale sunt responsabile pentru colectarea selectivă a deşeurilor medicale, depozitarea temporară (pe termen cât mai scurt posibil), transportul intern în condiţiile prevăzute de legislaţie şi eliminarea finală – prin incinerare, a deşeurilor periculoase sau prin depozitare, a celor nepericuloase, asimilate deşeurilor menajere. Deoarece marea majoritate a unităţilor spitaliceşti nu dispun de instalaţii de incinerare performante potrivite pentru deşeuri periculoase, aproape 70% dintre acestea au contractat servicii ale unor firme specializate în vederea tratării prin decontaminare termică la temperaturi scăzute a deşeurilor periculoase (Ministerul Sănătăţii, Hotărârea privind Strategia naţională şi Planul naţional de gestionare a deşeurilor rezultate din activităţi medicale la nivel naţional, 2016, în curs de aprobare).

Colectarea deşeurilor medicale la nivelul unităţilor sanitare se realizează utilizând următoarele recipiente:

- Sac galben, pentru colectarea deşeurilor infecţioase;
- Cutie de carton cu sac galben în interior, pentru colectarea deşeurilor infecţioase, a deşeurilor anatomo-patologice şi a părţilor anatomice;
- Recipiente din material plastic rigid rezistente la acţiuni mecanice, cu închidere temporară, pentru colectarea deşeurilor înţepătoare-tăietoare;

- Sac negru sau transparent din plastic, pentru colectarea deşeurilor nepericuloase, care nu necesită măsuri speciale de prevenire a infecţiile.

Fig. 3. Recipiente pentru deşeuri spitaliceşti infecţioase

Colectarea trebuie să respecte următoarele reguli:

a. Colectarea se face în cutii de carton, sau de polietilenă, speciale pentru deşeuri contaminate, cu o capacitate între 10 şi 30 l, autorizate de forurile sanitare. Deoarece aceste cutii sunt sigure împotriva înţepării prin ace de seringă şi a tăierii cu lame de bisturie. Cutiile sunt prevăzute cu trape de siguranţă, astfel că să nu se scoată materiale din ele şi, umplute se sigilează.
b. Recipientele au regim special de deplasare, deoarece trebuie să fie depozitate nu mai mult de 48 de ore şi neutralizate în maximum 78 de ore pentru a se evita eventuale procese de fermentare a produselor organice şi creşterea pericolului de proliferare a agenţilor patogeni.

Se marchează cu galben containerele pentru transport şi depozitare temporară, marcaj galben, şi inscripţii „**Deşeuri medicale**" şi vor avea pictograma „**Pericol biologic**". Spaţiul de depozitare temporară a deşeurilor medicale trebuie să fie prevăzut la fiecare unitate medicală în parte şi trebuie să aibă delimitate două compartimente, unul pentru deşeurile periculoase şi unul pentru deşeurile asimilabile celor menajere şi celor recuperabile.

Ambalajul utilizat pentru colectare, venind în contact direct cu deşeurile periculoase, este de unică folosinţă şi este eliminat odată cu conţinutul. Colectarea deşeurilor se face în două tipuri de ambalaje:

- **Saci de culoare neagră** – pentru deşeurile nepericuloase asimilate celor menajere;
- **Saci de culoare galbenă, marcaţi cu pictograma „Pericol biologic"** – pentru deşeurile periculoase infecţioase.

Fig. 4. Cutie pentru incinerarea deșeuri spitalicești infecțioase

Fig. 5. Saci de colectare

Apreciez că și materialele nesanitare provenite din reabilitarea construcțiilor unităților sanitare pot fi, în multe cazuri, incluse la deșeuri sanitare periculoase având în vedere că încăperile ar putea conține germeni patogeni (piocianic, nosocomiali etc), pentru care nu există legislație.

Menționez că în anul 2016 Ministerul Sănătății a elaborat un proiect care trebuia supus aprobării Guvernului pentru,, *Strategia națională privind gestionarea deșeurilor rezultate din activitatea medicală*'', la care trebuia să participe Ministerul Sănătății și avizate de Ministerul Mediului, Apelor și Pădurilor, iar planul național de gestionare trebuie inclus în Planul național de gestionare a deșeurilor, însă nu a fost încă adoptat, pentru a fi publicat în Monitorul Oficial, astfel că fiecare unitate instituie reguli aleatorii.

Ministerul Sănătății a elaborat un studiu din care rezultă că:

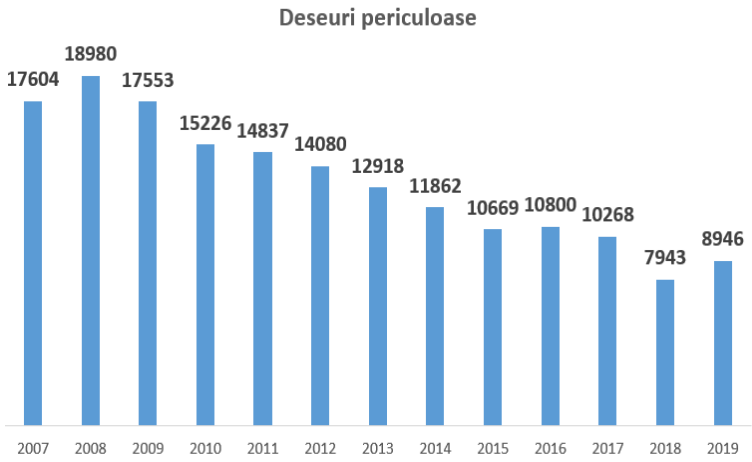


Fig. 6. Cantitatea estimată de deşeuri periculoase
rezultate din activităţile medicale în România, 2007-2019[54]

Faţă de aceste date, actual, având in vedere pandemia de coronavirus şi faptul că multe unităţii spitaliceşti au fost transformate pentru tratamente, sau ca suport tratamente, cantitatea de materiale sanitare periculoase s-a mărit substanţial. Menţionez că pentru unele spitale din ţările dezvoltate ale UE, până şi apa folosită în unităţile spitaliceşti, are un tratament special de sterilizare, înainte de a fi deversate în canale colectoare. Dacă Legea 1226/2012 reglementează generic Strategia naţională de gestionare a deşeurilor medicale, în baza Ordinului 1226/2012, fără să ia în considerare propunerile OMS şi Mediului din 2015, se impune o revizuire şi o reactualizare a legislaţiei în materie, având în vedere situaţiile create de pandemia COVID.

OMS a enumerat ca posibile surse de producere a deşeurilor medicale ar fi:

- **surse majore** - cabinete medicale, săli de operaţii, laboratoare de analize, secţii de radiologie şi chimioterapie, servicii de ambulanţă, campanii de vaccinare, servicii de curăţenie şi întreţinere precum şi cele de servire a mesei;
- **surse secundare** - ar fi, cabinetele medicale individuale şi cele stomatologice, precum şi îngrijirea sănătăţii la domiciliu, conform (*în publicaţia Safe Management Form Healthcare Activities, Second Edition, 2014*)

Nu s-au avut în vedere laboratoarele de cercetări care pot genera epidemii şi pandemii, aşa cum s-a întâmplat cu laboratoarele din China, din care a rezultat pandemia COVID, aşa cum a relatat mass-media. În România, Institutul Naţional de Sănătate Publică a preluat datele de la Direcţiile de Sănătate Publică teritoriale, în care cantităţile medii anuale reprezintă doar o medie aritmetică a celor patru raportări trimestriale până în anul 2010-2012, iar din 2013 legislaţia s-a modificat, astfel că raportările se fac defalcat conform codurilor din Lista europeană a deşeurilor medicale.

[54] Ministerul Sănătăţii, Hotărâre privind *Strategia naţională şi Planul naţional de gestionare a deşeurilor rezultate din activităţi medicale la nivel naţional, 2016*

Generarea deşeurilor medicale periculoase şi nepericuloase

Centrul Naţional de monitorizare a riscurilor transmite Institutului Naţional rezultatele monitorizării sistemului de gestionare a deşeurilor rezultate din activitatea medicală", care face parte din PN –II -Programul naţional de monitorizare a factorilor determinanţi din mediul de viaţă şi muncă, respectiv domeniul. Astfel, unităţile sanitare acţionează ca deşeurile rezultate din activitatea medicală să colectate la sursă şi separate pe categorii (**9 coduri**) conform Ordinului MS nr. 1226/2012 şi HG nr. 856/2002. Conform INSP pentru perioada **2012-2018**, care nu a luat în considerare, din lipsă de date, cabinetele particulare, situaţia cantităţilor de deşeuri medicale se prezintă conform tabelului ce urmează şi ajunge să fie la nivelul anului 2018 de **13,031** tone.

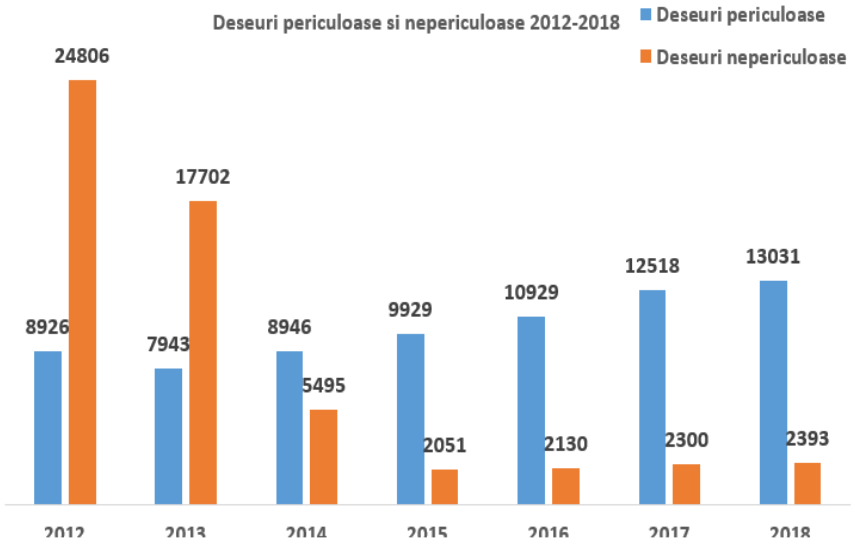


Fig. 7. *Sursa: prelucrare date INSP, Tabelul. 2. Evoluţia generării de deşeuri medicale, în România, în unităţi sanitare cu paturi (tone)*

Rezultă că a scăzut cantitatea de deşeuri medicale în unităţile medicale cu paturi, o scădere abruptă în perioada **2012-2014**, după cum se observă în tabel fie din raportări eronate, fie din nerespectarea colectării deşeurilor din lipsă de supraveghere, adică o scădere de la **24,806** tone în anul **2012** ajungându-se în anul **2018** la o scădere de **2,400**, adică de circa 10 ori.

Este surprinzător că, chiar dacă numărul spitalelor şi a cabinetelor medicale a crescut în perioada avută în vedere, cantitatea deşeurilor medicale toxice a scăzut, conform raportărilor cu 54% faţă de primul an de raportare. Se poate avea în vedere creşterea costurilor de selecţionare, depozitare, preluare şi transport a deşeurile medicale, neacoperite de bugetele alocate unităţilor medicale. Pentru perioada existenţei pandemiei de COVID, când s-au folosit echipamente medicale şi accesorii de protecţie în toate unităţile spitaliceşti în cantităţi impresionante, încă nu au fost colectate şi raportate deşeurile medicale toxice, dar se poate estima o creştere semnificativă a acestor deşeuri şi a costurilor neutralizării lor. De exemplu, la

spitalul chinezesc din,,*Wuhan, cantitatea de materiale medicale toxice a generat o cantitate de 600% ori mai mare față de perioada anterioară".*[55]

Guvernul prin Ministerul Sănătății a înțeles să contribuie la evitarea răspândirii noului coronavirus şi a iniţiat centre de vaccinare din care rezultă materiale medicale, care de asemenea ar trebui să fie colectate şi neutralizate.

Datele obținute de la DSP teritoriale, prelucrate de INSP, arată că gestionarea deşeurilor rezultate din activitatea medicală, a fost realizata în 2016 de către un număr de 661 de unități sanitare publice şi private (aproximativ 30% sunt din sistemul privat), respectiv de către 758 unități sanitare în anul 2018.

Metodologia de colectare pe categorii şi de separare a deşeurilor medicale

Unitățile sanitare, fie publice sau private au raportat că realizează separarea şi colectarea pe categorii a deşeurilor generate astfel:

- 94% (95% în 2018) din unitățile sanitare cercetate declară că utilizează sac galben pentru colectarea deşeurilor infecţioase**, cod 180103,**
- 88% (89% în 2018) din unitățile sanitare folosesc cutie de carton cu sac galben în interior pentru colectarea deşeurilor infecţioase **cod 180103** şi a deşeurilor anatomia-patologice şi parților anatomice,
- cod **180102**; recipientele din material plastic rigid rezistente la acţiuni mecanice, cu închidere temporară şi definitivă sunt utilizate de către unitățile sanitare într-o proporţie de 97% (96% în 2018),
- pentru colectarea deşeurilor înțepătoare-tăietoare, **cod 180101**, 90% din unități folosesc sac negru sau transparent din plastic pentru colectarea deşeurilor nepericuloase care nu necesită măsuri speciale de prevenire a infecțiilor, iar 25% din unitățile cercetate utilizează alte ambalaje (recipiente din plastic/metal cu închidere temporară şi definitivă, containere, europubele, recipiente metalice, bidoane de unică folosinţă) pentru celelalte categorii de deşeuri medicale, respectiv deşeuri chimice periculoase, medicamente etc.

Manipularea, depozitarea şi stocarea temporară şi transportarea deşeurilor medicale periculoase

Manipularea deşeurilor medicale periculoase presupune instruirea periodică a cadrelor medicale, asigurarea unor echipamente de protecţie (mănuşi, măşti uneori combinezon, recipiente portabile, dezinfectanți etc. Din datele publicate, referitor la depozitare, rezultă că:

- securizarea spațiului era asigurată în 87% (94% în 2018) din unități; apa curentă se regăsea în 79% (76%) din unități;
- sistemul de evacuare a apelor uzate era prezent în 83% (77%) din unități;
- în cazul a 83% (90% în 2018) dintre unități era asigurat sistem de ventilație;
- incinta frigorifica (sistem frigorific/frigider/lada frigorifica) era prezent în 48%
- (58%) din unități.
- 11% din unitățile sanitare, care au raportat date în anul 2018, au în vedere îmbunătățirea spațiului de stocare temporară.

[55] Sursa: Calma J., 2020, The COVID-19 pandemic is generating tons of medical waste, Sanitation workers need Personal protective equipment too, The Verge, 26.03.2020, https://www.theverge.com//thecovid-19-pandemic-is-generating-tons-of-medical-waste ora 20:00.

Stocarea temporară a materialelor medicale toxice/periculoase trebuie luată în considerare de fiecare unitate sanitară pentru a se evita eventualele incidente, care nu trebuie să depășească mai mult de 48 de ore.

După depozitarea temporară și în depozitele special amenajate din unitățile medicale în care se află materiale organice sau neorganice cu potențial periculos, urmează preluarea și transportarea lor pentru a fi neutralizate, conform legislației în vigoare. Transportul se face prin coridoare special amenajate, în mijloace de transport autorizate, specializate la zile și ore prestabilite. Totuși manevrarea acestor materiale sanitare, când nu s-au respectat procedurile, au determinat cazuri de infectare a personalului medical și s-au raportat:

- 292 cazuri sunt reprezentate de Hepatita B (48%),
- 202 cazuri de Hepatita C (34%),
- iar alte infecții virale cu transmitere sanguina - 110 (18%).

Comparativ cu anul precedent, numărul cazurilor noi de îmbolnăvire a crescut cu 17%.

Modalități de eliminare și tratarea a deșeurilor medicale

Deoarece materialele sanitare cu potențial infecțios de răspândire a diverselor boli intră în Strategia de politică sanitară a Guvernului, acesta a elaborat ordonanțe, norme și instrucțiuni, dintre care amintesc:

- Ordinul MS nr. 1279/2012, Art. 4, privind aprobarea Criteriilor de evaluare, a condițiilor de funcționare și monitorizare a echipamentelor de tratare prin decontaminare termică la temperaturi scăzute a deșeurilor periculoase medicale, direcțiile de sănătate publică teritoriale au responsabilitatea de a verifica condițiile de funcționare și monitorizare a echipamentelor de neutralizare aflate în faza de operare, localizate atât în unitatea sanitară, cât și pe un amplasament independent acesteia (stație de tratare).
- Ordinul ministrului sănătății nr. 1279/2012 pentru aprobarea Criteriilor de evaluare, a condițiilor de funcționare și monitorizare a echipamentelor de tratare prin decontaminare termică la temperaturi scăzute a deșeurilor medicale periculoase, doar deșeurile înțepătoare-tăietoare (**cod 18.01.01**) și deșeuri infecțioase (**18.01.03**) pot fi decontaminate termic la temperaturi scăzute.

La acestea se adaugă normele privind transportul materialelor și modul de manipulare al lor la locurile de neutralizare, fie la temperaturi scăzute prin utilizarea instalațiilor de tratare, fie la centrale termice, prin ardere, după cum urmează:

- 11 incineratoare ce funcționează în sistem centralizat;
- 14 stații de tratare prin decontaminare termică la temperaturi scăzute ce funcționează în sistem centralizat;
- 23 echipamente de tratare ce funcționează în cadrul unităților sanitare;
- 5 stații de transfer utilizate pentru anumite categorii de deșeuri medicale

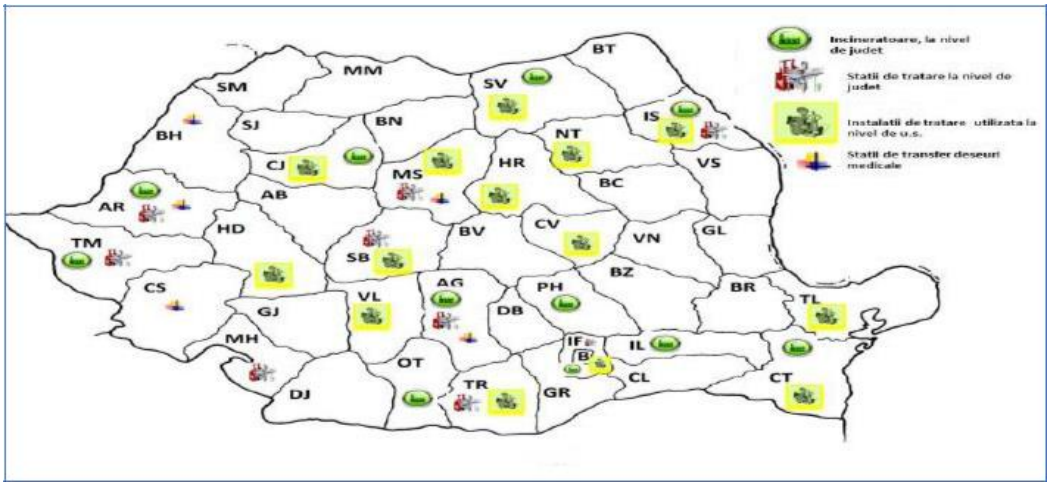


Fig. 8. *Sursa: Raport INSP, 2018. Repartiția la nivel județean a capacităților privind tratarea/eliminarea deșeurilor medicale periculoase*

Deoarece cca 20 de județe nu au posibilitatea de a neutraliza materialele sanitare periculoase, sunt nevoite să le transporte în alte județe ceea ce presupune existenţa unor vehicule specializate de transport care trebuie să parcurgă distanţe mai mari, dar şi un program de investiţii din cadrul bugetului Ministerului Sănătăţii şi a autorităţilor locale pentru instalaţii de contaminare, distrugere a materialelor sanitare. În acest caz DSP local trebuie să intervină la factorii politici. Cele cca 18,163 tone/an de materiale sanitare toxice şi periculoase din cele 832 unităţi sanitare publice şi private, înregistrate în anul 2018, în creştere anuală cantitativă remarcabilă, sunt preluate, transportate şi neutralizate numai de firme private, respectiv prin 67 de operatori economici care operează prin intermediul a 80 de puncte de lucru, aceştia colectând deşeurile în funcţie de cod, respectând legislaţia în vigoare.

ANP care monitorizează deşeurile medicale periculoase a raportat în anul 2020 că ar exista un număr total actual de 135 operatori autorizaţi pentru deşeurile medicale, dintre care 83 se ocupă doar de colectarea şi/sau transportul acestora şi doar o parte respectiv, 25 realizează tratarea termică (sau incinerarea) deşeurilor, faţă de anul 2018. Se estimează că în România pe baza studiilor ar exista până la apariţia pandemiei circa 15.000 t/an, de materiale sanitare periculoase pentru care există capacitate:

- **circa 11.000 t/an capacitatea de incinerare a deşeurilor medicale periculoase;**
- **circa 4.000 t/an capacitatea de tratare prin decontaminare termică la temperaturi scăzute a deşeurilor medicale periculoase.**

Ca urmare a pandemiei de COVID-19 se constată că există un număr mic de instalaţi redus de tratare prin decontaminare termică la temperaturi scăzute a deşeurilor medicale periculoase (în incinta unităţilor sanitare sau în sistem centralizat), mai ales că s-a extins numărul de unităţi medicale în tratarea pacienţilor COVID şi a centrelor de vaccinare preventivă.

Am precizat mai sus că există 20 de județe care nu au capacitatea necesară pentru incinerarea deșeurilor medicale și, ca urmare Ministerul Sănătății și factori politici ar trebui urgent să ia măsurile necesare pentru eliminarea riscurilor aferente.

Eliminarea deșeurilor medicale și calcularea costurilor

Costurile de colectare și eliminare a deșeurilor medicale periculoase se pot grupa în costuri interne, ale unității medicale și costuri datorate prestatorilor de servicii.

Costurile interne trebuie prevăzute în bugetul unității sanitare și ar trebui să acopere:

- salariile personalului specializat;
- containere speciale de colectare;
- amenajarea spațiului de depozitare;

Gestionarea deșeurilor medicale trebuie să aibă în vedere dezvoltarea unității medicale în cauză pentru a nu se ajunge la costuri suplimentare de extindere si reamenajare. Costurile pentru aceste acțiuni pot fi acoperite din fondurile bugetului unității, fonduri atrase din donații sau prin suplimentarea fondurilor de la autoritățile locale. În ultimul timp au apărut companii private care se ocupă de amenajarea, preluarea și neutralizarea deșeurilor medicale periculoase, deoarece s-a constatat eficiența lor și reducerea costurilor la bugetul destinat acestor activități (de la bugetul de stat, local sau al unităților medicale), față de serviciile prestate de firmele cu capital de stat.

În toate cazurile, trebuie respectate normele stabilite de legislația în vigoare, pentru evitarea riscurilor, dar nu se poate controla o eventuală majorare a costurilor pentru serviciile prestate de către firmele specializate pentru prestarea serviciilor respective. Gestionarea costurilor se evidențiază în contabilitatea fiecărei unității medicale, ca parte distinctă din executarea bugetară, diferențiat de costurile acțiunilor medicale și se aprobă de consiliile de administrație ale unităților medicale. Desigur că toate costurile aferente procesului de colectare, eliminare și neutralizare ale deșeurilor medicale periculoase trebuie recuperate de la beneficiarii actului medical. Fiind un proces care necesită investiții în mijloace fixe și mobile, costurile de amortizare și toate celelalte costuri financiare (dacă sa apelat la credite), trebuie incluse în facturile către beneficiarii serviciilor medicale prestate. Astfel că, tarifele, de regulă, sunt în creștere, mai ales la unitățile spitalicești cu multe paturi (peste 2000), unde costurile se pot înjumătăți.

Astfel, cu privire la costurile *rezultate din activitățile de gestionare a deșeurilor medicale în unitățile sanitare care cuprind transportul și eliminarea deșeurilor periculoase, s-au menționat următoarele valori*[56], astfel:

- 40% din unități au precizat că pentru 1 kg de deșeuri periculoase medicale plătesc mai puțin de 5 lei /kg;
- 16% din unitățile au specificat ca plătesc între 5 - 12 lei;
- 4% din unități au precizat costul între 12-50 lei;
- 4% din unitățile medicale au precizat că aceste informații sunt confidențiale;
- 36% din unități nu au dorit să furnizeze date în acest sens.

[56] Raportul pentru sănătate și mediu 2016, Institutul Național de Sănătate Publică, 2017., pag. 74.

Astfel, în România, de la 5 lei/kg la 50 lei/kg, unele studii internaţionale raportează valori de 2-8 €/kg. De asemenea se arată că 36% din unităţile medicale din România nu au furnizat date cu privire la aceste costuri. Datele statistice pentru costurile aferente deşeurile medicale periculoase nu sunt infailibile pentru situaţia din România, nu există raportări periodice controlabile colectate de INSP, care să poată determina o comparaţie cu cheltuielile din alte ţării, conform tabelului[57]:

Tabel 1. Exemple privind costurile de eliminare a deşeurilor medicale periculoase (în Elveţia)

Metoda de eliminare a deşeurilor medicale periculoase	Cost (US$/tonă)
Incinerare Pirolitică	380
Dezinfectare termică	400
Dezinfectare Chimică	200

„*Potrivit Raportului"*[58] pentru Sănătate şi Mediu al INSP din anul 2017, în anul 2018, la nivelul unităţilor sanitare publice şi private care au raportat date, cantitatea totala de deşeuri rezultate din activitatea medicală generată şi raportată a fost de 15.424 tone/an. Comparativ cu anul precedent se constată o creştere de aproximativ 4%. Din această cantitate, aproximativ **13.031 tone/an reprezintă cantitatea totală de deşeuri periculoase**. Din cantitatea totală de deşeuri periculoase, **aproximativ 12.309 tone/an sunt deşeuri periculoase infecţioase rezultate din activitatea medicală a celor 832 de unităţi sanitare publice şi private care au trimis raportări**. În anul 2018, numărul unităţilor sanitare raportoare a crescut cu 3% faţă de anul 2017. Cantitatea estimată de deşeuri medicale periculoase, provenită de la„*cabinetele stomatologice şi medicale*[59]" a fost de 5.132 tone.

Cantitatea de deşeuri periculoase totale estimată este de 18163 tone în anul 2018. Dacă se adaugă şi cantităţile generate de unităţile sanitare care nu au raportat **se poate estima o cantitate de deşeuri periculoase de 20.000 tone.**

Sunt controverse cu privire la modalităţile de cântărire a deşeurilor medicale periculoase, fie că sunt aproximate subiectiv, fie că nu există rampe cu dotările necesare.

Tot din datele INSP se menţionează că **23** de staţii sunt operaţionale, iar **43** sunt nefuncţionale, din următoarele cauze:

a. tarife mari;
b. defecţiuni majore repetate;
c. costuri salariale substanţiale cu personalul aferent;
d. costurilor mari pentru mentenanţă şi consumabile;
e. buletinelor de analiză necorespunzătoare a procesului de tratare;
f. datorită unităţilor sanitare care nu au obţinut autorizaţia de mediu, astfel că echipamentele de tratare nu au putut fi puse în funcţiune;

[57] Sursa: WHO (1994). *Regional guidelines for health care waste management in developing countries.* (Working document used at the WHO Regional Workshop on Clinical Waste Management, Kuala Lumpur, 28 November - 2 December 1994.) Kuala Lumpur, World HealthOrganization Western Pacific Regional Environmental Health Centre.

[58] Raportului pentru Sănătate şi Mediu al ANSP din anul 2018, pag. 99, 2019.

[59] Cifra aproximativă a cabinetelor medicale este de 28.000 (anul 2018) dar este fluctuantă deoarece se deschid cabinete noi şi se închid unele din cele existente.

Instalaţiile în cauză au o vechime neprecizată, nu au fost modernizate şi în multe cazuri nu au fost dotate corespunzător pentru realizarea eficientă a scopului lor, apariţia pandemiei impune obiectiv investiţii în mărirea capacităţilor de prelucrarea a materialelor medicale prin achiziţii de mijloace fixe dar şi prin crearea de noi depozite de prelucrare şi neutralizare. Efortul financiar trebuie reflectat în bugetul Ministerului Sănătăţii şi a organelor administrativ locale.

Din datele INSP rezultă că înainte de pandemie cantitatea de deşeuri medicale era de cca.**15.000t/an,** dintre care:

- cca. **11.000 t/an** capacitatea de incinerare a deşeurilor medicale
- cca**. 4.000 t/an** capacitatea de tratare/ decontaminare termica la temperaturi scăzute a deşeurilor medicale periculoase;

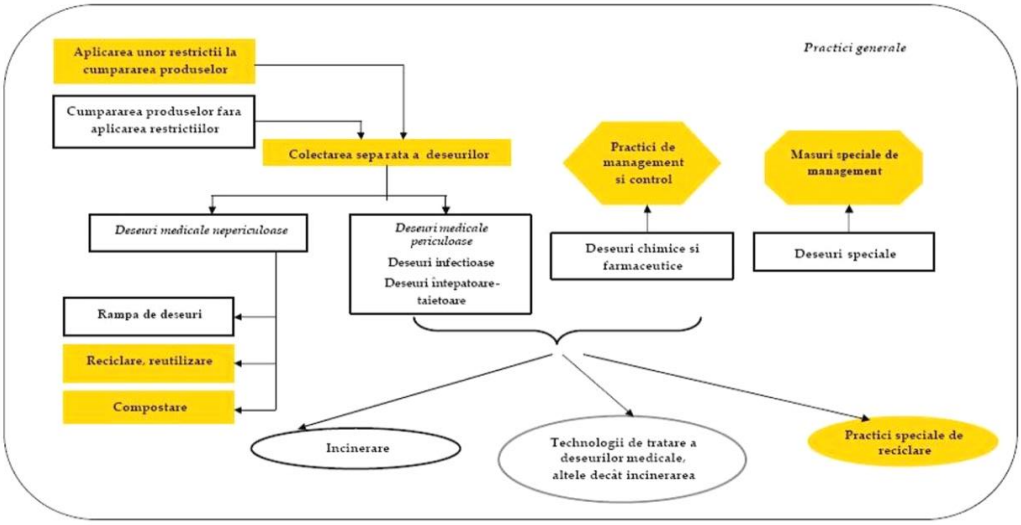
Tabel 2. Patru scenarii de evoluţie şi investiţiile necesare

Indicatori	**UM**	**Scenariu A**	**Scenariu B**	**Scenariu C**	**Scenariul D**
Creştere faţă de anul 2018	%	25	50	75	100
Deşeuri generate	T/an	25.000	30.000	35.000	40.000
Necesar capacităţi noi eliminare deşeuri medicale periculoase	T/an	17.000	22.000	27.000	32.000
Capacitate de rezervă (15%)	T/an	2.550	3.300	4.050	4.800
Total capacităţi noi	T/an	19.550	25.300	31.050	36.800
Costul investiţiilor în echipamente	**mii €**	7.820	10.120	12.420	14.720
Cost echip. special de transport	**mii €**	2.737	3.542	4.347	5.152
Alte costuri (clădiri, refrigerare etc.) (10% din echipamente)	**mii €**	782	1.012	1.242	1.472
Total costuri	**mii €**	**11.339**	**14.674**	**18.009**	**21.344**

Sursa. Atenuarea impactului COVID-19, în România, prin gestionarea corespunzătoare a deşeurilor medicale periculoase privind evoluţia investiţiilor necesare după dr. Andreea Constantinescu, dr. Simona Frone, Bucureşti 2020

Rezultă că în perioada pandemiei cu noul coronavirus, România ar trebui să facă investiţii de cca **21,344 mii €** pentru eliminarea şi neutralizarea deşeurilor medicale periculoase, dar ar trebui să se reevalueze echipamentele existente, calitatea şi fiabilitatea acestora, durata de viaţă a instalaţiilor, capacităţile de transport etc. Echipamentele de eliminare a deşeurilor medicale periculoase sunt modulare şi relativ uşor de procurat.

SCHEMA DE MINIMIZARE A DESEURILOR MEDICALE



Concluzii

Aşa cum am arătat mai sus, deşeurile medicale periculoase şi gestionarea acestora reprezintă una din problemele majore ale politicii strategice de sănătate publică care este reglementată atât la nivel naţional, cât şi la nivel UE. Se au în vedere consecinţele posibil dezastruoase asupra sănătăţii populaţiei şi afectarea mediului.

Ca urmare s-a impus crearea unor organisme de studii şi cercetări care să elaboreze periodic situaţiile din sistemul medical naţional, să elaboreze propuneri pentru rezolvarea urgentă a crizelor care pot apărea în sistemul medical, cum este actuala pandemie de COVID-19, organisme de control a modului de implementare şi control a măsurilor adoptate si mai ales, asigurarea finanţării lor.

Pandemia cu noul coronavirus a scos în evidenţă lipsurile materiale şi a resurselor umane de specialitate din sistemul medical, sistemele de management cu funcţionare ineficientă, legislaţia incompletă, necesitatea actualizării şi modernizării raportărilor de cazuistici, posibilităţile de adaptare la situaţiile de criză în sistemul medical naţional etc.

Dacă UE a elaborat directive generale pentru ţările membre, are au în vedere şi recomandările OMS, în România autorităţile au trebuit să încerce aplicarea măsurilor eficiente pentru a face faţă pandemiei. S-a constatat că, din lipsă de cadre de specialitate la nivel politic şi profesional, s-au adoptat măsuri provizorii cu consecinţe nefaste, când unele unităţii sanitare publice, nespecializate au fost obligate să preia cazurile de persoane afectate de noul coronavirus.

Apariţia unor tratamente aleatorii, cât şi a ordonanţelor pentru protecţia populaţiei (măşti, distanţare fizică, dezinfectanţi, limitarea aglomeraţiilor etc), au afectat negativ părţi din economia naţională prin falimentarea multor societăţii comerciale micii şi mijlocii, creşterea şomajului, sistemul de învăţământ etc.

În situaţia actuală, odată cu apariţia unor vaccinuri pentru eradicare pandemiei se constată noi probleme care trebuie rezolvate la nivel naţional şi la nivel european pentru care factorii politici trebuie să găsească rezolvări.

Demonstraţiile publice reclamă discriminări între persoanele vaccinate şi nevaccinate, respectarea măsurilor de protecţie obligatorii, călătorii interne şi internaţionale, şomaj, învăţământ, costuri de spitalizare care afectează strategia şi impun inovarea serviciilor publice, ca o consecinţă a neîncrederii populaţiei în factorii politici de conducere care au adoptat şi impus diverse măsuri, coercitive aparent nedemocratice.

Pentru evitarea riscurilor majore de răspândire a diferitelor maladii, dar mai ales în perioada pandemiei care pot afecta atât zootehnia cât şi populaţia, factorul politic şi administrativ are obligaţia să inventarieze pericolele şi să implementeze măsuri corespunzătoare.

Administrarea deşeurilor medicale impune proceduri, chiar standarde obligatorii legiferate de factorul politic pentru protejarea populaţiei şi a mediului.

Dacă raportările din domeniul medico-sanitar sunt incomplete, uneori subiective, din lipsă de date certe şi receptivitate strategică, credibilitatea factorului politico-administrativ devine determinantă. Nu este suficient să fie elaborat un sistem legislativ coercitiv, dacă nu se exercită măsuri de implementare şi control, care presupun investiţii şi costuri materiale şi umane.

În domeniul colectării şi neutralizării deşeurilor medicale, în perioada anilor **2012-2018**, există o scădere, de la o cantitate de **24.806** tone deşeuri nepericuloase în anul 2012 se ajunge la aproape **2.400** tone în anul **2018**, adică o scădere de 10 ori, conform INSP, apoi în anul **2012,** de la **8.900** tone deşeuri medicale periculoase se ajunge la **13.031** tone în anul **2018**. De asemenea, trebuie reţinut că, totalul deşeurilor medicale, în perioada de şapte ani **(2012-2018)** a scăzut de la **33.732** tone la **15.424** tone (scădere de **54%** sau **18.308** tone), în condiţiile în care a crescut numărul de unităţii medicale spitaliceşti de la **758 la 834** înregistrate.

Cu atât mai mult, chiar dacă nu există încă date publicate deşeurile medicale, cantitativ au crescut substanţial în perioada pandemiei.

Am arătat mai sus dotările existente în aul 2018 pentru neutralizarea deşeurilor medicale, desigur insuficiente în perioada pandemiei când cantităţile de deşeuri au crescut considerabil. De menţionat că există 20 de judeţe care nu dispun de instalaţie de tratare prin de contaminare termică la temperaturi scăzute a deşeurilor medicale periculoase.

Capacităţile din România ar fi de cca.**15.000t**/an, respectiv **47t**/zi, insuficient pentru perioada pandemiei. Nu există date de la INSP ca urmare a pandemiei şi încă nu s-a aprobat„„*Hotărârea de Guvern privind Strategia naţională şi Planul naţional de gestionare a deşeurilor rezultate din activităţi medicale la nivel naţional*"

În consecinţă serviciul public de colectare şi neutralizare a deşeurilor sanitare periculoase, ca parte din strategia de protecţie sanitară a populaţiei şi mediului, trebuie să aibă o adaptare continuă care să dovedească receptivitatea tuturor factorilor, dar în principal al factorului politic, cu previzionare intuitivă a evoluţiilor epidemiologice şi pandemice, care şă aibă în vedere atât costuri în structura bugetară cât şi pregătirea unor cadre medicale de specialitate.

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