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About the Journal

Journal has started as the main publication of ARA in 1977, to publish papers presented at the ARA Congress. The last issue of ARA Journal was published in 2009. Starting 2009, the Proceedings of the ARA Congress were published instead of the ARA Journal. This is because while the ARA Journal would publish the papers after they were presented at a Congress, ARA Congress Proceedings were published before the Congress. At the request of ARA members, the ARA Journal was re-started in 2017 in a new journal format and published as two Journals: **ARA Journal of Arts and Culture, and ARA Journal of Sciences.**

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The American-Romanian Academy of Arts and Sciences mission is to create an open academic forum discussion of scientific and cultural issues on Romanian related topics. The positions taken by the authors of the articles are their own and not necessarily those of the academy.

Table of Content

TELE for ARA: Evolution of Consciousness Society

Prof. Elena NECHITA, „Society Consciousness Computers" Journal Editor in Chief, Bacău, Romania,
Prof. Dumitru TODOROI, 11 Teleconferences (TELE) President, Chișinău, Republic of Moldova
Prof. Ruxandra VIDU, ARA President, University of California Davis, USA,

Abstract. The research direction "The Creation of the Society of Consciousness", carried out by the staff of the Academy of Economic Studies of Moldova (ASEM), since 2008, is a continuity of the research carried out in this field by the illustrious scientist, Academician Mihai Drăgănescu, former president of the Romanian Academy, Coordinator of research in the field of information society and author of many publications in the field of Informatics, including the famous publication "SOCIETY OF CONSCIOUSNESS". The research, carried out in the field of creation of the society of consciousness by the ASEM collaborators are supported by the American Romanian-Academy of Arts and Sciences (ARA), by Romanians everywhere and their colleagues from different fields of science and technology around the world. The 15 years of research and 11 years you meet researchers within the international TELECONFERENCES of young researchers its crowned with thousands of important results, hundreds of communications, and publications in the field of the Society of Consciousness, dozens of monographs and magazines, Enshrined to these famous activities of Romanians everywhere, representatives of ARA. The present work succinctly represents the totality of the results obtained in the field "The Creation of the Society of Consciousness" in the last 15 years of scientific activity of Romanians everywhere, represented and supporters of ARA.

Keywords: consciousness, knowledge, informatics, robotics, Humano-Robotics society, artificial intelligence, natural intelligence, robotics, creativity, emotions, temperaments, sensuality, ROBO-intelligence, JEL: B55, C53, C88, D2

Introduction.

We present the history of the evolution of the university project "Creating the Society of Consciousness" from its initiation in 2008 at the Summer School "Baile Tusnad" until now. The project was joined by scientists and young specialists from many universities and scientific centers in Bacau, Bochum, Boston, Bucharest, Chicago, Chisinau, Iasi, Kraków, Niderlande, Timișoara, Warsovia etc.

The components of science, consciousness, subconsciousness and inconsciousness are studied. These components are human-specific and will be incorporated into robots in the Society of Consciousness – The Human – Robotics Society.

IQ and EQ, creative and emotional intelligence, sits the Core of the Society of Consciousness. At the Symposiums of 2009 – 2011 and the international TELECONFERENCES of young specialists from 2012 to the present, they have been researched, highlighted, structured, algorithmically imple-mented, and discussed on a wide range of issues related to the adaptable implementation of human IQ and EQ in the robots of the Society of Consciousness. Creativity, emotionality, tempera-ment and sensuality of human IQ and EQ are studied and algorithmically adapted in the ROBO-intelligences of the Society of Consciousness.

Studying and measuring the energy sources of the components of science, consciousness, subcon-sciousness and inconsciousness is the current problem of creating the ROBO-intelligences of the Human-Robotic Society. Energy measurements are the source of the Energy Deposits of the Society of Consciousness. This repository is the basis for the

adaptable creation of robots – full members of the Human-Robotic Society.

December 2008.

Academy of Economic Studies of Moldova (AESM) Senate adopts the research project" Creation Consciousness Society", Research director was named Dumitru Todoroi, univ. prof., dr. hab., ARA corr. member.

In the years 2009-2011 research results in the field were discussed especially by the researchers – participants at the international annual symposia at the AESM.

Beginning with 2012-year results were discussed at the international TELECON-FERENCES of young researchers from Moldova, Romania, Germany, Italy, Poland, and the USA.

The TELECONFERENCES (TELE) were organized by the Academy of Economic Studies of Moldova, The American-Romanian Academy of Arts and Sciences, and "Vasile Alecsandri" University at Bacau, Romania. The TELE are supported by the scientists from around the World, University California Davis, California, USA, Illinois State University at Chicago, USA, Boston Tehnological Institute at Boston, USA, Boston Teological Institute at Boston, USA, Bochum Economic Institute, Bochum, Germany, AFEDEMY, Nitherlands, The Academy of Economis Studies of Bucharest, Romania, "Al. I. Cuza" University at Iasi, Romania, Free International University of Moldova, Chişinău, Timişoara Politechnical University, Romania, Moldova State University, Chişinău and others.

Adaptable tools represent the algorithmic basis to be implemented in first three stage of robotic creation: formulation the problem, its formalization, and its algorithmic definition. The Kernel of adaptable tools in presented be its **Adapter**, which defines pragmatics (utility), syntax (structure), semantics (content, mining), context (user environment) and examples of ROBO-intelligence elements. Very important subject constitutes the utilization of Adapters in definition higher level elements of ROBO-intelligences through its lower-level elements. Adapter is the tool, engine of information technology to create adaptive ROBO - intelligences. The Adaptable Evolution Method (AEM) is investigated, developed, and implemented in creation process of Consciousness ROBO-intelligences.

The TELE – 2012 [1].

Conference was dedicated especially to the discussion of research results of creativity of ROBO-intelligences. Volume work was published by AESM Publishing House: ISBN 978-9975-75-611-2. It was analyzed and developed the AEM to be used for the adaptable algorithmic processing of robotic creativity's features: Inspiration, Imagery, Imagination, Intuition, Insight, Improvisation, Incubation and its evolutions: Acquire Knowledge, Develop Curiosity, Become Interested, Passion, Dedication, and Professionalism. Were obtained higher level elements of Creative ROBO-intelligences which ware defined with the help of special developed the creative AEM.

3. TELE -2013.

Conference discussed research results obtained in the branch of emotional elements of ROBO-intelligences. The results were published in the Volume 1 of the founded by the University "Vasile Alecsandri" of Bacău Journal ***"Computers Consciousness Society"*: ISSN 2359-7321, ISSN-L 2359-7321.**

Were analyzed and developed the AEM to be used for the adaptable algorithmic processing of the basic emotion elements: Happiness, Fear, Amazement, Disgust, Sadness, and Anger in combination with its evolutions: Self-awareness, Managing emotions, Motivation, Empathy, Handling relationships. Were obtained higher level elements of Emotion ROBO-intelligences which ware defined with the help of special developed the emotion AEM.

Temperament elements of ROBO - intelligences were studied, analyzed, presented, and discussed in sections of **the TELE – 2014 [2]**. Research results were published by AESM Publishing House: ISBN 978-9975-75-612-6

At the TELE – 2015 **[3]** (*Society Consciousness*

Computers, *Volume 2*, ISSN 2359-7321, ISSN-L 2359-7321) and TELE – 2016 **[4]** (*Society Consciousness Computers, Volume 3,* ISSN 2359-7321, ISSN-L 2359-7321) were represent research results based on developed special types of AEM which were used in the process of creation the sensual elements of ROBO –intelligences - positive and negative sentiments. Were implemented special types of AEM in the process of algorithmically definition of Sensual positive ROBO-intelligences characteristics such as: Meekness, Modesty, Satisfaction, Pleasure, Simplicity, Lavishness, Tolerance, Frigidity, Love, Health, Diligence, Joy, Courage, Fidelity, Issue, Life, and Despair.

4. TELE-2014 [4].

The international FORUM TELE-2014 was dedicated to the analysis of the research results in the field of the creation of the Consciousness Society with the highlighting of the possibilities of creating ROBO – intelligences with temperament, ROBO – intelligences with character. ROBO research – creative intelligences (IQ) and emotional intelligences (EQ) are evaluated in the direction of obtaining ROBO – intelligences with Choleric, Bloody, Phlegmatic and Melancholic character. Each of these 4 characters has its own special peculiarities, which also makes people different or find tangencies with each other. The study of human temperaments is directed to the research of the energetic components of stability-instability and introversion. Temperamental energy is defined by energy currents, which are emitted by the components of introversion-exstravertation with stability-instability.

One of the measurements, as an example, is the measurement of energy currents specific to melancholics (introvertivity and instability): of sorrow, anxiosity, rigidity, sobricity, pessimisticity, reservibility, insocibility and limitation, which is a process of creating a repository of energy data characteristic of melancholic. The other measurements, specific to the qualities of phlegmatics, cholerics and bloodsuckers, are analogous to that of melancholics. The database composed of the amounts of phlegmatic, choleric, blood and melancholic temperamental energy currents determines the process of creating the respective components in robotic systems, in melancholic robots, for example, or in choleric robots and a.m.d., creating ROBO-intelligences with temperament, ROBO – intelligences with character.

Theme TELE-2014: "Information systems in the Society of Consciousness"; "ROBO-adaptable emotional intelligences"; "Sustainability and ROBO-intelligences"; ROBO-intelligences and the "Quanta Revolution".

It is necessary to emphasize the extension of the geography of international teleconferencing with the generic "Creation of the Society of Consciousness". With valuable works at TELE-2014, together with the researchers from the first FORs in the field of creating the Society of Consciousness, both the young researchers from the "Vasile Alescandri" University of Bacau together with those from the "Gh. DIMA" Academy of Mythics in Cluj Napoca, as well as the youth from abroad, joined together with the researchers from the first FORs in the field of creating the Society of Consciousness. TELE-2014 spent its activities with the first direct involvement of the American Romanian Academy of Arts and Sciences (ARA), of the new President of ARA, of Mrs. Ruxandra VIDU, Prof., Dr., who participated in all the stages of evaluation of this international FORUM.

TELE-2015 [5].

The purpose of the meeting of young researchers within the international FOR "Creating the Society of Consciousness" (TELE-2015) was to discuss ROBO-intelligences with positive and negative feelings. Feelings are labeled in Pandora's Box as negative feelings and their opposite is positive feelings.

The study of negative (Pandora's Box) and human positive feelings is directed in this case towards the research of the energetics of the sentimental components. The energy of sentimentality is defined by the energy currents, which are emanated by the

components of negative feelings (Pandora's Box): Cruelty, Arrogance, Suffering, Pain, Vanity, Greed, Jealousy, Bodily Lust, Hatred, Diseases, Laziness, Sadness, Fear, Deception, Subjugation, Suffering, Death, Hopelessness and positive feelings (opposite to those in Pandora's Box): Gentleness, Modesty, Satisfaction, Pleasure, Simplicity, Generosity, Tolerance, Fidelity, Love, Health, Diligence, Joy, Courage, Fidelity, Liberation, Stillness, Life, Hope in Pandora's Box. Measuring sentimental energy currents supplies the database composed of information about the amounts of sentimental energy currents that support the process of creating sentimental components in robotic systems. The energy of sentimentality participates in the creation of the robots with feelings, the Robot with the feeling of Suffering, for example, or the Robot with the feeling of Pleasure and so on. This process aims to create ROBO-intelligences with feelings.

Tele-2015 theme: "ROBO-intelligences in the Society of Consciousness"; "Information systems in the Societies of Knowledge and Consciousness"; "Sustainability of social systems in the Society of the Future".

TELE-2016 [6].

The Society of Consciousness is characterized by the equality of artificial intelligence and structured natural intelligence (structured AI=IN). It has been shown (Carnegie Mellon University) that of the 7 million human functions, about 5 and a half million currently can be performed by robots. These human functions are mostly of the physical type. Spiritual, intellectual, emotional, temperamental, sensual and other human functions are in the investigation phase.

The following processes of robotic investigations and current measurements are intended for complex measurements of ROBO-creative intelligences with emotions, for example, ROBO-intelligences with character and feelings, ROBO-emotional intelligences with character.

The industry of creating ROBO-intellectual, sensual, emotional, spiritual, creative and temperamental intelligences is in full activity, its purpose being to fill the robotic niche, which currently requires the robotic functionalization of over one and a half million human beings (Carnegie Mellon University), we "covered" by robots.

Currently, the collectives, which are concerned with the creation of robotic systems, are researching the schemes and tools for investigating and measuring energy properties, which characterize intelligence, emotion and the human spirit. The physical parts of the creative (IQ), emotional (EQ), moral and spiritual components of the human body are investigated, including the human heart and brain, which emit energy signals with different properties, signal types, amplitudes and frequencies. Such investigations are carried out by mixed teams of researchers from biology, psychology, physics, nanotechnology, bioinformatics and other sciences. The results of these investigations are the digital basis for algorithms for reproducing the corresponding robotic characteristics.

TELE-2016 theme: "Robotic sustainability"; "Information sustainability"; "Social sustainability".

The goal of TELE-2016 was to investigate the elements of the first level of spiritual, intellectual, emotional, temperamental, sensual (positive and negative) functions and their sustainability in the creation of ROBO-intelligences. The evolution of temperamental robotic characteristics from an intellectual, emotional and sensual point of view of the process of creating ROBO-intelligences was discussed.

7. TELE-2017 [7].

International TELECONFERENCE of young researchers" The Creation of the Society of Consciousness", April 21-22, 2017, (TELE-2017), 6th Edition [6], Dedicated to the scientist Radu MIHALCEA.

Many scientists from different fields of science and technology, from the fields of pedagogy, sociology and philosophy, from the fields of quantum physics, nanotechnologies, psychiatry and psychology, scientists from about 90 groups of researchers in the world, with different views of the Consciousness Society, with different supporting results of the idea of

creating the Consciousness Society, postulated that the Consciousness Society will be created between 2019 and 2035! It's a pretty long period of time, and it also defines the mentality of humanity - when, how, who, who, who, and why is this Society of Consciousness necessary...

The most optimistic futurologists claim that already in 2019 we will live in the Society of Consciousness but the most pessimistic believe that only in the year 2035 we will live in it!

We will live in the Society of Consciousness when Artificial Intelligence equals structured Natural Intelligence. So we're going to live in a homo-robotic society, with its new laws for humanity and those laws for robots: in this society both humans and robots will be holders of social passports. Tele-2017 theme: "Robots of the Society of Consciousness"; "Information systems in the Society of Consciousness"; "Information, Knowledge and Robotics Consciousness"; "Robots of Small and Medium Enterprises". The results were published in the Journal ***„Society Consciousness Computers", Volume 4,*** ISSN 2359-7321, ISSN-L 2359-7321; ***Consciousness Society Creation*, 6th Edition, April 21-22, 2017,** ARA Publisher, **University of California Davis, USA**, ISBN: 978-1-935924-21-0, http://www.AmericanRomanianAcademy.org) .

Was implemented special type of Adaptable Evaluation Method (AEM) which was used in the process of algorithmically definition of Sensual negative ROBO-intelligences characteristics. Was developed the AEM to be used for the adaptable algorithmic processing of main negative sensual robotic characteristics: Pride, Wrath, Sorrow, Deceit, Misery, Glory, Cowardice, Hate, Arrogance, Gluttony, Envy, Vanity, Lust, Fear, and Greed. Obtained higher level elements of negative Sensual ROBO-intelligences were adaptable algorithmic defined with the help of special developed AEM.

8. TELE-2018 [8].

Adaptable technology is the algorithmic basis that is implemented in the first three stages of the creation of robotic systems: problem formulation, its formalization and algorithmic definition. The core of Adaptable Technology is presented by its Adapter, which defines the pragmatics (usefulness), syntax (structure), semantics (content, meaning), context (user environment) and examples of elements of ROBO-intelligences. The main topic is the use of adapters in defining the top-level elements of ROBO-intelligences through its lower level elements and, possibly, recursively, by itself. The adapter is the tool, the engine of Adaptable Technology to create ROBO-adaptive intelligences.

The developed Adaptable technology, composed of Adapters and Information Systems, for creative, emotional and sensual ROBO intelligence forms the algorithmic basis of the energy data warehouses for creating ROBO-intelligences for the robotics industry, of the new generation of artificial intelligences.

A special type of Adaptable Evolution Method (AEM) was used in the process of algorithmically defining the characteristics of ROBO-sensual negative intelligences. AEM was developed to be used for adaptable algorithmic processing of the main sensual negative robotic characteristics: Pride, Wrath, Sorrow, Deception, Misery, Glory, Cowardice, Hatred, Arrogance, Greed, Envy, Vanity, Lust, Fear, and Greed. The obtained top-level elements of negative sensual ROBO intelligences were algorithmically adaptable defined with the help of the specially developed AEM.

At the TELE-2018 were discussed research results concerned to the investigations in the next research directions: (1) Artificial Intelligence, E-Society & Business Solutions, (2) Information, Knowledge, and Robotic Consciousness, (3) Artificial Intelligence in Consciousness Society, (4) Artificial Intelligence in SMEs, and (5) COST Activities for SMEs & Consciousness Society.

There are investigated the measure of intellectual and spiritual human features, the physical places of the brain from where such features are directed and managed, the type of signals and its intensity these places produce. Such investigations are in the great

interest for the mixt teams of researchers from the biology, psychology, physics, nano-technology, bio-informatics and other sciences. Results of such investigations represent the **digital basis** for the adaptable algorithms of reproducing the intelligent and spiritual robotic features.

Intelligent robots have to have the creativity's evolutional features, which depends from the intensity of corresponding intelligent signals. Spiritual robots have to possess emotion and sensual features. Its algorithmic adaptation depends of digital emotion, temperament, and sensual correspond **digital basis.**

9. TELE-2019 [9].

The intergenerational cooperation in a collective is based on the physical, intellectual and spiritual activities of the staff composed of people of all ages. The subject of intergenerational cooperation in general and the specificity of the interaction of the lucrative component of the Society with the elderly constitute the permanent and prospective concern in the European Community. In the European Union, over the last two decades, there have been communities of Scientific and Technological Organizations (COST), which have as common goal: solving the problems of intergenerational cooperation. One of these communities is COST CA 16226, in which activates 38 organizations from the EU and co-partners from other Countries of the World, including the Republic of Moldova, which is represented in this COST by ASEM.

The major goal of COST CA 16226 for the years 2018-2021 of activity is the research and implementation of measures to improve the lives of elderly people, the creation of Associations and Communities for the sustainable well-being of people aged 65+ and of the third age, and the radical change of the correlation of physical (material), intellectual and spiritual intergenerational activity in the European Society.

At the **TELE-2019** were discussed research results concerned to the investigations in the next research directions: (1) "Age-friendly communities in Human-Robotic Society", (2) "Science and Art in Consciousness Society", (3) "SMEs in Consciousness Society", and (4) "ARA and TELE in Knowledge and Conscience Societies".

Are investigated the life conditions of the elders in future society – the society where the number of workers in comparison with the number of older people will be in continuous lineage and the problem of older people will be too important for society. Researchers proposed a set of measures to develop the SMEs for the elders, SMEs for women and girls, and the SMEs for the young people which will support the Age Friendly communities in the Human-Robotics Society.

The teams of researchers from the American-Romanian Academy of Arts and Sciences, the Academy of Economic Studies of Moldova, the AFEDEMY from Netherlands, the "Vasile Alecsandri" University at Bacau in collaboration with international teams of researchers proposed the decisions for problems of life of Elderly in the Future Society - the Society of Consciousness.

10. TELE-2020 [10].

When developing complex policies of society it is necessary to take into account the social, political, economic, normative, cultural, informational and health aspects of the ageing society. Policies that provide for investments in social programs, human resources and in the economy in ASEM will help prevent unjustified dependence of people in old age. Early and effective investments contribute to the transformation of the aging society of ASEM from a factor of consumption of resources into a creative factor of development of the human, economic, social and cultural environment.

Senioral intergenerational cooperation requires the research, invention and implementation of innovative methods to support the sustainability of the well-being of retired teachers from the highlighted groups of people – the seniors from ASEM **[12]**. The continuity of the intergenerational activity at the transition of the person from one group of seniors to another requires the resolution of the psychological state of the pensioners: the person is psychologically overloaded, he is "at the crossroads" of the transition from one

category of activities to another.

The **TELE-2020** theme reflects the requirements of the society of robotic involvement in the lives of the elderly: "Intelligent systems with creativity and emotionality"; "Artificial Intelligence to help the Elderly"; "Smart robots"; "Morality and Spirituality in the Digital Age." We present just a few of the topics addressed by the researchers for the current TELE-CONFERENCE: " ASEM is my home " & " My house is EMSA ": New paradigm; Intelligent waste sorting system; The arrival of the homo-intelligence paradigm and new forms of work organization; Practical expertise in building a secure network infrastructure; Robotic assistance for the elderly and people with disabilities; Automation of the legal process; Acrobatic intelligence; Old age in the digital age; Adopting a healthy lifestyle in the Society of Consciousness.

The scope of the topics addressed is to meet the requirements of Europe's ageing population while promoting healthy and safe ageing. Research is aimed at creating methods to improve the lives of all the elderly and, first of all, professionals who have reached the retirement age (hereinafter referred to as seniors), the involvement of robotic technologies in the daily life of the elderly, the continuity of the work of these seniors in the same enterprise, in which the seniors are currently acting, and will act in the future until the deepest age.

11. TELE-2021 [13].

The communications to the International TELECONFERENCE of young researchers "Creation of the Society of Consciousness" (TELE-2021), 10th edition, 12-13 March 2021, represents the results of research and implementations generally carried out within COST Action CA16226: *Indoor Living Space Improvement: Smart Habitat for the Elderly* and COST Action CA19136: *International Interdisciplinary Network on Smart Healthy Age-friendly Environments*, and under the patronage of the Romanian-American Academy of Arts and Science.

The results of the research presented and selected to be communicated at TELE-2021 are structurally presented at the meetings of the 3 Plenary Sections and 5 Ordinary Sections of this international forum. TELE-2021 highlighted a set of research results in the research and implementation directions of the actions envisaged by the International Interdisciplinary Network on Smart Healthy Age-friendly Environments (NET4Age-Friendly):

WG1: User-centred inclusive design of age-friendly environments and communities,

WG2: Integrated health and well-being pathways,

WG3: Digital solutions and large-scale sustainable implementation,

WG4: SHAFE impact and sustainability: policy development, funding forecast and cost benefit evaluations, and

WG5: Reference Framework.

At TELE-2021, the results of research carried out in the research and implementation directions of the actions envisaged by COST Action CA16226: Smart Habitat for the Elderly (SHELD-ON), which intends to achieve specific objectives on Research Coordination:

RCO1: To define and provide all relevant inputs for the design and development of Smart Support Furniture and habitats from different disciplines: Health care, Psychology, Ergonomics, Construction, etc., and from the users: elderly, caregivers, etc.

RCO2: To design and create innovative ICT solutions that will be integrated into Smart Support Furniture and habitat environments.

RCO3: To design, develop and test smart support furniture and habitat environments according to user's needs and further validated by these users (elderly and caretakers) for an active ageing.

RCO4: To ensure dissemination, evaluation and exploitation of the Action's results together with establishing a strong network with the relevant industrial stakeholders.

At the TELE-2021 were discussed:

1. Psychology and Impact of Professional Transition Ecosystems,
2. Continuity of the intellectual and emotional activities of older people,
3. Sustainability of intergenerational friendly

environments,
4. Professional environments and communities of employees, associates and affiliates, and
5. Economic digital solutions in the context of continuous sustainable learning.

10. TELE-2022 [14].

At the International TELECONFERENCE of young researchers "Creating the Society of Consciousness" (TELE-2022), 11th Edition of 18-19 March 2022 were discussed the research results obtained in the Research Directorate: "The friendly interaction of adults in the continuous intergenerational cooperation in the workplace until deep old age".
For the year 2022, the Association "Seniors of AESM" and co-partners in Europe, in the research direction "Creating the Society of Consciousness", proposes the following investigative activities: (1) Designing age-friendly intellectual and emotional environments and communities; (2) Digital solutions and large-scale sustainable deployment; (3) Impact and sustainability of SHAFE: policy making, funding forecasts and cost-benefit assessments; (4) Healthcare, psychology and ergonomics of the professional ecosystems of employees, associates and affiliates; (5) Design and creation of innovative ICT solutions integrated into the smart support for active ageing, and (6) Digital economic development.
The TELE-2022 international conference was a real international success.
Older people "around the retirement period" in most cases want to continue their activities at work, where they have worked for a long time. That's what it's all about (1) persons employed in the labor force in the last 5-6 years before retirement (employees), (2) retired persons with continuous part-time activity at work (associates) and (3) persons retired without activity (affiliates). It makes sense to organize the continuity of the activities of these groups of adults at the "mother enterprise". It is also psychologically normal for adults to continue their activities by working together with young people in intergenerational communities. Such a community with the title: Association "Seniors of AESM" already activates for two years within the Academy of Economic Studies of Moldova (AESM).

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The Developement of Innovative Smart Solutions for Independent and Active Aging

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Abstract: The global population of retirees over 65 years of age is increasing, year by year. There is evidence that shows that this age group of pensioners prefer to 'grow old' at home even if this means being alone. The state welfare services that care for the elderly are in short supply. It is expected that smart technologies will not only reform the welfare services but in addition provide support for the elderly in their homes and support their independent living. Finding solutions to these two problems should become a priority in the developing countries. Here, there are weaker health and care ecosystems especially because formal home-care services remain underdeveloped and difficult to access, At the same time the number of informal carers is decreasing. The present study aims at supporting the understanding of 'How can innovation contribute in supporting health and care ecosystems in developing countries?' For this purpose, the study employed two perspectives: one provided by the experts and one by the summarizing the powerful evidence of the older adults' technology adoption studies with regard to aging independently. The study interviewed 13 experts from across Europe from the NET4Age networking which comprises experts in Health and Care and conducted desk research on the adoption of the new technologies by older adults and their next of kin. The study identifies the types of innovations which need to be adopted by the developing health and care ecosystems and the new technologies which should be available in the markets of the developing countries.
Key words: social sciences, health and care ecosystems, technology adoption, older adults, SWOT analysis

1 Introduction

In Europe the number of the population of retirees over 60 has reached 20% of the population. The post war baby boomer is now in her/his 70s. In the context of the Health and Care ecosystems which have significant shortcomings in terms of effectiveness, professionalism and readiness, we have asked: How can innovation support ageing well and independently in developing countries?

Globally, the focus on innovation increased as it promises to bring economic growth and social inclusiveness. For the last decade, research and white papers in innovation and technology diffusion began to flourish and, currently, there is a significant amount of

work which emphasizes the facilitating and limiting factors of innovative ecosystems on the one hand, and the older adults' and their families' adoption and effective usage of new technologies, on the other hand. Moreover, there is an urgent need of studies which focus on health and care innovativeness and technology absorption in developing countries. To the present, their needs and requirements have not commanded much interest. However, today there is globally a growing interest in studying innovation in health and care ecosystems due to sky-rocketing increasing needs and requirements of the new coming retirement of the Baby Boomer generation and their families.

Moreover, the innovation can be seen within a catching up strategy, which refers to developing a health and care ecosystem based on the Western model, while learning about its limitations and having access to the last updated technology. The strategy of 'choosing the own way' implies a qualitative understanding of the current situation and specificities while taking steps further considering the culture and current infrastructure. Hence, a strategy requires vision and values.

2 Theoretical backgrounds

The Health and Care developing ecosystems are merely existing in collectivist cultures or lay between a collectivist and an individualist culture. These cultures exhibit to a large extend group cohesiveness, which is often expressed through the extended family where members offer help and loyalty, strengthening the family-oriented paradigm. In order to measure the strength of the informal care, one can look at the degree of familialism paradigm through Hofstede Insights [1]. The ecosystems' framework of analysis is applied to countries comparatively much larger and advanced than countries still under development. There, ecosystems success stories are to be found, such as the aging well in Switzerland, Denmark or Finland. The most common explanation is that the small size of their domestic markets led to early economic openness to technology: small ecosystems can be more easily reforms as the periphery would not leg behind while the discrepancies are fading.

On the same par, according to evidence, the density of innovators and public communities' organizations in a given area enable higher rates of health and care development at a regional level, which make innovation sustainable, rather than reforming a whole country ecosystem. Hence, action is taken at small regional ecosystem levels, and thus, innovation and sustainability grow quickly without unbalancing the whole country ecosystem in case of failure or limited adoption [2].

Latest research studies show that the health and care ecosystems from the developing countries have the following commonalities: 1) Limited or no access to information and healthcare services, 2) Poor care and self-care at home, 3) Poor communication between patient and doctors, 4) Unequal access to technology benefits. All these lead to the following consequences: a) No diagnosis/ Self-diagnosis/ Disease aggravation, b) Critical treatment can be skipped and the older adult can be at high risk, c) Frequent users of ambulance services (high pressure on the system), higher rate of hospital emergency admissions, medical complications and re-hospitalization, d) Poor medical adherence: overmedication or undermedication, Non-compliance with doctor's instructions, doctors cannot have an overview and precise understanding of the symptoms which leads to poor anamnesis, e) Poor prevention and control measures in care at home [3, 4; 5].

If it takes political will to build an innovative health and care ecosystem, it definitely requires expertise and the careful consideration of the needs and technological familiarity in order to strengthen and give sustainability to the ecosystem through innovation. That would lead to the transformation and readiness of the health and care ecosystems in the developing countries.

3 Methodology

The study was based on a survey and desk research. The survey was conducted within NET4Age networking over the course of February 2022. The survey collected the opinions of the researchers across NET4Age European networking on 'How can innovation support ageing well and independently in

developing countries?' A convenience sample of 13 researchers across Europe participated in the survey and answered to 3 key questions asked. Their perspective has been completed which solicited barriers and facilitators to technology adoption from the older adults and their next of kin informal caregivers.

We employed a survey methodology because this approach affords the comparative analysis among the research inputs providing insight into the types of innovation, and different stages of their vision towards technology absorption. The researchers survey had a convenient sample of members. The sample size is moderate. No personal data has been collected so no informed consent was provided to the study participants. The survey has comprised 2 open questions which revolved around the central theme: 'How can innovation support ageing well and independently in developing countries?'

Here, we have considered if radical innovation should be employed, meaning that the system has to be restructured, or technological reforms should be taken, incremental innovation, for advancing the system performance. However, frugal innovation is another alternative, where points of focus are established in a top-down approach.

The following two questions have been asked:

1. Based on your knowledge and practice, what innovations can work even within a health-care system which has significant shortcomings in terms of effectiveness, professionalism, readiness etc.? (if you have no answer: What is your opinion of this situation?)
2. There are countries where the State cannot afford to meet the health care needs of its elderly poor and their carers. In these countries what innovations should be adopted by the elderly and their carers themselves which would increase their state of health, and/or their ability to be independent and/or their quality of life?

If this study aimed at contributing to a better understanding of what kind of innovation is needed from the experts' perspective, on the same par, the study looked for what is, from the end-users' perspective, the 'perceived usefulness' of the new technologies for the older adults and their caregivers, be they their families of the formal care service providers.

4 Discussion

4.1 Innovation in the health and care ecosystem from developing countries.

However, we look at how to encourage the growth of the health and care country ecosystems through recommendations for strengthening the adoption of the innovation and believe that the discrepancies between and within the ecosystems should be addressed through policies with a strong emphasis on culture, and not solely by promoting technological innovation. The cases of under-developing countries pose a challenge to the ecosystem frameworks, due to their disparities in development: there are sharp contrasts in technological innovation and culture as well. The policies are commonly biased, favouring technology adoption in underdeveloped national ecosystems and neglecting cultural differences and status-qua and contextual requirements which consider the differences in development.

Our participants categorized innovation in two groups: technological and non-technological innovation and some of them insisted on the importance of the last, given the underdevelopment of the health and care ecosystems and their prone to failure when it comes about absorbing radical innovation. Moreover, we found significant differences in the meta-analysis of the actual usage of the new technologies by the older adults given the differences between the health and care ecosystems. These findings emphasized that, on the one hand, innovation for health and care ecosystems in the developing countries has different missions and ways of absorption comparative to the innovation from economically advanced countries, and on the other hand, the technologies needed for ageing well also different, given the different needs of the informal care support. All this constitute powerful evidence of the value of creating and designing the vision of change in accordance to the contextual requirements, rather than planning a catching-up strategy of technology absorption which constitute sources of political, economic and technological non-readiness and hence, new sources of failures.

In order to reform the health and care national systems, some of the experts emphasised that social innovation without technology is needed. "New access and concepts for systematically health-care work and services, upgrading organisation and coordination even to develop new profiles or jobs - social effectiveness facilitator, special coordinators" (Survey, 2022). Integrated care is another point of focus of the experts interviewed so, using new technologies for health promotion and especially for integrated care. "Integrated care which helps both patients, family care givers and all the professionals. Bureaucracies can become more effective and leave a trail of responsibility if considered carefully" (Survey, 2022).

Informal care needs special attention, and it refers to using IoT for health monitoring and evaluation – supporting informal care-givers/ next of kin.

Data shows that older adults' technology acceptance and usage is still slow and lags behind expectations. At the core of technology rejection or limited use of technology are: 1) indifference or the lack of relevance of the new technologies, 2) age-related impairments, 3) deficient knowledge, (while cost is not a key factor anymore). Informal carers' technology optimal usage lags behind expectations because:

The new technologies are lacking relevance to the informal carers while targeting older adults who are already cared for. Data is provided without interpretation (hence, monitoring became irrelevant);

A vision for integrated care is needed, where stakeholders are involved, though at primary level: community and non-governmental or social business organizations and not at an ambitious level (local communities, businesses, technology developers).

4.2 Innovation in the informal care context

There are complex limiting factors at play into the adoption of a top-down approach with respect to absorption of technology, which mismatch between technologies and older adults' and their families' needs. A user-centred design approach should be employed in order to identify older adults' perspectives regarding the new smart technologies and gauge interest in participating in the co-design process. Identified barriers to technology use included low technology literacy, including lack of familiarity with terminology, and physical challenges, which can make adoption difficult. Facilitators included an eagerness to learn, interest in co-design, and a desire to understand and control their data. Most participants identified as privacy pragmatics and fundamentalists, indicating that privacy is important to older adults. At the same time, they also reported a willingness to contribute to the design of technologies that would facilitate aging independently. There is a need to increase technology literacy of older adults along with aging literacy of technologists.

Latest studies [6,7] bring evidence that an innovative combination of acoustic sensing, artificial intelligence (AI), and the Internet-of-Things (IoT), is a cost-effective way for alerting care providers when an older adult in their charge requires help. Home mobility monitoring systems in visiting nursing practice proved to be a supportive tool for monitoring daily activities in community-dwelling older adults [8]. Actually, since a decade ago it is researched the monitoring of the sound environment where outliers (abnormal situations) are identified in order to decide for emitting an alarm wither to the formal or to the informal care providers (Strauss et al., 2008). The focus of the development of the new environmental technologies is on reducing cost and increasing reliability.

Some research shows that costs of the new smart technologies should not be high as long as we draw from the technologies which have been already adopted. For example, Istrate et al (2008) has shown that an embedded PC, equipped with a classical sound card and a microphone, is capable of real-time detection and analysis of sounds to detect abnormal situations. Hence, the system was found to be reliable for detecting and classifying sounds at signal to noise ratios of 10 decibels (dB) or more, with an error rate of 5% or less. However, it was less efficient at sound and speech recognition [9].

Most of the remote monitoring systems are non-intrusive as privacy is a very important point of concern for the older adults and for their caregivers as well. According to [10], the advance of artificial intelligence provides unique opportunities to provide health monitoring and assistance for older adults facing difficulties to live independently in their homes.

That includes the correlation of the following technologies who aim to do activity recognition, activity discovery, activity prediction, and prompting system.

Changes in the intensity of the daily activities correspond to exacerbations of mental illnesses including depression and dementia as measured by standard health assessments (Geriatric Depression Scale, Mini-Mental State Exam, and the SF-12 Health Survey). The densities can be used to alert clinicians to changes in mental health status the theoretical section, there are two perspectives which can be employed when envisioning the reform and strengthening of the health and care ecosystem in developing countries in order to meet the new societal challenges as well as benefit on the last advanced research: 'catching up' and 'doing their own way'allowing for early interventions assisting residents to age in place.

Social isolation is the highest risk factor for functional and cognitive decline and, more it is the greatest fear of the older adults and their families. Goonawardene et al [11] show how a non-intrusive sensor-based monitoring system comprising of motion-sensors and a door contact sensor can be utilized to detect elderly who are at risk of social isolation. They have found that the overall social isolation level of the elderly and the time spent in the living room is positively associated with the emotional loneliness level. Further, elderly who perceived themselves as socially lonely tend to take more naps during the daytime.

Based on the survey' results, we distinct between type of innovations and the sectors where they are most needed. Generally, according to the expertise, no radical innovation should be undertaken in the formal care sector, while, in order to strengthen the informal care sector, radical innovation is needed and can be incrementally adopted.

If the first perspective employs the incremental adoption of the innovation in order to induce gradual change into the ecosystem, the second perspective shows its strengths and weaknesses, as well as threats and opportunities, in a different approach. Hence, the survey results are shown in the SWOT analysis presented below. Hence, we should further understand that 1) in the developing countries, frugal innovation should be considered and not disruptive innovation; 2) Social innovation without technology should be considered in order to develop new job profiles and gaps in the community services provided, 3) Due to the weak formal care ecosystem, health promotion should be considered; 4) Developing Integrated care should be a priority, instead of strengthening formal care at the expense of informal care sector, 5) The new technologies should target and look to strengthen the informal care sector.

From the experts' perspective, the types of innovation needed within the Health and Care Ecosystems in the developing countries, from the experts' perspective (Survey, 2022) are as following:

Formal care: Social innovation without technology is needed

Integrated care: Using new technologies for health promotion and especially for integrated care

Informal care: Using IoT for health monitoring and evaluation – supporting informal caregivers/ next of kin.

A SWOT Analysis of the Health and Care Ecosystem in the developing countries, from the experts' perspective (Survey, 2022).

Strengths: informal care/ family-oriented paradigm

Weaknesses: overall weak technology adoption by formal care providers and older adults

Threats: overburdening of formal and informal care

Opportunities: innovation without technology and frugal innovation for supporting the informal carers.

It is relevant to mention here that the threat identified based on the SWOT analysis can be overcome by the smart new technologies, while developed based on the end-users' requirements.

We have shown that the degree of development of the health and care ecosystems plays a key role, nd so does the psychological factors when deciding the relevance of the new technologies to the older adults.

Research limitations/implications: This paper undertake the discussion around technology acceptance by the older adults, but most of the research evidence is drawn from the European cultural context.

Practical implications: In this paper we argue that the technology developers should take into consideration the facilitating and limiting factors of the technology

acceptance, and that beside the end-user implications in the co-creation process, facilitators should be included into the teams for assuring the information flow among the end-users and the business and the technical teams.

Originality/value. The present communication adds a new dimension by considering the acceptance and adoption of new technologies based on the degree of development of the health- and care-ecosystems within which the new technologies are developed.

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Comparative to other monitoring systems, those based on sensors have a higher rate of acceptability. In the future, we need to determine a more simplified view of self-management.

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Lifelong learning and digital inclusivity of older persons in Moldova

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Abstract: The article presents a tangential analysis of the demographic changes that are accelerating the aging of human resources, lifelong learning, and the development of digital skills in the context of active aging. Lifelong learning and digital literacy in late adulthood deserve more attention in the condition of various changes and our longer life. In the Republic of Moldova, the potential of the elderly is poorly tapped in terms of economic productivity, although among seniors there is a high level of education. At the same time, lifelong learning and digital literacy are not a priority at the individual level, although sectoral policies are adjusting to the principle of active aging and the achievement of nationalized SDGs Goals. The article highlights the current situation but also the barriers to lifelong learning and the development of ITC skills among the elderly population.
Keywords: older persons, lifelong learning, active ageing, digital literacy /inclusivity, SDGs Goals.

Introduction

In the context of accentuated demographic processes, marked by a performance of humanity such as increasing the longevity of life, but also of rapidly developing technological innovations, the issue of lifelong learning and digital literacy becomes imperative for all countries. Technological change demands stronger and more continuous connections between education and employment. Technological advances are increasingly becoming entrenched in our lifestyles and are accelerated by the COVID-19 pandemic.

As in all of the countries in the European region, older people are a large and growing part of the population, and this is changing our societies in fundamental ways. Older persons wish to be active participants in their workplaces and communities, but in many cases, opportunities and facilities are not available or accessible.

From the perspective of demographic changes, the Republic of Moldova has a rapid depopulation which, according to forecasts [11], will evolve in the next two decades. In the coming decades, demographic aging will increase as a result of the return of older adult migrants. It endangers national security and undermines opportunities for sustainable economic growth if the full potential of the older adult population is not realized and their integration into contemporary technologies is not facilitated. Thus, the growth of the generations aged 60 and over is projected – by 2040, their share will reach 32.3% (Table 1). By 2040, generations aged 50 and older will be about half of the total population. The median age will increase from 37.3 years (in 2020) to 47.3 years (in 2040).

Age groups (years)	2025	2040
50-59	13	18.9
60+	25.4	32.3
65+	18.2	24.4
70+	11.1	17.2
80+	2.3	5.7

Table 1. Projected population structure aged 50 and over, by age groups in 2025 and 2040, Moldova, % Source: [12]

The perspective of aging and lifelong learning in Moldovan policies. Moldova's commitments have evolved over the past two decades, with a mix of proactive and adaptive policy interventions in the field of population aging. For the alignment with the Madrid International Plan of Action on Aging (MIPAA) and the Regional Strategy for the Implementation of the MIPAA (RIS), the Government of the Republic of Moldova has developed The program for the integration of aging issues in policies, completed over the years (2007-2011; 2012-2016; 2018-2021) with an Action Plan in the field, and adapted the international methodology for calculating the Active Aging Index (AAI) [15] and elaborated two editions with the support of UNFPA Moldova in 2016 and 2020 [2].

The perspective of aging has been integrated into the cross-cutting areas whose national action plans partially target the elderly population: Moldova-2030 National Development Strategy; National Health Strategy 2030; National Employment Strategy, 2017-2021; National Strategy for the Development of the Youth Sector 2020; National program in the fields of research and innovation for the years 2020-2023 - strategic direction Migration, diaspora, and socio-demographic changes. Virtually all ten strategic dimensions (income level; living conditions; working conditions; level of education; health; social climate; use of time; quality of government; public safety and security; quality of the environment) and the priorities set out in Moldova 2030 Strategy emphasizes the vulnerability of older citizens.

Continuing education, including in the workplace, helps workers to adapt quickly to constantly changing conditions. The *National Action Plan for the integration of active aging issues in policies (2018-2021)* includes the commitment to promote Lifelong Learning [6] and adapt the education system to be resilient to economic, social, and demographic changes. Based on good European practices, which aim to provide good education throughout life, mentoring, employment opportunities for the elderly, the *Concept of the Adult Competency Guarantee Program* has been developed [8]. However, in the context of the barriers imposed by the intensified socio-economic crisis and the onset of the COVID pandemic, testing of the program, including the initiation of training courses for the elderly, has been postponed. In 2019, the Concept of Adult Education has been developed but has not yet been subject to public consultation. The benefits of adult education are not fully realized, especially for the elderly, although various actions are planned in the field of education for the elderly, particularly at the local level, they are not being implemented.

In national studies, topics related to lifelong learning are poorly analyzed, being highlighted recently with the nationalization of the SDG goals and the adjustment of the 2030 Agenda [1].

Lifelong learning and digital literacy among older adults. Speaking about the situation of the old population in the Republic of Moldova based on estimations of the Active Ageing Index – less than one-third of the total potential of the population aged 55+ can participate in the economy and society and over 70% of this potential is unused, with low chances to age actively and contribute to the economy through paid activities (Table 2). So, in 2020, the value of the Index estimated for Moldova was 28.6 points out of 100 (maximum value), being the lowest compared to the position of the EU countries.

	Total	Male	Female
Moldova AAI*	28.6	30.5	27.1
EU average AAI	36.8	38.5	35.3

Table 2. Projected population structure aged 50 and over, by age groups in 2025 and 2040, Source: *[2]; [4]

The active ageing framework [16] acknowledges that lifelong learning is an important factor that facilitates participation, health, and security, as people grow older. At the same time, lifelong learning is an important component in facilitating longer working lives as an important policy objective for mitigating fiscal pressures from population ageing, notably increasing pension and healthcare expenditures. In the Republic of Moldova, to prolonging the economic activity of the population that has reached retirement and early retirement age is a problem. Statistically, only 1/4 of the population aged 55+, is integrated into the labor market. At the same time, this category of the population has a relatively high level of education (Figure 1). Three out of four have at least general secondary education. To mention that the EU average of this indicator is lower – 67.7%, however, Moldova is overtaken by some countries in the region. But the general situation on the labour market in the Republic of Moldova, where the employment rate for economically active age (15-64 years) stays low (45.7% compared with 67.6% – EU average) with low opportunities for integration, impacts the current reality for older population.

It should be noted that the relatively high level of education among the older adults is the result of the educational program applied until the collapse of the Soviet Union, namely the compulsory general secondary education and the encouragement of vocational education.

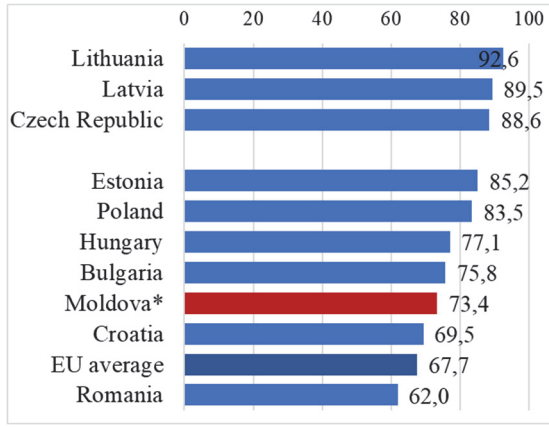

Figure 1. Educational attainment (at list general secondary\vocational) among people aged 55+, the year 2020, Source:[9]; [4]

So, the distribution of people aged 55 and over by the level of education attests that over 14% of them have higher education, almost 18% postsecondary vocational education, and every fifth secondary vocational education.

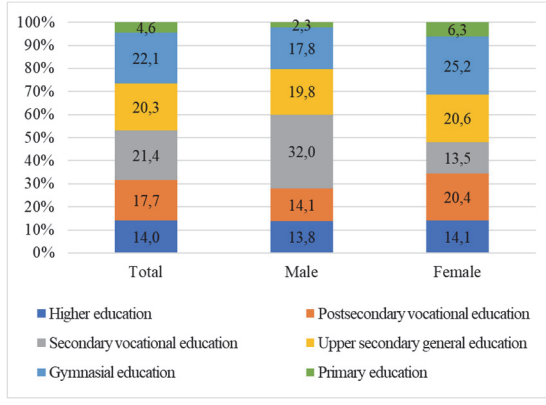

Figure 2. Distribution of people aged 55 and over, by the level of education and gender, Moldova, 2020, Source: [9]

Differentiated by gender, it is seen that women have a higher level of education and training, however, gender inequality in the labor market is evident - the employment rate of women aged 55+, is only 18.5%, while among men it is over 30%.

Recently, there has been a slight increase in the share

of the Moldavian elderly population involved in lifelong learning activities. In 2020 it was 2% for the population aged 55 and over, while in 2016, the indicator estimated only 0.3%. In a comparative aspect, the lifelong learning rate among the older adult population in EU countries is 5.3%. The Northern European countries are the most advanced in the field, where between 14%-20% of persons aged 55+, are involved in educational activities.

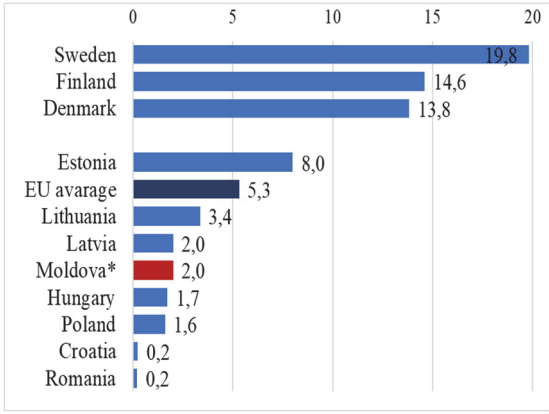

Figure 3. Lifelong learning among the population aged 55 and over, the year 2020, Source: [9]; [4]

In Moldova, the adult population poorly understands both the concept of lifelong learning and the process itself. In the general perception, lifelong learning is limited to professional development courses among the employed population. According to studies [5], only 13.2% of the employed population and 8.4% of the inactive population would be interested to benefit from new opportunities for learning and skills development. Among the population, aged 60+, motivated for new formal studies are about 5% and for informal studies over 2%. The main barriers highlighted by seniors (aged 60+) to continue to learn are *health* or *age* (30.4%) and *training costs* (18.5%).
At the moment, in promoting lifelong learning for older adults, the main implication has the civil society. Starting with 2020, there are developed five Centers of Education for the elderly. The main activity of centers is focused on: training in the use of modern information technologies; information activities on the rights of the elderly; craft workshops; seminars on employment and self-employment opportunities for older people. At the local level, about 150 territorial public libraries offer modern services such as: "50+", "Club for seniors", "Aging healthy" etc. [3; 10].
As we are living longer, our world is becoming increasingly digital. Lifelong learning helps to maintain the equilibrium between life and technology driven change in the world. Digital competence is becoming a necessity in order to succeed in everyday tasks. According to the International Telecommunications Union (ITU) in the last 15 years, the connection to the Internet has quadrupled, in 2021 already 2/3 of the world's population has been Internet users [17].

	2016	**2020**
Poland	80	90
Hungary	79	88
Romania	72	86
Azerbaijan	77.2	84.8
Georgia	70.1	83.8
Belarus	66.7	80.3
Ukraine	54.0	79.2
Bulgaria	64	79
Moldova*	**51.3**	**64.6**
Armenia	61.2	
CIS		*76.4*
Europe		*85*
EU-27	*84*	*91*

Table 3. Percentage of households having internet access at home, in 2016 and 2020; Source: [7]; [9]

Compared to the countries in the region, Moldova has the lowest internet connection rate of households - about 65% in 2020 (Table 3). The average for CIS member countries is 76.4%, and for EU countries - 91%. Information and communication technologies (ICTs) can enable healthy and active ageing by facilitating access to information, health and healthcare, socio-economic participation, and other

factors that promote full engagement and participation as we age.

In the last five years, strengthening ICT skills among older adults was the most obvious progress in achieving the nationalized SDGs reflected in the composite indicators of active aging.

In Moldova, the share of people aged 55-74 who use the Internet at least once a week is about 47.2%, is lower compared to EU countries - 57.5%, but higher than some countries in the region such as Hungary, Poland, Romania, etc. (Figure 4). To mention, in the last five years, strengthening ICT skills among older adults was the most obvious progress in achieving the nationalized SDGs reflected in the composite indicators of active aging.

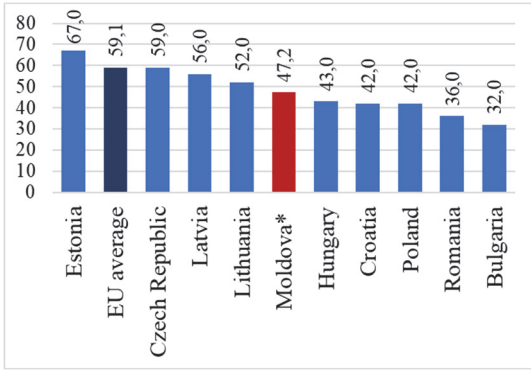

Figure 4. Share of ICT users at least once a week among population aged 55-74 years, 2020, Source: [7]; [13].

The Generation and Gender study, conducted in Moldova in 2020, shows that the share of ICT users decreases with age [13]. If at the age of 55-59, about 2/3 use the internet weekly, at 75-79 years - every seventh.

There is a significant discrepancy in areas of residence. Older adults from villages uses ICT less often than those in the cities. Gender differences are more pronounced up to the age of 65-69, among women the share of ICT users is higher compared to men, but in older ages the situation reverses.

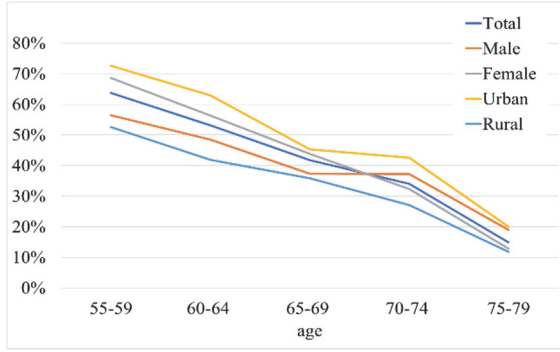

Figure 5. Share of ICT older adult users by age, gender and area of residence, 2020, Moldova, Source: [13].

Through the qualitative study [3] we can see that the digital literacy of the population in old age is poor and does not focus on complex digital skills:

- most have only basic knowledge, but they don't know how to do a banking operation, how to pay online, or to buy online, etc.
- using the internet and available gadgets is considered sufficient if they can see their adult children and grandchildren through a social media platform.
- older people in cities are more open to training than those from rural are;
- at the same time, there are no Wi-Fi hotspots in many villages, so there are few opportunities to use IT;
- a significant discrepancy in the access to information of the elderly by the area of residence is evident. Only a few people know about the existence of different projects, laws, strategies that support old people, social assistance services, etc.

In the context of the Covid pandemic, the opportunities and reduced digital skills of the elderly population have insufficiently compensated for the interrupted social contacts for the elderly, thus leading to increased loneliness and psychological stress among them.

Conclusions

Lifelong learning, along with formal education and digital literacy, is an important factor that facilitates participation, health, and security as people grow older. Recent studies highlight the presence of the link between later-life learning and psychological wellbeing and suggest that continued engagement may

help older learners sustain wellbeing over the long term. Preparation for old age should begin much earlier, with the transition to adulthood.

Although the share of people involved in lifelong learning activities is increasing compared to 2016, lifelong learning is still a poorly developed area and still little promoted in the Republic of Moldova. In Moldova, the main persistent barriers for Lifelong Learning for older adults are:

Underdevelopment of the labor market in the Republic of Moldova, insufficiency/lack of jobs, especially in rural areas is a major barrier to prolonging the economic activity of the population in the retirement age and preventing early retirement.

Incomplete regulatory framework for the organization of adult and senior education, which would ensure the conditions for continuing education, including in the workplace for rapid adaptation to ever-changing technologies

The benefits of adult education are not fully realized by the adult population, especially by the older population.

Insufficient access for adults to education, especially informal education.

Work and family time balance and responsibilities.

The cost of formal/nonformal studies

The passivity of the local authorities in the implementation of the activities related to the lifelong learning of the adult population.

Although the aging of the population is a priority area for the government and raising the standard of living is on its agenda, it is far behind. Older people face multiple problems in their daily lives, with reduced opportunities for involvement in social life, participation in the labor market, reduced access to basic services, which undermines the right of this category of population to a decent and independent life. Promoting the learning of older adults in the Republic of Moldova is a complex process, which involves changes in perception and attitude; restructuring in the education system; extension of the attributions of the relevant ministry; reconceptualizing the process of professional training of teachers and the mission of the educational institution; creating an attractive and accessible educational offer for older adults. This complex change requires the responsibility of the education system to take responsibility and integrate into structures and services for the learning of older (retired) adults.

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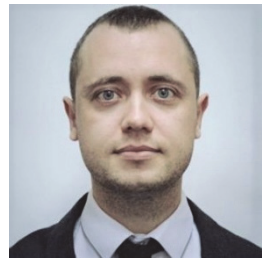

Sustainable cybersecurity training for modern society

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Abstract: The ongoing training of the whole cybersecurity (CS) culture of the whole society level starts with the classification of users, continues with the definition of the needs/areas of CS, the identification of the appropriate forms and tools of training. And maintaining a strong CS culture is possible only through a continuous process of updating, measuring, assessing and repeating training. The paper aims to promote a conscious and responsible attitude towards continuing and sustainable Cybersecurity education by training target groups, such as broad masses of end-users outside corporations, corporate users by categories, including CS professionals by fields and types of industries.

Keywords: Cybersecurity, Awareness, Training, Education, Professional Development, Certification.

1 Actuality of Cybersecurity

Today we live in a dynamic and interconnected global information environment, based on modern information and communication technologies *(I&CT, shortly IT)*: Personal computers, Tablets, Smartphones, iPhones, IoT/IoB *(Internet of Things/Internet of Bussines),* Smart home, Internet, Web, Social networks, Cloud computing, electronic payments, Online education, Distance learning/working, etc. If 20 years ago online presence was more of a style, today, online presence has become a vital necessity: presence on various social networks, official sites, business, education, games, entertainment, various insecure objects connected to the Internet; the massive online transition, much accelerated in the last 2 years by COVID 19, Internet and Web, electronic transactions in cyberspace, regardless of the business size. People, organizations, businesses want easy access to everything from products to services and transactions, including access to information, often just a "click away". Systems, people, and related devices exchange huge amounts of data, documents, photos, audio, video, and more.

Simultaneously with the expansion and penetration of IT in all spheres of human life, ranging from a simple smartphone to complex information systems that manage critical infrastructure, cyber threats are constantly evolving, affecting everyone. Also, cyber risks give rise to geopolitical, economic, national security, reputation and privacy issues. Threats are becoming more sophisticated and growing exponentially. Despite an excessive tendency on focusing CS only on the technical-technological aspect, it is based on three pillars: "people, processes and technology", the weakest link being the human component. Only technical measures for more than

twenty years have ceased to be sufficient for safe operation in cyberspace. Any connected entity and/or network user may face cyber-attacks: spear-phishing, spam, scam, ransomware, malware, Denial-of-service attacks *(DoS)*, *DDoS* – Distributed DoS, *PDoS* – a Permanent Denial of Service and *TDoS* – a Telephony Denial of Service, three types of DoS attacks, that can compromise telephone system, computer hardware, theft of information or identity, etc., used by attackers for scam, money laundering, industrial espionage, etc. Currently attackers avoid "classic" attempts such as intrusion, DDoS, etc. Instead, they prefer attacks on people: either employees or customers, or third parties, often combining phishing and social engineering.

The aftermath of today's cyberattacks can be:

- Damaging the reputation of a company/person by changing a brand on the Internet, distorting a website, etc.;
- Withdrawal of funds, such as embezzlement of bank websites and ransomware;
- Espionage to steal company or government secrets;
- Total sabotage IT/Information Systems *(IS),* infrastructure blockage.

Faced with sophisticated attacks, politicians are beginning to realize that the response to the CS must also be state-led. Thus, for more than twenty years, CS cybersecurity has become an issue, which all leaders and those responsible should take into account on a permanent basis to ensure a secure and stable cyberspace as the basis for the functioning of modern society.

Private, state-owned enterprises, government agencies, both large and medium and small - are all vulnerable to cyber intrusions. Cyber-risks and attacks target all interconnected individuals/private and legal entities, national economies, critical national and corporate infrastructures and all valuable information assets.

All entities that process sensitive data must implement advanced cybersecurity systems. At the same time, by virtue of global connectivity, CS also refers to all interconnected users, not just the people responsible for the organization and management of CS. According to [1] at the beginning of 2021, there were almost 4.88 billion Internet users or over 67.1% of the world's population, with over 27 billion networked devices spending an average of about 3.5 hours a day on the Internet. On social networks alone, about 4.55 billion Internet users or 57.6% of the world's population are present on a daily basis, their number being constantly increasing by 409 million annually.

2 Awareness, training, education is the key of cybersecurity

Several researches in the field of CS focus on the "human factor", in the context in which people are considered the weakest link, one of the main weaknesses exploited by cyber attackers. Researchers associate 70% to 95% of CS incidents undergone by states, organizations, individuals due to human error.

According to a study by IBM, Cybint and others, "Human error is the main cause of 95% of Cybersecurity breaches. In other words, if human error was somehow eliminated entirely, 19 out of 20 cyber breaches may not have taken place at all" [2]. Human error occurs either because of a lack of qualification, or because users fail to adopt safe CS practices, or because they are unaware of the risks of CS, or because they do not understand the implications of violating security procedures, or because they do not understand how which they must act on, etc. Such errors include poor passwords, disclosure of sensitive information on social networks, neglect or carelessness regarding certain emails and phone calls, misuse of corporate IT resources, and so on. According to the same study and NIST [3], the key to reducing losses due to the human factor is the proper training of users of any level, each according to its role and needs *(Fig. 1)*.

NIST intends to upgrade SP 800-50 published in 2003 [3] to include privacy and add potential by consolidating with SP 800-16 (Information Technology Security Training Requirements: a Role and Performance Based Model), originally launched in 1998 and revised in 2014. The new proposed title for up-to-date version SP 800-50 Revision 1 is "Building a Cybersecurity and Privacy Awareness and Training Program".

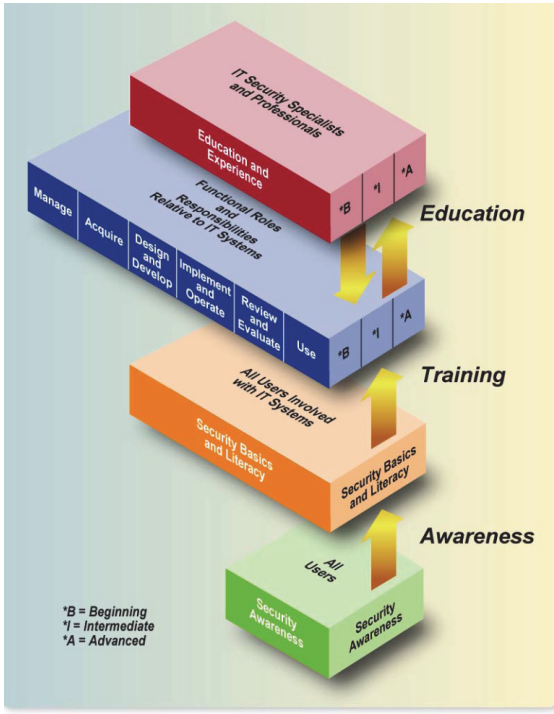

Figure 1. The IT Security learning continuum [3]

Online security has become one of the most pressing issues in the modern world, and cybersecurity awareness has become a vital necessity for everyone. Ongoing and sustainable training for the protection of IT users in the dynamic cyberspace is becoming increasingly important against the background of the increasing number of significant incidents of CS and the growing dependence on IT. This fact is recognized globally by adopting the numerous standards and recommendations of good practices, developed by ISO, IEC, ITU, NIST, ISACA (Information Systems Audit and Control Association, founded in 1967 in USA, *www.isaca.org*), ENISA (European Network and Information Security Agency, founded in 2004, *https://www.enisa.europa.eu*) etc. to steer institutions and organizations towards organizational e-transformation capable of responding to cyber-attacks, fact confirmed by the ever-increasing demand for Cybersecurity culture training programs.

Correct use of terminology

A lasting formation of the CS culture starts from the clarification of the terminology. The fields of security are booming, the terminology has changed significantly over the years, with many different meanings and connotations [4]. There are currently dozens of related terms in the world related to computer/digital security, security of IT, IS, IoT/IoB, Cloud Computing Security, computers, information, corporate network, critical infrastructure security, etc. On the other hand, there is a lack of a clear relationship and delimitation between the different concepts of security.

Indeed, the great diversity of terms can overwhelm anyone. People often confuse the concepts of computer security – information security – Cybersecurity, etc., do not have a clear vision of the boundaries and relationships between them. In fact, although these concepts are closely related, they differ a lot in terms of tasks, areas of coverage, functions, etc. Briefly, information security includes all other types of security as interdependent architectural components (Fig.2).

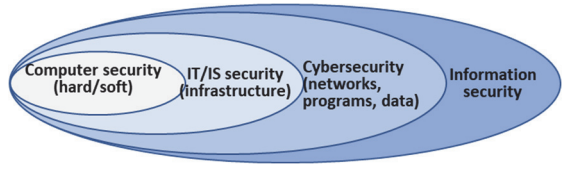

Figure 2. Correlation of security components

Information security, generally, refers to the **security of any information assets**, including paper documents, oral, voice, verbal, visual, digital information, mobile, media, etc. At the highest state level, this includes various other issues, such as media security, propaganda, censorship, social manipulation, cyber espionage, etc. Formally, information security is defined in the standard ISO/IEC 27000 [5]: Information security involves ensuring the protection of the fundamental characteristics of information: **Confidentiality**, **Integrity** and **Availability**, in the literature referred to as the **CIA triad**. However, in addition to preserving the CIA triad, various regulatory bodies e.g. *ISO, IEC, ITU, NIST, ISACA, ENISA,* etc.

require the assurance of other additional CIA-based attributes, such as the **right to possess information**, **the authenticity** of information *(ensuring that a message, transaction, or other exchange of information comes from the source it is claimed to be),* non-repudiation *(inability to deny the issuance of information and easy verification of the issuer),* reliability *(degree of trust)*"[5-8] and others. In turn, the field of information security includes Cybersecurity, IT/IS security, etc. up to the lowest level of computer security, media, codes used, etc.

Security of computers/operating terminals managed by end users, often connected to the corporate network via the Internet, in fact it refers to any smart device, with working memory, processor, operating system, including mobile phone and is the main target of attack hackers, viruses, spam, scams, phishing, social engineering, and many other threats, which come mainly from the Internet. Usually, at this level, protection is implemented by reducing certain organizational or technical-technological security vulnerabilities in computing and telecommunications systems, including devices for storing, processing and transmitting information mainly through configurations.

IT/IS security is self-contained and is based on computer security, but is not limited to purely technical-technological security. In addition, it includes many other related tasks, such as compliance with security requirements, information risk management, IT/IS security performance management, business continuity, etc. These and other similar tasks of IT/IS security require the skills of economists, managers, lawyers, financiers, psychologists, teachers, etc. Thus, IT/IS security goes from the purely technical-technological level to the competent management level of IT/IS and, sooner or later, it comes down to information security in understanding the standard ISO/IEC 27001 [7].

Cybersecurity [8] is the most ambiguous term, often being assigned to one or more of its wide ranges of related areas, e.g., physical and logical security of software and technical infrastructures, computer security, network security, technology security, IT/IS security, human component security, etc. Some people think that cybersecurity is the same as IT/IS security or information security or computer security. Others consider CS to be a new level of IT/IS security in the Internet environment.

Briefly, Cybersecurity means information security in control systems and/or complex information systems and, in any case, is reduced to information security management within the meaning of ISO/IEC 27001. Both concepts refer to CIA preservation, but also to protect other secondary properties based on the CIA triad. However, while *CS refers to a threat which may exist or not in cyberspace*, e.g., protection of social media accounts and other active in digital format in cyberspace, *information security refers to both digital and non-digital information in physical format*, e.g., paper., oral, vocal information, etc. CS is the largest and most important part of information security, covering about 95% [4].

In essence, SC covers a set of methods, technologies, and processes designed to protect the integrity of networks, programs, and data from digital attacks. In practice, CS refers to the protection of the CIA triad only for the valuable information and data of the company, circulated in cyberspace. From an architectural point of view CS consists of a very complex and varied set of problems with the operation of IT/IS software in cyberspace, data protection, systems and related infrastructures, in order to keep them safe anytime in order to ensure business continuity, either before, during, or after an unwanted attack or incident. Issues can range from simple, narrow, such as enforcing configuration standards, investigating incidents to the most extensive and complex, such as performance analysis and continuous improvement of information security.

Other variations in the interpretation of the concept of "Cybersecurity" according to ISO/IEC 27032 [8] emphasize the human component: protection

against political, physical, spiritual, emotional, educational, professional, psychological and other influences, as well as the consequences of urgency, errors, accidents, damages, injuries and other events that take place in cyberspace, which are considered undesirable. The set of conditions under which all objects in cyberspace are protected from the maximum possible number of known threats, as well as from impacts with undesirable consequences.

From the paper, the terms CS and Information Security can be considered synonymous because their functions are largely intertwined, but their fine line of demarcation must also be taken into account.

CS awareness for the widest masses of users

Promoting the culture of information security to enable users of all levels to comply with **information security policies, rules and procedures** is largely associated with ongoing and sustainable training programs in the field. Understanding security threats is important for everyone, from end users in end nodes, to cybersecurity professionals and ending with top management at the highest C3 level. In general, the content of the programs and the training process for promoting the desired behaviors is targeted at different target groups with different levels of training (*Fig.1).*

In order to prevent the many cyber risks, social engineering attacks, etc., the masses of users must adopt **scrupulous cyber hygiene**. Cyber-hygiene is especially important for Generation Z children, as their lives are inextricably linked to modern IT and access to Internet-connected equipment, and they are among the most vulnerable to online threats, cyber harassment. Modern children cannot imagine their lives without the Internet and gadgets. They master new technologies much faster than adults and use cybersecurity resources more confidently. Such trust, combined with a lack of life experience for decent filtering, often causes problems for children. Because with the development of the Internet, the illegal, unwritten, unreviewed content grows; cases of aggressive behavior of some users towards others and cyber harassment are becoming more frequent; many children become victims of scams and malware, etc.

Above all, cyber hygiene is a matter of individual responsibility for everyone. All users need to know and apply a number of best practices, both at home and at work. Cyber-hygiene refers to the actions and methods that users of computers and any other electronic devices connected to the Internet must follow to protect personal and corporate data. Cyber-hygiene also refers to the ethics of online communication. This education is dedicated, in particular, to the safe operation of devices in the digital educational environment and must be supported by both the school, the state and the family. Organizations must also adopt and enforce cyber hygiene rules designed to minimize human risk with technical solutions.

Actions to raise awareness of cyber hygiene can range from thematic information campaigns, launched in the form of symposia, conferences, exhibitions, to the publication of newsletters and news on risks in the field of CS and other profile materials on corporate sites, and/or government. At the state level, cyber-hygiene is promoted through strategies, familiarization programs, global orientations, etc.

For example, "Cybersecurity guidelines for eastern partner countries" https://eufordigital.eu/library/cybersecurity-guidelines-for-the-eastern-partner-countries/ published in 2020 by EU4Digital, explores the main obstacles and gaps to be addressed, as well as key challenges and recommendations for strengthening cyber resilience in each of the Eastern Partnership Countries.

CS awareness from TreeTop security (https://www.treetopsecurity.com/cat/), distributed free of charge, "Basic rules of information security" (https://cybereducation.org/mc/index.php/usr/login/login), free course thanks to a grant from CRDF Global, funded by the USA. CS Learning Hub, (https://www.weforum.org/projects/cybersecurity-learning-hub), an initiative led by Salesforce

(https://trailhead.salesforce.com/cybersecurity) with the support of Fortinet, Global Cyber-Alliance and World Economic Forum, Canadian Center for CS, Learning Hub (https://cyber.gc.ca/en/learning-hub/), provides on-demand Cybersecurity skills training.

ABSA Group (formerly Barclays Africa Group) (https://www.weforum.org/organizations/barclays-africa-group-limited), in collaboration with the Maharishi Institute, is successfully running cybersecurity academies, targeting some of the most disadvantaged groups in South Africa.

There are also paid courses, e.g.: Cybersecurity course for children aged 6 to 14 at CODDY (https://coddyschool.com/courses/kiberbezopasnost), Cybersecurity and digital literacy for children aged 11 to 17 (https://gb.ru/courses/geek-school/security? tip-course-x9ng = korotkiy-course) and others, who share their knowledge, security rules, help them protect their personal data and increase their resistance to scammers and criminals.

In recent years, the awareness of the general public regarding Cybersecurity risks has begun to take shape in the Republic of Moldova. The main promoter of the CS is the Public Enterprise Information Technology and Cybersecurity Service (PEITCS), in 2020 designated as the Government Computer Emergency Response Team (CERT Gov MD). PEITCS is involved in several awareness-raising activities through the organization of various international conferences, the publication of reports, the organization of expert workshops, cooperation with international partners, the development of public-private partnerships, the publication of simple cyber hygiene rules (https://stisc.gov.md/ro/reguli-de-igiena-cibernetica-pe-timp-de-covid-19), the publication of the weekly news on CS (https://stisc.gov.md/ro/noutatile-saptamanii-din-cybersecurity-28012022, https://stisc.gov.md/ro/cisa-adaugat-17-vulnerabilitati-catalogul-de-vulnerabilitati-existentecunoscute-si-exploatate) etc.

There are other structures involved, e.g., the State Chancellery publishes and promotes various materials, posters on the increase of cyber hygiene, the Institute for the Development of the Information Society to ensure the continuity of research activities and increase the visibility of scientific results (https://idsi.md/implementarea-cerintelor-minime-securitate-cibernetica-necessara-pentru-organizacións-de-cercetare-inovare), etc.

The main objective of these organizations, programs, international and national events is to create platforms for public-private dialogue, offering the possibility of identifying effective solutions aimed at reducing the risks of cybersecurity, as well as developing strategic partnerships between the public and private sectors and international collaboration on CS issues.

2.3 The continuous growth of the corporate culture of cybersecurity

Management uses security policies as a way of defining what is expected of its members. This assumes that all staff of organization must be proficient regarding this role in the insurance of CS. Maintaining the required levels of competence or raising the awareness of employees is achieved either through initial and in-service training or through specific corporate training oriented at target user groups. And the corporate training aims to create a correct attitude towards CS, in line with the user's position/role in the organizational structure by adopting preventive and proactive measures, based on knowledge of how to manage IT resources and threats towards them.

In order to recruit and develop the right employees in the right places and to maintain the appropriate skill levels, organizations have to be able to understand the areas of CS needed for the different roles. And in order to reduce the gap between academic training and the concrete needs of some entities in mitigating the consequences of cyber threats, each organization should conduct ongoing corporate training according to individual programs, tailored to needs, through various seminars,

trainings, round tables and special cybersecurity courses, including outsourced. For more details see [3].

Organizations must ensure that interested/ responsible information security stakeholders understand security policies and procedures for valuable information assets and comply with the specified conduct rules for the systems and applications to which they have access. Corporations often set up training centers for the continuous training of their own employees. Typically, the target audience for continuing education programs includes top management, professional CS technical staff, employees, and third parties employed by the organization (e.g., contractors, suppliers). Information security management usually involves a "pyramid structure" of communication with different levels of awareness, training and education, which are determined by the internal requirements of the organization and external factors.

At the lowest, basic level of the pyramid, with billions of users, as well as on level 2 *(Fig.1),* Awareness-literacy programs are required, aimed at stimulating security behaviors, motivating stakeholders to recognize security concerns and respond to them.

On the 3rd level of the pyramid, the training programs relate to functional responsibilities in the protection of employees' personal data, in recruitment, integration and termination of employment, the production of security skills and competences, such as the operation of physical and logical security controls.

At the highest level of the pyramid, education aims to develop expertise in the field of information security and is addressed to professionals in CS.

However, computer users, local and global networks, information and communication technologies/systems, Cloud Computing, the Internet of Things (IoT, IoB), etc., do not always succeed in complying with these policies. In order to address this issue and meet regulatory requirements, entities should systematically conduct specific information security/CS awareness programs that address specific key components of the CS for those specific contexts.

There are many eLearning programs from Infosequre (https://www.infosequre.com), SANS (www.sans.org), Quick Start (https://www.quickstart.com/find-training/training-by-topic/information-security.html) etc., which offers a variety of highly customizable security training and security awareness solutions and programs that fit the requirements of any company, including courses, summer schools, training camps, and more.

Basic training and professional certifications in the field of security

If cyber hygiene is a general requirement prescribed, but poorly verified (proven), for certain target groups of professionals in important areas of security, knowledge and skills are validated by certification. Usually, professional skills are obtained through in-depth formal training in higher education institutions and/or especially in colleges and universities, including in designated centers and/or through personalized corporate training programs.

Basic training/formal training is carried out in education at all levels, taking into account the national specifics, the particularities of the digital economy and culture. But this subject is not the subject of present paper. Here we just mention that things have started well in Moldova as well. For example, in an international project ERASMUS + "LMPI Professional Bachelor and Master Degrees for Development, Administration, Management, Protection of Computer Systems and Networks in Companies", carried out with EU support in the period 2016-2019 in some universities, which have opened dozens of new courses related to Information security, CS, Network security, etc.

An ideal tool to support educational institutions, vocational training centers and any organization interested in CS, is the European IT Competence Framework with eCF Explorer (https://ecfexplorer.itprofessionalism.org/). eCF

can be used by anyone, either for the development of specific certification programs in the field of CS, or as a coherent standard of competences to evaluate the existing individual training programs in order to complete them.

The certification of staff demonstrates that the person is qualified as a professional recognized in the area in accordance with certain reference standards, administered by many independent centers and specialized certification bodies. As a rule, certificates demonstrate competencies in a particular field, at different levels, *e.g. beginner, associate, practitioner, professional, expert, architect*; in some specializations, *e.g. management, engineering, audit, firewall, intrusion preventing systems*; in a particular technology, *e.g. Microsoft, CISCO, Linux;* in a certain standard, e.g. ISO/IEC 27001, COBIT 2019 framework *(Control Objectives for Information and Related Technology)* from ISACA, PCI DSS (Payment Card Industry Data Security Standard) from PCI Security Standards Council etc., have a relatively short period of validity *(1-4 years),* or require annual reconfirmation in the form of simplified examinations.

The best information security certificates for security professionals include:

CISSP *(Certified Information Systems Security Professional)*, CAP *(Certification and Accreditation Professional)*, SSCP *(Systems Security Certified Practitioner)* etc. of the International Information Systems Security Certification Consortium (ISC)², founded in 1989 in USA*(www.isc2.org)***,** who developed the *"CBK-Common Body of Knowledge",* a comprehensive framework of all the relevant subjects a security professional should be familiar with, including skills, techniques and best practices.

CISA *(The Certified Information Systems Auditor),* CISM *(The Certified Information Security Manager),* CGEIT *(Certified in the Governance of Enterprise IT)* ***etc.*** of the professional association ISACA.

SANS Institute (*SysAdmin, Audit, Networking and Security, www.sans.org),* founded in 1964 as a research and education organization, seems to be the largest source of information for information security training, which created the CIAG certification program *(www.giac.org, Global Information Assurance Certification)* which offers dozens of professional certifications, as GIAC Security Essentials Certification (*GSEC)*, GIAC Certified Firewall Analyst *(GCFW)*, GIAC Certified Windows/UNIX Security Administrator *(GCWN/GCUX)*, GIAC Secure Software Programmer *(GSSP-C/Java/NET)*, GIAC Systems and Network Auditor *(GSNA),* GIAC Certified Penetration Tester (*GPEN)* etc.

The International Council of Electronic Commerce Consultants, Founded in 2001, *(www.eccouncil.org/)*, a professional organization that aims to develop e-commerce, set professional standards, education and certification, offers dozens of professional certifications as well Certified Ethical Hacker *(CEH),* Certified EC-Council Instructor *(CEI),* Computer Hacking Forensic Investigator *(CHFI)*, EC-Council Certified Security Analyst *(ECSA),* Certified Network Defense Architect *(CNDA*), Licensed Penetration Tester *(LPT)* etc.

Cisco Systems *(https://edu-cisco.org/)*, one of the world's largest high-tech companies, founded in 1984, San Francisco, California, USA, offer such certificates as Cisco Certified Security Professional (*CCSP)*, The Cisco Certified Internetwork Expert Security *(CCIE Security),* Cisco Certified Network Associate *(CCNA)* Security Certification, Cisco Certified Network Professional Security *(CCNP Security),* Cisco Adaptive Security Appliance Software (*CISCO ASA)* etc. (https://www.cisco.com/c/en/us/training-events/training-certifications.html).

For more information on Cybersecurity Training and Courses see https://www.educba.com/software-development/courses/cyber-security-course/?btnz=edu-blg-inline-banner1/, free course

"Ethical Hacking for Beginners" (the fundamentals of ethical hacking) https://www.simplilearn.com/learn-ethical-hacking-online-free-course-skillup?utm_source=frs&utm_medium=skillup-course-banner&utm_campaign=frs-skillup-course-promotion/, free course "Introduction to Cyber Security" (the basics of cybersecurity) https://www.simplilearn.com/learn-ethical-hacking-online-free-course-skillup?utm_source=frs&utm_medium=skillup-course-banner&utm_campaign=frs-skillup-course-promotion/ etc.

According to Cybersecurity Ventures the number of vacancies in CS has increased by 350% in the last 8 years (https://cybersecurityventures. com/jobs) and the 2021 Cyber Security Workforce Survey (SAI) 2 (https://www.isc2.org/-/media/ISC2/Research/2021/ISC2-Cybersecurity-Workforce-Study-2021.ashx) estimates that another 2.7 million cybersecurity professionals are needed.

Choosing the right training techniques

Individuals are often likely to overestimate their own control over the threat and underestimate the chances of the threat materializing. Many people believe that having an IT department or the best security technologies can give them 100% protection. Therefore, simply informing them about the likelihood and potential impact of a threat is not enough; users need to be aware of the risks, know and be able to work safely. Because individual beliefs and illusions affect users' intentions to comply with CS policies, they must be identified and rigorously managed to comply with the rules.

Starting from this premise, educating security behavior involves not only simply knowing security policies and rules, not only understanding of the importance of CS, but also influencing how users perceive risks and make security decisions, taking into account how individuals obtain and process CS awareness information. Awareness programs must be personalized according to the internal/external contexts and business needs of the organization and be relevant to its information culture and IT architecture. This leads us to the idea of the correct selection of the appropriate forms of corporate education of the CS for each of the different target groups of users,

The main techniques of education and sustainable training in the field of CS

Corporate training in the field of CS can be done through lectures, seminars/webinars, trainings and/or workshops *(Fig.3)*. In order to choose the most appropriate option in each case, the purpose and characteristics of each of these forms of education and training should be known. Improperly organized training can be a waste of time and money. And if the training is well planned, it becomes valuable enough for everyone involved.

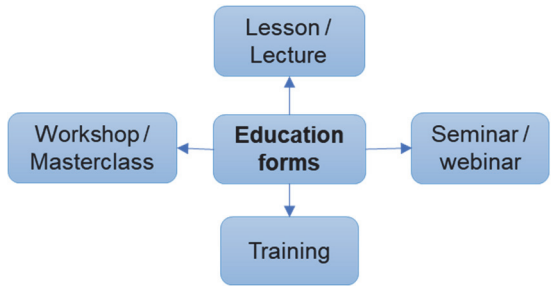

Figure 3. Forms of training

According to the renowned expert in educational psychology William Glasser: *"Man usually learns 10% of what he reads; 20% of what he hears; 30% of what he sees; 50% of what they hear and see; 70% of what they discuss with others; 80% of one's own experience (what one does alone); 95% of what others teach"*

*(*http://thinkexist.com/quotes/william_glasser*)*.

Lesson/lecture is a monologue, a presentation of the provider with minimal interactivity. As a rule, the lecture has an increased volume of information, is aimed at relatively large audiences, can be conducted in any form, with presence, remote/online, including in the form of web-conferences, can be audio/video recorded and multiple repeated/broadcast without losing its meaning. The big problem is that the rate of assimilation of the material of a lecture is quite low,

according to experts at best "about 20% of what they hear".

A seminar/webinar is an extensive and detailed presentation on a relatively narrow topic, involves interactivity and communication between the presenter and a smaller audience, can be conducted in the form of presence or distance/online. Due to the relatively small amount of information and the higher number of transmission channels (sound, graphics, video, interaction), the quality of material assimilation is higher than in a lecture, up to *"50% from what he hears and sees"*. In pandemic conditions, webinars and web-conferences are gaining ground in the face of traditional lectures and seminars, being widely used in all fields and offering large openings of space, audience and space size, which can be virtually any depending on the purpose. At the same time, in addition to the relatively low rate of assimilation in webinars and video conferencing, there are some additional problems such as the need for a high-performance Internet connection, the digital divide, etc.

Training combines mini-lectures, business games, discussions and solving exercises/problems. Due to several mechanisms and stimuli of memory included in the process, the quality of learning and the result obtained is higher, up to "70% of what is discussed with others". Usually, the training removes a person from the so-called "comfort zone", requires certain activities, identifying solutions, etc. and in this way he makes her perceive new things at a high rate. It can last from an hour to a few days, it can usually be conducted in person or, in some cases, in a remote online format, via teleconferencing and interactive tools.

Workshop/masterclass, is quite close to the masterclass. A masterclass is the communication with a master of his craft, and a workshop learns through collaboration; masterclass is a workshop event in which all participants are involved in active group work. Workshops usually involve discussions and the practical application of on-site knowledge. The workshops are characterized by the fact that each participant can "try to do with his own hands" what is being discussed.

Knowledge, Skills, Abilities, Competencies

When we talk about the main techniques/forms of education, we usually refer to lectures, seminars, trainings, as well as their variety: workshops, videoconferences, webinars, etc. But not all and not equally provide knowledge, skills, abilities and competencies, which are closely dependent on each other (Fig. 4).

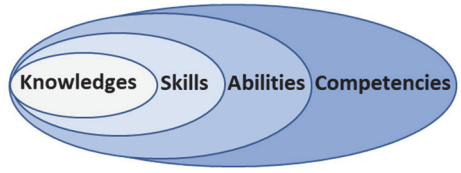

Figure 4. Relationship between Knowledge, Skills, Abilities, Competences

Knowledges are obtained as a result of the process of knowing the surrounding world: of a set of ideas, judgments, theories. Knowledge of CS and cyber hygiene allows users to surf the Internet and operate properly in cyberspace, recognize various common (already known) situations and consciously respond to these events according to best practice recommendations. Professional knowledge of CS is more specific and deeper. They allow the accumulation of Skills - abilities to perform certain actions consciously, based on knowledge and experience.

Professionals must also show certain skills - the ability to perform stereotypical action sets over a long period of time; is when a person repeatedly repeats the same type of actions. Possessing the skills allows you to perform complex tasks much faster and at no additional cost.

The lecture allows to obtain a maximum amount of information in a short time, but the material is poorly absorbed and quickly forgotten. The seminar is good for studying a small amount of material and gaining knowledge on several topics within the topic, it ensures a more active interaction between the speaker and the audience. Training and

instruction in specific masterclasses/workshops are the most effective for the learner and the most difficult for the trainer, they require the active participation and joint work of the trainer and the trainees, their active involvement in the process, which allows the accumulation of experiences own and assimilation up to "*80% of what he does alone"*. Most forms of education only allow the acquisition of knowledge and skills, and for the development of skills and competencies professionals must work on their own. If in a lecture the listener is completely passive, in the seminar he participates to a limited extent in the learning process, then during the trainings and workshops the student immerses himself in a much deeper learning.

Conclusion

Improving users' knowledge and awareness of current and future cyber threats is an essential part of an effective Cybersecurity strategy.

Firstly, because there are about 5 times more technical devices in the world than humans, it is extremely necessary and important to provide effective measures to protect these information assets at the individual level.

Secondly, everything that does not develop - degrades. IT corporate infrastructures, systems and applications, the security measures and policies that protect valuable digital assets are changing rapidly, due of the dynamics of IT and the threats of CS.

As a result, training in the field of CS is a continuum, which begins with awareness, continues with literacy and basic training and evolves towards formal education and professional development professionals. Continuous training in the field of CS is also required by the emergence of new users, new threats, the development of new products, services, technologies and the fact that people forget the acquired knowledge (according to some research, people forget about 70% after 24 hours and about 80% after a month *[9])*.

Thus, the effective management of CS is largely associated with awareness and lifelong learning, the role of which is to get users to comply with information security policies. And maintaining a sustainable CS culture is only possible through a continuous process of raising awareness, updating, measuring, evaluating and cyclically repeating training. Continuous training in the field of CS requires different programs, courses and frequent training and education sessions, depending on regulations, responsibilities, target group of users, specific context, etc.

As cyberattacks become more frequent and violent, governments, public institutions, organizations have a responsibility to protect their dynamic cyberspace. These are the necessities of information security, and understanding of technologies and security threats is essential for everyone, from cybersecurity professionals, governors and managers at any C1-C3 level, and ending with the broadest masses of terminal device users. High management is the one that values security in all types of security: IT/IS information security, security, cybernetics, etc.

Given the dynamics of IT development and the continuous expansion of CS threats, sustainable and continuous training in the field of CS becomes indisputable and without alternatives. This allows for risk awareness, the development of personal and corporate cyber hygiene skills and culture through information, formal, informal, non-formal training and ongoing guidance of target groups, or in generic, free, open and accessible programs for the broadest masses of users. , either as part of corporate continuing education or as part of special certification courses.

In order to be aware of what is happening - it is necessary to follow the news in the field of information security, the emergence of new threats and recommendations of CS. In essence, technology and law are not enough. People are the biggest weakness in ICT systems and. Therefore, cyber security is also based on user awareness and training. Users need to adopt good practices and become as vigilant in cyberspace as they are on the streets.

While the human factor is the weakest link in the CS, human intelligence is the best defense against

attacks, whether they come from social engineering, technical defects, management, etc. Improving knowledge and awareness of current and future cyber threats is an essential part of an effective Cybersecurity strategy.

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Entertainment Mobile Applications

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Abstract: This paper explores the impact and value of entertainment mobile applications over the market, how it supports different business affairs and covers most consumers age ranges. It focuses on investigations, reports and statistics from different sources regarding relation between the entertainment market and mobile applications designed for it. Besides the points mentioned previously it also applies a use case used during the research. Based on information provided from different resources and past two years impact of COVID-19 over the entire world, we can observe an increased interest into these types of applications. A lot of new products came live thanks to the increased demand of this market area. The entertainment world has changed since then and transformed from a simple content providing service to a solid solution that provides visualization emotions as well, new user experience, new market fragmentation, new researches in consumers demands and interest in integrating complex systems in order to deliver all mentioned previously. This includes as well support for different ages. Knowledge gathered around this market direction in association with mobile application trends, the statistics founded during the research are provided by private institutes and might not contain the latest exact information about it. Mobile applications represent a major sector in the world market that cover a bit number of consumers. Based on people's demand many business affairs were created, extended and increased their revenue. This represents an interesting area to explore new use cases for using modern mobile applications and analyze their impact over business.
Keywords: Engineering, Mobile Applications, Entertainment, Accessibility, In-App Purchase, Advertising, Large Scale Systems, Mobile Marketplace.

Introduction

Mobile development industry is gaining more and more interest in the last couple of years. People tend to spend more time with their mobile devices based on an activity basis, around 4 hours according to latest mobile consumer statistics [1], that means around 25% of their daily activity. This environment creates a powerful platform for engaging consumers. The entertainment market place is an interesting, complex and severe world. It was always based on the consumers interests. This area needs to be under permanent adjustment and in trend satisfying the existing user's needs. According to last year's reports, the global market transactions reached USD 91.3 Billion [2] only mobile applications in the entertainment category, that represents an impressive number. Mobile applications allow gain diversified audience based on different criteria like age, interest, preferences, etc. Having a big audience with diversified requests was always hard task to maintain, at this point the mobile applications come and help the business owners with providing additional information for the data center and providing mobile capabilities to support people with disabilities or at old age.

Mobile Applications

Mobile Devices

This period is not considered anymore age of mobile phones and tablets, they are not anymore, the only part limiting the mobile world. They now are oriented for supporting the operating system.

The most popular mobile operating systems used over the entire world are Android [3] (developed by Google) & OSX [4] (developed by Apple).

Today a mobile device is considered the following as well:

- Smart TV's
- Android TV [5]
- Apple TV [6]
- Wearables
- Wear OS [7]
- Watch OS [8]
- Cars
- Android Auto [9]
- CarPlay [10]
- custom devices
- devices that support Android OS [11]

Mobile Development Frameworks

Selecting a mobile development framework is an important key for creating an entertainment mobile application. It depends on many factors like development time, cost, maintenance and time to implement new features dominating the mobile market places. These frameworks can be classified in two major categories, native mobile development and hybrid mobile development.

Native mobile development frameworks are:

- Google Android Native Development [12]
- Apple iOS Native Development [13].

Hybrid mobile development frameworks have a lot more of ramification. The main scope of this approach is to use a single code base and achieve same results for both platforms Android and iOS. The main dominant hybrid frameworks in the mobile world at the moment are:

- React Native [14]
- Flutter [15]
- Xamarin [16]
- Ionic [17].

Each development platform has its advantages and disadvantages. These differences we can see in the following Table 1.

Selecting the type of mobile development framework represents an important decision that has to be done at the beginning of any development. On later stages when the product passed several cycles of development, it can be modified or changed completely.

Criteria	***Native Development***	***Hybrid Development***
Cost	High	Medium - High
Number of developers	One for each platform	At least one developer
Development time	Fast	Medium
Native mobile features	Complete adoption	Partially adoption
Performance	High	Medium
Maintanence	High	Medium
Product Complexity Support	High	Medium
Depency on third-parties	None	Depends
Access to hardware capabilities	Available	Depends on third-party integrations

Table 1. Comparison between Native Development & Hybrid Development

Mobile Accessibility

Mobile Accessibility Guidelines are a set of technology agnostic best practices for mobile web content, hybrid and native apps.

Different type of guidelines is recommended or required to be used depending on the type of the project or country the targeting audience is located, due to the geographical compliance that needs to be met [18].

Mobile accessibility requires detailed knowledge that supports both the development of digitally accessible products and the remediation of inaccessible digital products.

Those accessibility features are:

Spoken feedback. The TalkBack function allows the user to interact with their device using touch and spoken feedback. The TalkBack tool describes each user action and provides spoken alerts and notifications.

Select to speak. Select to Speak limits the spoken

feedback function to only user-selected items on the screen, reading or describing them aloud.

Switch access. For users with limited mobility, Switch Access provides an alternative to the touchscreen. This enables the user to instead use a switch, keyboard, or mouse.

Voice commands. If using a touchscreen is difficult, the Voice Access app allows users to control their device using spoken commands. This feature can be used to open apps, navigate, and edit texts hands free. Voice Access is currently only available as a beta release in English only.

Braille display. The BrailleBack feature allows people to connect a refreshable braille display to an Android device via Bluetooth. BrailleBack can also be integrated with TalkBack for a combined speech and braille experience.

Display size and font size. These settings allow users to change the size that items are displayed on screen as well as the font size.

Magnification gestures. Allows temporary zooming or magnification of the screen.

Contrast and color options. This can be useful for people who are color-blind or have partial visual impairment to improve the legibility of text through inverting colors, or applying color correction.

Captions. Users can turn on captions for their device as well as specify the language used and make style adjustments to the captions.

Methodologies for product development

There are many methodologies used for developing mobile features or apps from scratch for the entertainment market. All these technics are unique and most usually matching the company profile, so from a definition they all are using hybrid approach, meaning taking what's working for them and for the end users. This approach is considered one of the best matches, because it helps to companies to grow.

If we talk specifically about the methodology, most of them cross with the Grounded Theory approach and Agile methodology. These two methodologies contain the basic principles that are used for developing the company's framework.

Grounded Theory

Grounded Theory is a methodology of interpretation that can be used in research targeting to build a theory or investigate a phenomenon in a new context. This method is considered as a unique technique, where the theories are obtained from data not from existing theory [19]. As the literature has mainly addressed the phenomenon of mobile application adoption from the user's points of need or view, and there is not an integrated final model considering the whole process of mobile application development.

Grounded Theory, is a theory derived from data which collected systematically during the research process and analyzed. In this approach, collecting and analyzing data and the theory, which eventually derived from data are in close contact with each other. Researcher, rather than beginning its study with pre-conceived idea, begins the work with a specific field of study, and allows the theory to emerge from the.

In addition, we use the Grounded Theory method to identify the factors affecting mobile application adoption, particularly in the field of entertainment. These factors obtain through the generation of codes and categories during the analysis process [20].

Agile

Agile represents an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches, issues, bugs etc. Instead of betting everything on a single rocket launch, an agile team delivers work in small, but consumable, increments. Requirements, plans, and results are evaluated continuously so teams have a natural mechanism for responding to change or adjustments quickly [21].

Whereas the traditional "waterfall" approach has one discipline contribute to the project, then "throw it over the wall" to the next contributor, agile calls for collaborative cross-functional teams. Open communication, collaboration, adaptation, and trust amongst team members are at the heart of agile. Although the project lead or product owner typically prioritizes the work to be delivered, the team takes the lead on deciding how the work will get done, self-

organizing around granular tasks and assignments. Agile isn't defined by a set of ceremonies or specific development techniques. Rather, agile is a group of methodologies that demonstrate a commitment to tight feedback cycles and continuous improvement.

Initially, according to Agile Manifesto [22], this methodology was developed by software craftsmanship's to help to deliver healthier software products on the coding stage. Later this approach was applied to the other layers and stages of software development life-cycle.

Data Analysis

Data analysis using Ground Theory as method commences with coding, entailing the converting content into codes after information are transcribed into textual content. Coding is fundamental analytic, that is the main step for identifying the similarities and differences within data to categorize and label the data. If we take the scope of mobile applications we can observe the following concepts, categories and main categories that we need to consider. They are mentioned in the following Table 2.

Concepts	Categories	Core Categories
Considering App income model in order to better adoption	App income model	App Marketing
The use of new methods of in-app advertising (push notifications)	App Advertising Methods	
Using virtual Marketing to introduce an App		
Launching Social pages and websites to promote an App		
Creating advertising campaigns to introduce an App		
Conducting initial tests to get feedback about Potential errors	Beta test	App support
The maintenance and upgrades because of app errors and bugs	App updates	
The maintenance and upgrades due to hardware changes such as screen sizes		
The maintenance and upgrades to add new features		
Mobile application marketplaces and other organizations assistance	App support	

Innovative and original Idea	New idea	App Idea
Scanning potential users and audience group to identify new requirements	User needs	
Avoiding versatility Apps	Specific idea	
Scanning successful Apps	Successful apps scanning	
Compliance with social norms and values	Cultural values	
Considering design standards such as the graphical user interface (GUI)	User interface	App design
Employing experienced design team and experts		
Low error and technical problem rate	Perfect performance	
Application security and accuracy		
The high degree of usability, ease of use, aesthetic appearance of the device and response time	User experience	
Bilateral interface in particular for entertainment and game apps	Interactive App	
Appropriate name and icon	App Icon and Name	

Categories extracted using Grounded Theory

Use Case

During the research on "Impact of mobile applications" was implemented a use case related to mobile applications in the entertainment. The scope of work for this was to develop an android application that will be installed on different custom devices, especially those that were mounted inside new cars. An example of the application running on the car you can see on Figure 1.

The application with all its content passed the entire development life cycle around 9 months and continues until today to be under maintenance. The application was strictly developed under required accessibility constraints and safe-security points (we were not allowed to let the driver play with the application while he was driving a car).

Table 2. **Figure 1.** Android Streaming app running on custom device.

Table 3.

Table 4. Even though this was a small niche that covered a part of the market, the analysis and statics showed us interesting stuff that need to be considered while developing such apps:

- The streaming server has to have elastic performance, we often saw on specific period of time when it reaches its peak
- Analytics provide a lot of information, not only regarding the preferences, but also the behavior of the user
- Adding accessibility considerable increased the number of audiences for the application
- From 100.000+ downloads, we had an average 1500-2000 active users
- When the server was on its performance peak, at that moment were over 10.000 active users

Recommendations

Developing a mobile application for any type of industry is not a cheap and easy task. In order to avoid many confusions on what a mobile application in health care needs to have, the product owner or stakeholders must decide and define the following points: Product Stage, Feature list, Time to market and Security.

A. Product Stage

Defining at what stage the current product is represents an important step, before diving into deep development or planning stage. Here needs to be defined at what stage the product is, whenever it's on proof-of-concept, most viable product or simple idea.

B. Feature list

Defining feature list on short-term, mid-term and long term is important for making the development plan and primordial in choosing the mobile development framework. For example, if in the roadmap its planned to establish communication with custom devices or exploit the mobile device hardware capabilities, then would be more reasonable to go for native mobile development.

C. Time to market

Time to market represents an important aspect for every product. This is important moment that depends on what feature needs to be developed and kicked-off first.

D. Security

User information represents a sensitive data. In the digital world this data must be stored and used according to GDPR. These rules apply as well for the mobile applications, from the moment they share same information. The mobile applications as well represent a target for the attackers.

Conclusion

Every day we use at least one mobile app to make an action, for example a simple phone call. Mobile applications have become an inevitable part of our life style. With the growth of the performance of the mobile devices and integrations with the IoT segment, the mobile applications markets grow at an incredible speed. People get more comfortable to have everything under one ecosystem. They try to avoid any type of migration that could cause limitations or headaches. Mobile applications can be a perfect instrument to help the users to keep their ordinary lifestyle and continue to use their favorite entertainment stuff in any environment. If you have a chance to add a mobile application to your business affair, either it's related to entertainment or no, I would suggest to invest in it and not to forget about supporting its accessibility capabilities.

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The EU digital age

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Abstract: Purpose: The aim of the paper is to raise awareness of the need to develop a human factor which is well familiar with new technologies. At the same time it shows the importance of digitalization for economic acceleration, social well being and maintaining the sustainable ecosystem. Approach: In this work are analyzed the process of digitalization and its positive impact on the social, natural or economic environment. At the same time was explored a EU's experience in digitizing the population, such as programs adopted up to 2027 and some measures which were taken. Findings: The analysis of the EU's digitization programs and their benefits to the economic and social framework reveals that digitalization process is highly to be implemented especially in overpopulated areas. The effect that digitalization has due to simplification and reduction the negative impact of globalization and social modernization are maintaining and improving the environmental, economic situation. Research limitations/implications: This paper shows the EU's experience in digitalization, some solutions and objectives for education of a developed human factor. It outlines the current beneficial changes and future trends in acceleration of the global economy. Practical implications: The results of the work are supported by the value of findings, conclusions and recommendations which can be useful for: Economists, entrepreneurs and are applied to setting out new avenues for development the economies of the States and promotion digitalization in the world. The data also can be useful in making decisions of creation as many digital cities as possible. Originality: The need of implementation of new measures to develop digital and modern spaces, analysis of the changes that will take place after an improvement of the social, environmental and economic situations, also the reference to EU's financial/technical support programs in the Republic of Moldova.

Introduction

In this presentation I will demonstrate the importance of digitalization process for daily life. At the same time I will analyze the impact of new innovation for economic, environmental and ecological success. The aim of this work was to explore the experience of EU and its projects for digitizing the population because of its position as one of the main powers in the world. The digital transformation is one of the EU's priorities. The European Parliament is helping to shape the policies that will strengthen Europe's capacities in new digital technologies, open new opportunities for businesses and consumers, support the EU's green transitions and help it to reach climate neutrality by 2050, support people's digital skills and training for workers, and help digitalise public services, while ensuring the respect of basic rights and values.

Purpose:

To raise awareness of the need to develop a human factor which is well familiar with new technologies. At the same time this work shows the importance of digitalization for economic acceleration, social well being and maintaining the sustainable ecosystem.

What is digital transformation?

Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. It's also a cultural change that requires organizations to continually challenge the status quo, experiment, and get comfortable with failure. Digital transformation leverages technologies to create value and new services for various stakeholders, innovate and acquire the capabilities to rapidly adapt to changing circumstances.

Objectives of digital transformation are:

- To create digital platforms, the Internet of Things, cloud computing and artificial intelligence are among the technologies affecting.
- To change sectors from transport to energy, agri-food, telecommunications, financial services, factory production and health care, and transforming people's lives.
- To optimise production, reduce emissions and waste, boost companies' competitive advantages and bring new services and products to consumers.

Digital age strategy

On 29 January 2020, the European Commission's new work programme was published. Under the second priority - 'A Europe fit for the digital age', the Commission announced its intention to launch an overarching strategy on the subject. The strategy addresses the priorities and challenges related to the digital transformation of the EU's economy and society, while ensuring the approach taken is human, ethical and values-based. It includes three streams of action: technology that works for people, a fair and competitive digital economy and an open, democratic and sustainable society.

Main topics of digitalization

Platform economy

Online platforms are an important part of the economy and people's lives. They present significant opportunities as marketplaces and are important communication channels. However, there also pose significant challenges.

On 29 October 2019, the Commission published the first annual self-assessment reports by the signatories of the Code of Practice. It presented its final assessment of the implementation and effectiveness of the Code on 10 September 2020, calling for more structured cooperation between platforms and the research community.

On 26 May 2021, the Commission published a revamped guidance to strengthen the Code and announced it will become a co-regulatory instrument within the DSA legislative framework. On 3 December the Commission announced the extension of its Coronavirus disinformation monitoring programme for another six months until June 2022.

Cybersecurity

As digital and physical are increasingly intertwined, new dangers arise, making cybersecurity important for areas ranging from consumer safety online to the normal functioning of hospitals, water and power supplies.

On 22 March 2021 the European Council adopted its conclusions on the cybersecurity strategy with the work of the coming years: Among others the design of a network of operational centers and the common cyber unit, the finalization of the 5G toolbox, the establishment of security standards, the defense of strong encryption, strengthening both the cyber diplomacy toolbox planning its own action plan.

On 15 September 2021, the Commission's president announced an initiative to create an European Cyber Defence Policy, including legislation on common standards under a new European Cyber Resilience Act.

Artificial intelligence and data strategy

People can benefit of AI by imroving health care, making cars safer and enabling tailored services. It can improve production processes and bring a competitive advantage to European businesses, including in sectors where EU's companies already enjoy strong positions, such as the green and circular economy, machinery, farming and tourism.

Digital skills and education

The Covid-19 pandemic has demonstrated how important digital skills are for work and interactions but has also accentuated the digital skills gap and the need to increase digital education. The Parliament wants the European skills agenda to ensure people and businesses can take full advantage of technological advancements.

Over the past two years, efforts to curb the outbreak of COVID-19 led to the closure of schools and campuses prompting a shift to emergency modes of digital education.

In May 2021, the Council of the EU adopted conclusions on equity and inclusion in education and training to promote educational success for all.

On 29 November 2021 the Council of Education, Youth, Culture and Sport Council adopted a recommendation on blended learning approaches for high-quality and inclusive primary and secondary education with measures to respond to the crisis and more long-term actions.

Europe digital decade

On 9 March 2021, the European Commission presented a vision and avenues for Europe's digital transformation by 2030. The Digital Decade Community proposes ambitious targets in the area of digital skills, digital infrastructures, digital business and digital public services to empower people and businesses to seize a human-centred, sustainable and more prosperous future in a digitally sovereign Europe. This can only be achieved through close cooperation and coordination between the Commission, Member States, and public and private stakeholders.

That will be based on:

- **Digital infrastructure**

Europe will only achieve digital leadership by building it on secure and performant sustainable digital infrastructures for connectivity, microelectronics and data processing. A strong foundation for digital technology will enable innovation and support our industry's competitive edge.

- **Digital business**

The digital transformation of businesses will depend on their ability to adopt new technologies rapidly and across the board, including in industrial and service ecosystems that are lagging. This will enable more efficient resource use, boost material productivity, and reduce vulnerability to supply shocks. SMEs play a central role in this process, not only because they represent the bulk of EU companies, but also because they are a critical source of innovation. A truly functioning single market should create favourable conditions for digital take-up, disruptive innovation, rapid-growth and scale-up.

- **Multi-Country Plan**

Achievingthe Dgital objectives requires scaling up EU's digital capacities and strengthening critical infrastructures linked to EU's digital sovereignty. To meet this challenge, the Commission introduces a new type of plan – Multi-Country Projects – with the aim to mobilise and combine investments from the EU budget, Member States and the private sector, building on the Recovery and Resilience Facility and other EU funding. Such Multi-Country projects can create an impact that no single entity could achieve on its own, reduce digital divides within and between Member States, and support an interconnected, interoperable and secure Single Market.

These projects could combine investments from the EU's budget, including from the Recovery and Resilience Facility, from Member States, and the private sector address gaps in the identified critical capacities of the EU

Multi-country projects:

- **5G OR 6G**

The Commission adopted a 5G action plan for Europe in 2016 to ensure the early deployment of 5G infrastructure across Europe. The objective of the action plan was to start launching 5G services in all Member States by end 2020 at the latest. Following this, it suggests a rapid build-up to ensure uninterrupted 5G coverage in urban areas and along main transport paths by 2025.

To monitor the progress of the 5G Action Plan and the Digital Decade strategy, the Commission is supporting the European 5G Observatory. The Observatory is a monitoring tool covering major market developments in Europe in a global context. It also reports on preparatory actions taken by Member States such as spectrum auctions and national 5G strategies. Also, 5G technology and standards will evolve over the next few years as deployment advances. Research and Innovation (R&I) initiatives on 6G technologies are now starting around the world, with the first products and infrastructures expected for the end of this decade.

- **Digital public services and environments**

The Commission is using digital technologies to improve public services and develop smart cities.
Smart public services, also known as digital public services or eGovernment, refer to the use of technology to provide services to citizens at local, regional and national levels. They bring many opportunities to both citizens and businesses: students can apply to study abroad, citizens can open bank accounts online, and workers can file taxes with the click of a button.

The EU is working to help public administrations across Europe to make the change to digital so all citizens can enjoy the benefits of smart public services during the Digital Decade. It focuses on reducing barriers to public services and ensuring they are accessible across borders.

- **Blockchain technology**

Blockchain technology allows people and organisations who may not know or trust each other to collectively agree on and permanently record information without third-party authority. By creating trust in data in ways that were not possible before, blockchain has the potential to revolutionise how we share information and carry out transactions online.

- **European Digital Innovation Hubs**

European Digital Innovation Hubs will function as one-stop shops that help companies dynamically respond to digital challenges and become more competitive.

By providing access to technical expertise and experimentation as well as the possibility to test before investing, EDIHs help companies improve business/production processes, products, or services using digital technologies. They also provide innovative services, such as financing advice, training, and skills development that are needed for a successful digital transformation. Environmental issues are also taken into account, in particular with regard to energy consumption and low carbon emissions. European Digital Innovation Hubs will have both local and European functions. EU funding will be made available for hubs that are already (or will be) supported by their Member States (or regions), in order to increase the impact of public funding. The Digital Europe Programme will increase the capacities of the selected hubs to cover activities with a clear European added value, based on networking the hubs and promoting the transfer of expertise. Member States have an essential role in the selection process of the EDIHs; the initial network of EDIHs will be established from a list of hubs designated by the Member States.

Global partnership

The EU will promote its human-centred digital agenda on the global stage and promote alignment or convergence with EU norms and standards. It will also ensure the security and resilience of its digital supply chains and deliver global solutions. These will be achieved by

- setting a toolbox combining regulatory cooperation, addressing capacity building and skills, investment in international cooperation and research partnerships
- combining EU internal investments and external cooperation instruments
- investing in improved connectivity with the EU's partners, for example through a possible Digital Connectivity Fund

Digitalization for ecology

The (non-energy) environmental opportunities arising from digitalisation can play an important role in relation circular economy, especially with respect to tackling the issue of electronic waste. Most importantly, technological advancement plays a role in better collection and subsequent recycling of electronic waste and the reuse of the materials used.

Furthermore, Digital technologies may help to alleviate pressures on the natural environment and biodiversity in many respects. ICT-enabled solutions help monitor biodiversity and ecosystem services.

With regards to pollution reduction, non-energy environmental opportunities can also be relevant, especially when addressing reduction of air pollution. The types of technologies most significant in this respect are artificial intelligence and blockchain.

Digitalization for economy

All economists agree that digital technologies will become increasingly important for production processes in the future. It can therefore be assumed that production processes will become increasingly capital- and technology-intensive over time – not only in developed economies, but worldwide.

The increasing capital and technology intensity of production has an impact on the international competitiveness of all countries in the world.

In the future, the international competitiveness of individual economies will depend crucially on how quickly digital technologies are used in production processes. This digital transformation in turn depends on whether a country has the necessary resources for this transformation.

Digitalization for society

Digital transformation is generating a fierce debate among policy-makers, economists and industry leaders about its societal impact. As digitalization disrupts society ever more profoundly, concern is growing about how it is affecting issues such as jobs, wages, inequality, health, resource efficiency and security.

Digital cities

Digital solutions are broad and include approaches to smart urban mobility, energy efficiency, sustainable housing, digital public services, and civic-led governance. Large-scale uptake and upscale of these solutions are crucial to help our cities and communities meet their climate targets and reduce their environmental footprint, while fostering citizen participation and bringing prosperity to all types of business, including SMEs and start-ups.

The importance of digital cities:

Cities and communities are ideal real-life, large-scale testing grounds for digital solutions and can act as urban-living labs. Cities can lead stakeholder participation and ensure that the local community is actively involved in creating solutions. Open innovation, through which local stakeholders cooperate and take ownership of the agreed solutions, is vital for a successful digital transformation in the EU. With the help of digital cities local governments will support practices and initiatives that ensure a better use and management of data, transparency and the use of unbiased algorithms to improve quality of life and digital rights in cities and communities.

New innovation in digital cities

- **Smart AgriFood**

Smart Farming aims to optimise the production in farms by using the most modern means in a sustainable way, thereby increasing the production and delivering the best products in terms of quality while maximizing the return. It makes use of a wide range of technologies including IoT sensors, wearables, GPS services, UAVs, robots and drones operating in the field which provide real-time data to systems helping to monitor the production line and support decisions. This enables less waste and maximum efficiency in operations. FIWARE, as an Open Source Platform, has developed a standard way to develop and integrate solutions for Smart Agrifood

It will be based on:

Open source means work with no licenses on platform components and enabling the contribution from multiple organizations.

Standard based enables an open and competitive marketplace of compatible farm management systems and vertical smart farming solutions. Also, it means a lower cost to achieve interoperability of vertical solutions or their integration with farm management systems and lower costs for integration with multiple IoT protocols, farm machines, robots, drones.

Flexibility is based on adding platform components parallel to business needs and an ability to add innovative features: blockchain-based traceability, open data publication, monetization of data.

Security means Quality Assurance testing on every component, designed to get the most out of the cloud and scale on demand and enabling to define or enforce compliance with data access control policies.

- **Smart ECOsistem**

What was once a direct value chain is now transforming itself into complex ecosystems. Consumers are becoming prosumers and supply and demand are optimized in real time and at a very granular level. The need for flexibility has grown notably with the innovations of renewable energy resources, batteries, power electronics, electric mobility, blockchain, and rapid digitalization.

In my opinion digitalization process is one of transitional factor of the society from an old thinker to an efficient decision maker. Technological transition is important not only for making our life easier, but for relaunch State's economy, for monitories environmental challenge and for bigger success in our daily life. Robotics in manufacturing opens many doors — new career paths for employees, economic gains, business growth opportunities — but it is a business network that takes your innovation and success beyond your company walls.

Modern technologies create the opportunity to multiply different ways to preserve the cultural heritage and legacy for the future generations.

Especially now digital technologies are the key factor which can connect people. In COVID-19 Era online life has become more developed and each of us have to perform his digital skills for being at the same step with everyone.

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PROIECTAREA ȘI GESTIONAREA UNEI MAȘINI AUTONOME BAZATE PE ARDUINO

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Abstract: Nowadays it has proven the importance of automating some processes that ensure the safety of human lives, and also ease and make efficient many activities. Arduino board allows you to read data from different sensors later turning them into output data. This paper reveals discussions on robotics, the automation of daily processes and human acceptance of these massive changes. It is presented the construction of a prototype of a car that can be teleguided as well as the method of self-management. The basic feature of this autonomous car is that it uses sensors and the Bluetooth/Wireless module to send automatically the data obtained from the sensors to the receiver and to avoid colliding with an obstacle.

Keywords: digital, Arduino, automation, motors, sensor, robotics.

Introducere

Tehnologiile reprezintă o parte semnificativă în viața de zi cu zi. Tehnologia este ansamblul oricăror tehnici, abilități, metode și procese utilizate în producția de bunuri sau servicii sau în realizarea unor obiective, cum ar fi investigația științifică. Astfel multe procese care necesitau cândva timp și muncă fizică se realizează în prezent mult mai eficient.

Robotica, ca unul din conceptele tehnologiei, implică proiectarea, construcția, operarea și utilizarea roboților. Scopul roboticii este de a proiecta mașini care pot ajuta oamenii. Aceasta dezvoltă mașini care pot înlocui oamenii și pot replica acțiunile umane. Roboții pot fi folosiți în multiple situații pentru diverse scopuri. Un robot cu conducere autonomă este o mașină care încorporează automatizarea vehiculului, adică un vehicul la sol care este capabil să detecteze mediul înconjurător și să se deplaseze în siguranță, cu puțin sau deloc aport uman

Generalități

Viitorul acestei tehnologii poate avea un impact major asupra mai multor industrii și în variate circumstanțe. Asemenea roboți pot fi utilizați în diverse domenii care implică zone greu accesibile omului sau cu prezența condițiilor nocive pentru organismul uman. Explorarea planetară este unul din scopurile puse acestui robot, acesta fiind capabil de a traversa anumite

zone, de a lua decizii în mijlocul pericolelor cum ar fi rocile sau peșterile sau alte terenuri dificile. Sistemele de control avansate, cu care poate fi dotat, interpretează informațiile senzoriale pentru a identifica căile de navigație adecvate, precum și obstacolele și semnalizarea relevantă. Fiecare robot poate dispune de un computer încorporat cu un radio wireless pentru comunicații și o cameră stereo cu mai multe lentile și senzori de imagine pentru a simți mediul din fața acestuia și pentru a capta imagini 3D. Ei pot comunica între ei și lucra împreună pentru a crea hărți și a identifica pericolele în timp real pe măsură ce explorează o suprafață. În special, roboții pot fi trimiși în misiuni precursoare pe alte planete pentru a oferi mai multe informații despre destinație înainte ca oamenii să aterizeze pe aceste destinații. În plus, roboții pot însoți astronauții în timpul misiunilor pentru a ajuta la cercetarea anumitor terenuri sau cu logistică și multe sarcini care pot face misiunile astronauților mai sigure și mai eficiente.[2] Exploatarea unui loc periculos sau chiar în misiuni pe Lună. Prezenta lucrare cuprinde destul de detaliat aspecte teoretice ce țin de placa Arduino și celelalte componente utilizate pentru crearea unui echipament specific pentru a proteja omul împotriva factorilor fatali pentru viața umană. Această informație permite vizualizarea clară a viitorului proiect.

2.1 Arduino Uno

Arduino Uno este o placă de microcontroler bazată pe ATmega328P.Acesta dispune de 14 pini de intrare/ieșire digitale, 6 intrări analogice, un rezonator ceramic de 16 MHz, o conexiune USB, o mufă de alimentare, un antet ICSP și un buton de resetare. Placa respectivă conține tot ce este necesar pentru a susține microcontrolerul, pur și simplu este nevoie de a-l conecta la un computer cu un cablu USB sau poate fi alimentat cu un adaptor AC-la-DC sau cu o baterie pentru a începe. Placa poate funcționa pe o sursă externă de la 6 la 20 volți. Cu toate acestea, dacă este furnizat cu mai puțin de 7V, pinul de 5V poate furniza mai puțin de cinci volți și placa poate deveni instabilă. Dacă se utilizează mai mult de 12 V, regulatorul de tensiune se poate supraîncălzi și deteriora placa. Intervalul recomandat este de la 7 la 12 volți.[1] Arduino UNO este cea mai bună placă pentru a începe cu electronica și codificare. Dacă aceasta este prima experiență, UNO este cea mai robustă placă cu care este simplu de a începe primele proiecte. UNO este placa cea mai folosită și documentată din întreaga familie Arduino.

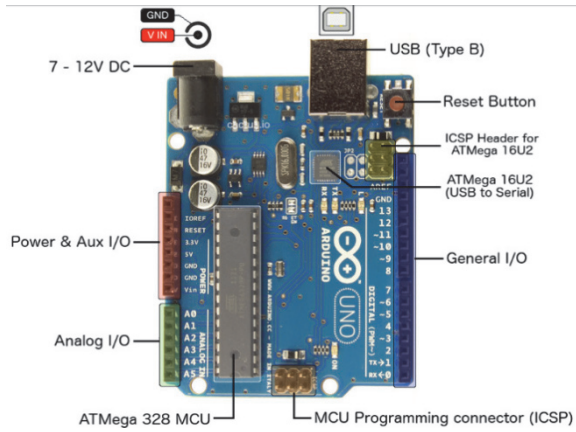

Figura 1. Arduino Uno, componente.

ATmega328 de pe Arduino Uno vine preprogramat cu un bootloader care permite să se încarce cod nou pe acesta fără a utiliza un programator hardware extern. Acesta comunică folosind protocolul original STK500. De asemenea, este posibil de a ocoli bootloader-ul și programa microcontrolerul prin antetul ICSP (In-Circuit Serial Programming) folosind Arduino ISP.

Arduino Uno are o polifuziune resetabilă care protejează porturile USB ale computerului de scurtcircuit și supracurent. Deși majoritatea computerelor oferă propria protecție internă, siguranța oferă un strat suplimentar de protecție. Dacă se aplică mai mult de 500 mA la portul USB, siguranța va întrerupe automat conexiunea până când scurtcircuitul sau suprasarcina este eliminată.

Fiecare dintre cei 14 pini digitali de pe Uno poate fi folosit ca intrare sau ieșire, folosind funcțiile pinMode(), digitalWrite() și digitalRead(). Ele funcționează la 5 volți. Fiecare pin poate furniza sau

primi 20 mA conform condițiilor de funcționare recomandate și are un rezistor intern de tracțiune (deconectat implicit) de 20-50k ohmi. Un maxim de 40mA este valoarea care nu trebuie depășită pe niciun pin I/O pentru a evita deteriorarea permanentă a microcontrolerului.[1]

Arduino Uno are o serie de facilități pentru comunicarea cu un computer, o altă placă Arduino sau alte microcontrolere. ATmega328 oferă comunicație serială UART TTL (5V), care este disponibilă pe pinii digitali 0 (RX) și 1 (TX). Un ATmega16U2 de pe placă canalizează această comunicare serială prin USB și apare ca un port de comunicație virtual pentru software-ul de pe computer. Firmware-ul 16U2 utilizează driverele standard USB COM și nu este necesar niciun driver extern. Cu toate acestea, pe Windows, este necesar un fișier extensie .inf. Software-ul Arduino (IDE) include un monitor serial care permite trimiterea de date textuale simple către și de la placă. LED-urile RX și TX de pe placă vor clipi când datele sunt transmise prin cipul USB-la-serial și prin conexiunea USB la computer.[1].

Bluetooth Module

Modulul Bluetooth este un modul ușor de utilizat, conceput pentru configurarea transparentă a conexiunii seriale fără fir. Această comunicare reprezintă o modalitate ușoară de interfață cu controlerul sau PC-ul. HC-05 Bluetooth modulul oferă modul de comutare între modul master și modul slave, ceea ce înseamnă că poate fi utilizat nici primind, nici transmițând date.

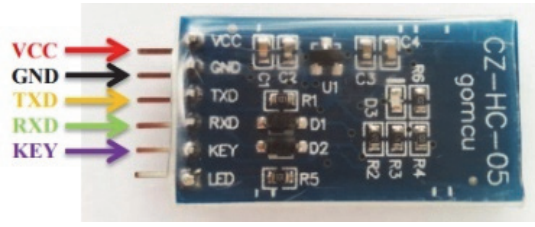

Figura 2. Bluetooth module.

Bluetooth este liber de utilizat în protocolul de comunicație fără fir, deoarece raza de acțiune a Bluetooth este mai mică decât celelalte protocoale de comunicație fără fir precum WiFi și Zigbee. Bluetooth-ul funcționează la frecvența de 2,41 GHz și este, de asemenea, utilizat în multe game mici de aplicații. Modulul Bluetooth necesită un protocol de comunicație pentru a interfața cu celelalte dispozitive. Microcontrolerul poate comunica cu dispozitivele Bluetooth prin următoarele comunicații prin cablu pentru a primi și trimite informații către alte dispozitive Bluetooth.

UART

SPI

USB

Acest modul este utilizat mai ales în proiectele încorporate. Modulele Bluetooth HC 05 sunt ușor de utilizat și simplu, prețul său este scăzut și aceste tipuri de module sunt interfațate cu Arduino, Rasberry Pi și Microcontroller prin interfața serială UART.

Ultrasonic senzor

Un senzor ultrasonic este un instrument care măsoară distanța pînă la un obiect folosind unde sonore ultrasonice. El folosește un traductor pentru a trimite și a primi impulsuri ultrasonice care transmit informații despre apropierea unui obiect. Undele sonore de înaltă frecvență reflectă de la granițe pentru a produce modele distincte de ecou. Senzorii cu ultrasunete funcționează trimițînd o undă sonoră la o frecvență peste intervalul de auz uman. Traductorul senzorului acționează ca un microfon pentru a primi și a trimite sunetul ultrasonic. Senzorul determină distanța pînă la o țintă prin măsurarea intervalelor de timp dintre trimiterea și primirea impulsului ultrasonic.

Distanța poate fi calculată cu următoarea formula:

$$Distanța\ L = 1/2 \times T \times C \quad (1)$$

unde L este distanța, T este timpul dintre emisie și recepție și C este viteza sonică. Valoarea este înmulțită cu 1/2 deoarece T este timpul pentru distanța de dus și întoarcere.

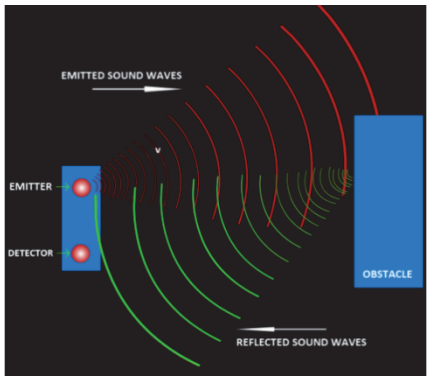

Figura 3. Modul de funcționare a senzorului ultrasonic.

Principiul de funcționare al acestui modul este simplu. Trimite un impuls ultrasonic la 40 kHz care călătorește prin aer și, dacă există un obstacol sau un obiect, acesta va reveni la senzor. Calculând timpul de călătorie și viteza sunetului, distanța poate fi determinată.

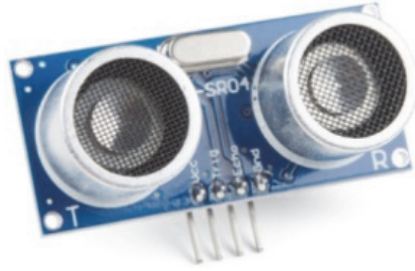

Table 5. **Figura 4.** Senzor ultrasonic.

Senzorii cu ultrasunete sunt o soluție excelentă pentru detectarea obiectelor clare. Pentru măsurarea nivelului lichidului, aplicațiile care folosesc senzori cu infraroșu, de exemplu, se luptă cu acest caz particular de utilizare din cauza translucidenței țintei. Pentru detectarea prezenței, senzorii cu ultrasunete detectează obiecte indiferent de culoare, suprafață sau material (cu excepția cazului în care materialul este foarte moale ca lâna, deoarece ar absorbi sunetul).

Concluzii

Realizarea acestui proiect a fost interesantă întrucât este un domeniu important pentru societate din mai multe puncte de vedere. În primul rând ar scădea semnificativ numărul accidentelor ce au loc în zonele periculoase de muncă, cum ar fi minele. Inițial pot fi trimiși acești roboței pentru a studia zona respectivă, iar ulterior după ce este asigurată siguranța oamenilor pot iniția ei munca. De asemenea o serie de zone nestudiate până la moment ar deveni mult mai simplu de cercetat. Un succes major ar reprezenta descoperirea spațiului cosmic. Aceste mașini pot fi înzestrate cu piese care ar permite colectarea materiilor pentru cercetări.

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Digitalizarea și avuția națională

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Abstract
Sunt prezentate conceptele de digitalizare și de avuție naționale. Este arătat modul în care procesul de digitalizare contribuie la creșterea avuției naționale. Sunt date modele de estimare a volumului componentei digitale din avuția națională și modele de estimare a costurilor generate de accelerarea creșterii ritmului de digitalizare pentru componentele avuției naționale.
Avuția națională este o construcție de mare complexitate la care participă toată lumea care dorește soluționarea de probleme prin intermediul echipamentelor hardware și software, prin achiziția de date și stocarea acestora.

1. Digitalizarea, componentă esențială a informatizării

Digitalizarea este procesul prin care toate documentele aflate sub formă de documente pe hârtie sunt transpuse în fișiere prin scanare și fotografiere, informațiile stocate pe discuri de vinil, filme pe pelicule de celuloid sunt supuse conversiei pentru a deveni fișiere, iar schimburile de informații dintre persoane se realizează numai folosind fișiere create și transmise ca atare.
Digitalizarea este un proces amplu, care necesită:

- personal calificat,
- echipamente de conversie,
- suport de stocare,
- software de management a arhivelor,
- schimbarea mentalității privind securitatea fișierelor.

Condițiile ultimilor ani au adus în centrul atenției accelerarea procesului de digitalizare, urmând ca perioadele ce vor veni să fie implementată strategia națională conform căreia să se aloce sume importante pentru achiziționarea de echipamente și pentru derularea unor procese de conversie de pe diferite tipuri de suporți purtători de informație, prin digitalizare a informației în fișiere de diferite formate, pentru texte, sunete, imagine și filme.
Organizațiile vor dispune de arhive cu documente în totalitate scanate și cu sisteme rapide de regăsire a informațiilor.
Bibliotecile vor încheia procesele de scanare a cărților, manuscriselor și revistelor din patrimoniu, astfel încât să se realizeze accesul neîngrădit la fondul documentar din dotare, fără a exista restricțiile privind deteriorarea datorată manipulării vechilor documente.
Digitalizarea va conduce la crearea de baze de date complexe, care prin integrare, vor defini un alt mod de lucru, specific debirocratizării din societate.

2. Avuția națională și digitalizarea

Conceptul de avuție națională a înregistrat o evoluție odată cu cristalizarea teoriei sistemelor și abordarea cibernetică a fenomenelor din societate. Se vorbește de componente ale avuției naționale, se vorbește de valorile avuției naționale și de valoarea avuției naționale, mergându-se la limită în a se stabili costuri ale componentelor avuției naționale, prin folosirea de ipoteze și limite legate de exactitatea expresiilor valorice estimate, măsurate sau deduse.
Apariția calculatoarelor electronice a generat definirea unor noi tipuri de componente ale avuției

naționale și aici este vorba de produsele software, care au o serie de trăsături precum:
sunt acorporale,
nu au uzură fizică,
au costuri nule de reproductibilitate,
au uzură morală accelerată,
în structura costurilor de producție, salariile sunt dominante.
Tehnologiile noi care au apărut au determinat extinderea utilizării și diversificării fișierelor cu care se lucrează acum, căci există fișiere pentru documente, pentru imagine, pentru filme, pentru sunete și corespunzător, există echipamente și produse software pentru achiziție de date, pentru stocare și pentru asigurarea integrității și securității acestora.
Dacă acum 70 de ani, la enumerarea componentelor care alcătuiau avuția națională lista era una intuitivă și categoriile incluse erau sugestive, cu apariția calculatoarelor electronice și a echipamentelor de achiziție de informații, toate componentele rezultate sub formă de fișiere, vin să se adauge celorlalte componente clasice ale avuției naționale.
Disponibilul de resurse financiare și dimensiunea costurilor proceselor de digitalizare determină ritmul acestui proces, căci în multe situații s-a considerat că digitalizarea unei arhive, a unei biblioteci, a unor fonoteci nu sunt procese prioritare, deci dacă rămân în așteptare nu apar probleme deosebit de grave în dezvoltarea economico-socială. Numai că ritmul lent al digitalizării influențează negativ întreaga dinamică a societății, întrucât se accentuează risipa singurei resurse netangibile care este timpul. Conform (Parviainen et al, 2017), impactul digitalizării și obiectivele digitalizării pentru o organizație pot fi identificate din trei puncte de vedere diferite, Figura 1.

3. Căi de creștere a avuției naționale prin digitalizare

Avuția națională în structura cunoscută de dinainte de apariția calculatoarelor electronice, are dinamica ei , iar contextul perioadei pe care o trăim aduce o serie de particularități, lumea fiind mult mai atentă cu protejarea mediului înconjurător. Schimbările din industria cărbunelui, determină scăderi masive a contribuției acestei industrii în structura avuției naționale.

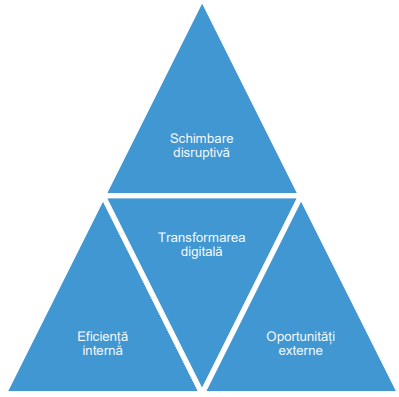

Figura 1. Impactul digitalizări (Parviainen et al, 2017)

Avuția națională digitală, care este componentă nouă a avuției naționale înregistrează creșteri spectaculoase, iar căile de creștere identificate sunt următoarele:
accelerarea procesului de digitalizare în domenii esențiale precum arhivele, bibliotecile, editurile, fonotecile, filmotecile, dar și în multe alte zone unde produsele multimedia își dovedesc utilitatea și eficiența,
abordarea completă a dezvoltării de aplicații informatice care generează documente direct sub formă de fișiere, eliminându-se în acest fel manipularea de documente tipărite, fotocopiate sau redactate pe hârtie,
gestionarea cu atenție a produselor aflate în format digital pentru a fi evitate fie ștergerile involuntare, fie pierderile de fișiere în dorința de a elibera spațiul de stocare, deși arhivarea pe un suport extern este soluția ideală,
copierea periodică a conținutului digital pentru că este știut faptul că la anumite intervale, datorită scurgerii timpului și a influenței unor factori externi, dar și datorită îmbătrânirii materialelor de stocare, se produce deteriorarea conținutului digital; împrospătarea periodică este însoțită și de

reorganizarea conținutului digital, pentru a ține pasul cu noile tehnologii aflate în uz curent la momentul copierii,

- efectuarea de operații specifice pe conținutul digital deja existent în vederea creșterii valorii sale de întrebuințare, prin introducerea de noi cuvinte cheie, de noi imagini sau de derularea de procese de agregare ce duc la creșterea complexității componentelor avuției naționale digitale,
- extinderea numărului de utilizatori ai aplicațiilor informatice,
- antrenarea cetățenilor la crearea de conținut digital sub formă de fișiere în diferite formate, după cum rețelele de socializare sau aplicațiile de largă utilitate le pun la dispoziție,
- înzestrarea aplicațiilor informatice cu componente care asigură protecție atât produselor software, cât și bazelor de date, în fața atacurilor dirijate sau a unor modalități neadecvate de accesare de către operatori,
- construirea de variante de conținut digital care să asigure portabilitatea aplicațiilor informatice,
- realizarea de versiuni ale aplicațiilor informatice cu conservarea versiunilor precedente,
- impunerea unor rețete de reutilizare de componente software, cu efecte directe asupra creșterii potențialului de a dezvolta noi componente de avuție națională digitală cu caracter de originalitate cât mai ridicat.
- crearea de noi aplicații informatice folosind noi tehnici și metode, care în final conduc la scurtarea ciclului de dezvoltare, la creșterea calității produselor implementate și care reișesc să mărească atât numărul de utilizatori, cât și nivelul de satisfacție al acestora prin rezultatele prelucrărilor pe care utilizatorii reușesc să le realizeze direct.

Toate acestea presupun dezvoltarea de rutine eficiente de lucru, abordarea disciplinată a managementului de fișiere, căci în contextul actual nu se mai pune problema economiei de spațiu de stocare a informației.

4. Modele de estimare a dimensiunii avuției naționale digitale

Avuția națională digitală este creată în mod descentralizat, ceea ce necesită o analiză aprofundată a surselor de creație a acesteia.

Există dezvoltatori de produse software complexe în cadrul unor companii specializate.

Există echipe de dezvoltatori de software care acționează independent pentru realizarea unui produs software.

Există persoane care lucrează individual pentru scrierea de componente software. Avuția națională digitală nu înseamnă numai produse software, ci în ea se includ:

baze de date,

fișiere cu texte generate, fișiere cu imagini,

fișiere de sunet,

componente multimedia

Dimensiunea avuției naționale digitale este dată de componentele realizate într-un interval de timp exprimate ca nivel de ocupare a spațiului de stocare. Dacă acum zece ani dimensiunea avușiei naționale digitale se măsura în număr de Gb (Gigabyte), acum deja se fac estimări ale dimensiunii acesteia folosind nu Tb (Terabyte), ci Pb (Petabyte) și de ce nu Eb (Exabyte).

Un model de estimare a dimensiunii avuției naționale digitale DAND exprimată ca număr de Tb, este dat de relația:

$$DAND = a * \exp(b * NS)$$

unde:

a și b - coeficienții modelului,

NS - numărul de salariați din IT.

Pentru a estima coeficienții a și b se constituie serii de date cu dimensiuni efective ale componentelor create de un eșantion de dezvoltatori pe un interval de timp. După aceea, cu coeficienții astfel estimați se va trece la estimarea cu numărul de persoane care activează în domeniul IT. Dacă se dorește și

includerea celor care lucrează independent, la constituirea seriilor de date vor fi incluși în eșantion și o parte din aceștia. Există metode statistice care permit asigurarea reprezentativității datelor din eșantion și stabilitatea coeficienților a și b ai modelului.

Dacă se dorește construirea de modele cu complexitate mai mare, se includ mai mulți factori care influențează dimensiunea avuției naționale și modelele cresc în complexitate, fără a exista dificultăți de estimare a coeficienților și de utilizare a modelelor în fundamentarea deciziilor legate de dezvoltarea acestei componente de avuție națională.

5. Costuri ale avuției naționale digitale

Se știe că industria de producție software este deosebit de costisitoare, căci este o producție de unicate.

Ceea ce se știe la estimarea costurile de deviz pentru realizarea de sisteme informatice sau aplicații informatice, se translatează și spre estimarea de costuri ale componentelor avuției naționale digitale.

Nu trebuie să se emită pretenții că în procesul de estimare se vor obține niveluri de costuri, care prin comparație cu costurile efective, se înregistrează diferențe nesemnificative, foarte apropiate de zero. realitatea arată că apar diferențe destul de mari între costurile estimate pentru un sistem informatic, costuri ce apar în devizul cu care se semnează contractul inițial și costul efectiv al sistemului informatic, în momentul predării la cheie.

Dacă pentru un sistem informatic apar diferențe semnificative între costul estimat și costul efectiv, este clar că la nivelul de agregare dat de componentele avuției naționale digitale, diferențele vor fi și mai mari. Costurile estimate au caracter pur orientativ, pentru a se ști care sunt sumele necesare pentru a dezvolta avuția națională digitală cu un anumit procent sau pentru a realiza un grad de acoperire al unei tipologii de aplicații informatice cu un nivel definit deja.

Studiul complexității produselor informatice conduce spre un nivel agregat al acestei caracteristici. Dacă se construiește un set de modele pentru costurile complexității bazate pe complexitatea componentelor sau pe complexitatea componentelor și numărul de persoane care activează în domeniul IT, se va obține o imagine mai clară asupra efortului financiar cerut de atingerea unui obiectiv în contextul în care se alocă resurse și se dorește atingerea unei ținte de complexitate. Variante de modele ale costurilor CAND ale avuției naționale digitale sunt:

$$CAND = a * C + b$$
$$CAND = a * \exp(b * C)$$
$$CAND = a * C^d * NS^g$$

unde:

a, b, d, g - coeficienții modelelor

C- complexitatea componentelor avuției naționale digitale,

NS - efortul depus de persoanele care elaborează componente.

Trebuie remarcat faptul că aceste modele au numai un caracter orientativ, pentru că la ora actuală procesul de dezvoltare de componente pentru avuția națională este extrem de complex, greu de cuantificat, căci multe persoane lucrează pe cont propriu, iar componentele migrează în mediul virtual cu o viteză foarte mare și volatilitatea lor impune o prudență crescută în a face evaluări.

6. Concluzii

Scăderea ponderii documentelor tipărite sau scrise pe hârtie va duce la creșterea preocupării tuturor persoanelor de a crea arhive digitale și de a lucra cu componentele acestora, iar elementele de actualizare vor fi efectuate numai prin adăugare de fișiere. Fișierele sau articolele din baze de date nu mai sunt șterse, nu mai sunt modificate. Tot timpul vor apare noi conținuturi digitale, care prin codificări adecvate vor furniza informații că fișierele sunt fie dezactivate, fie conțin informații modificate în raport cu conținutul altor fișiere mai vechi. În acest fel se reproduc operațiile cunoscute în lumea documentelor pe hârtie, din fișete, bibliorafturi sau din dosare.

Încrederea pe care toți oamenii o vor avea în documentele în format digital va fi atât de puternică, încât aceștia vor folosi beneficiile oferite de aplicațiile care asigură transparența tuturor proceselor și regăsirea informației după chei flexibile.

Digitalizarea are menirea de a schimba raporturile dintre cetățeni și informație, întrucât dispar acele bariere pe care le-au invocat secole de-a rândul oamenii care motivau unele minusuri din activitatea lor prin imposibilitatea de a accesa documente fundamentale.

În era digitalizării, calitatea tuturor producțiilor intelectuale va depinde strict de capacitatea fiecăruia dintre noi de a se organiza, de a se documenta și de a implementa noi idei, dar și de managementul de a lucra în echipe interdisciplinare, în absența limitărilor de acces la informațiile cerute de un nivel de documentare excepțional ca arie de cuprindere, profunzime și nivel de agregare, bazat de utilizarea inteligenței artificiale.

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Despre autori

Ion IVAN a absolvit Facultatea de Calcul Economic și Cibernetică Economică în 1970. Este doctor în științe economice din 1978 și ocupase toate funcțiile didactice din 1970 când s-a alăturat personalului Academiei de Studii Economice București, asistent universitar în 1970, lector superior în 1978, asistent universitar în 1991 și profesor titular în 1993. Este autorul a peste 25 de cărți și a peste 75 de articole de reviste în domeniul managementului calității software, al metricii software și al auditului informatic. Activitatea sa se concentrează pe analiza calității aplicațiilor software. A participat în comitetul științific a peste 20 de Conferințe de Informatică și a coordonat apariția a 3 volume de lucrări pentru Conferințe Internaționale. Din 1994 este coordonator de doctorat în domeniul Informaticii Economice. Principalele sale domenii de interes sunt: metricile software, optimizarea aplicațiilor informatice, dezvoltarea și evaluarea entităților text, analiza implementării eficiente a codurilor etice în domeniul informatic, managementul calității software și managementul calității datelor.

Alin ZAMFIROIU a absolvit Facultatea de Cibernetică, Statistică și Informatică Economică în 2009. În 2011 a absolvit Programul de Master Informatic Economic, organizat de Academia de

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Principalele sale preocupări științifice sunt în domeniile: securitatea dispozitivelor mobile, calitatea aplicațiilor mobile, comportamentul utilizatorilor în cadrul platformelor web, tehnologiile IoT.

TIC pentru Interacțiunea prietenoasă a adulților în cooperarea continuă între generații.

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Scopul lucrării: Dezvoltarea strategiilor de implemenatre a Tehnologiilor Informaționale și de Comunicare (TIC) în viața celor vârstnici, cu scopul asigurării a unui support informational, medical și social pentru seniori angajați (persoanele din perioada de pre-pensionare), seniorii asociați (pensionarii cu angajare part-time în continuare) și seniori afiliați (profesori pensionari fără angajare în continuare).
Abordarea: Sunt examinate diferite surse TIC ce reprezintă metode de implemetare a TIC și a inteligenții artificiale în viața cotidiană a vârstnicilor cu sopul explorării modului de interacționare cu societatea.
Constatări: În prezent, o nouă concepție privind îmbătrânirea pune sub semnul întrebării imaginea foarte larg răspândită anterior a bătrâneții ca perioada a declinului fizic și psihic inevitabil. În present oamenii trăesc mai mult și mai bine decât oricând în istorie. În contextul obiceiurilor de sănătate și a îngrijirilor medicale mai bune, devine tot mai greu de trasat granița dintre sfârșitul vârstei mijlocii și începutul vârstei a treia, granița pe care o trasăm arbitrar la 65 de ani. Grupa de vârstă cu cea mai rapidă creștere numerică este alcătuită din oameni de 80 ani și peste: „ ...conform datelor statistice prognozate se estimează o creștere a ponderii vârstnicilor de la 17,2% în prezent până la 33% către anul 2050". Astfel apare necesitatea creării locurilor de muncă pentru vârstnici și sporirii suportului TIC de monitorizare a evoluției bunăstării vârstnicilor.
Sugestii de cerecetare: Analiza modului și nivelului de interacțiune între seniori și generațiile tinere prin intermediul TIC cu scopul elaborării unui plan de implimentare a efectivelor de conlucrare intergenerațională.
Valoarea aplicativă: Studiul dat urmează să ofere support informațional specialiștilor în domeniul TIC și organelor responsabile pentru Planul de acțiuni privind implementarea principiului îmbătrânirii active și alipit la Strategia de dezvoltare a industriei TIC și a ecosistemului pentru inovare digitală pe anii 2019-2024 și la Planul de acțiuni privind implementarea acesteia (Europa 2030)
Noutatea şi originalitatea ştiinţifică: Necesitatea elaborării strategiilor de famialiarizare a societății cu aspectul progresului TIC în favoarea susținerii bunăstării oamenilor în vârstă.
Cuvinte cheee: TIC, adult, bunăstare, Internet, rețele, generații, 4G, 5G, 6G, omnipresent, IoT; JEL: B55, C53, C88,D23

Introducere

Societatea modernă evoluează sub semnul unor schimbări rapide. Inovarea permanentă, datorată creativităţii oamenilor, este un progres implicit, dar aduce şi o cantitate enormă de informaţie. Schimbarea se produce la toate nivelurile: în viaţă de zi cu zi a oamenilor, în organizaţii şi în sistemele sociale. În societatea actuală, *schimbarea este un nou mod de viaţă.*

Prograsul social este evidențiat de etapele, valurile revoluționale, prin care trece Omenirea. Sunt evidențiate revoluțiile agrară, industrială până la Era informațională, prezentată de revoluția informației, care în prezent este prezentată de revoluția cunoașterii și în viitorul apropiat – revoluția conștiinței (Figura 1.9).

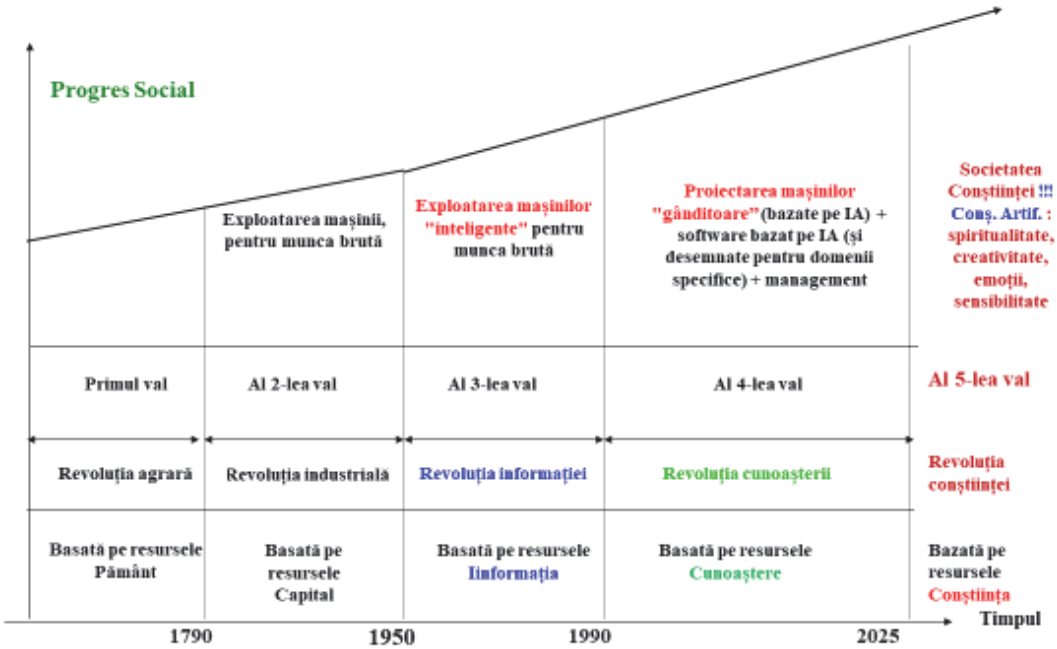


Figura nr. 1. Progres social. Era informațională.

Trecând deja de primii ani ai noului mileniu, ne putem întreba cum va fi viaţa noastră. În ultimele decenii am trecut prin multe transformări care au condus la Era informaţională. Pentru un cetăţean obişnuit, ultimele două decenii ale secolului trecut pot fi numite "al PC-ului" şi "al lărgimii de bandă", respectiv. Pe măsură ce societatea informaţională (information society – IS) se dezvoltă, impactul său nu poate fi încă bănuit. Societatea total informaţională va deveni realitate printr-o evoluţie a tehnologiei informaţionale a **societăților conoașterii și a conștiinței.**

1. Evoluția comunicațiilor electronice. Reţelele de calculatoare sunt colecţii de calculatoare care sunt conectate şi pot schimba informaţii conform unor standarde. După suprafaţa ocupată de calculatoare, reţele se pot clasifica în:

reţele locale (***l****ocal* ***a****rea* ***n****etwork* – *LAN*), care deservesc o firmă, un departament, situate de obicei într-o clădire sau într-un grup de clădiri alăturate. Prezintă rate mari de transfer de date şi tehnici specifice de acces.

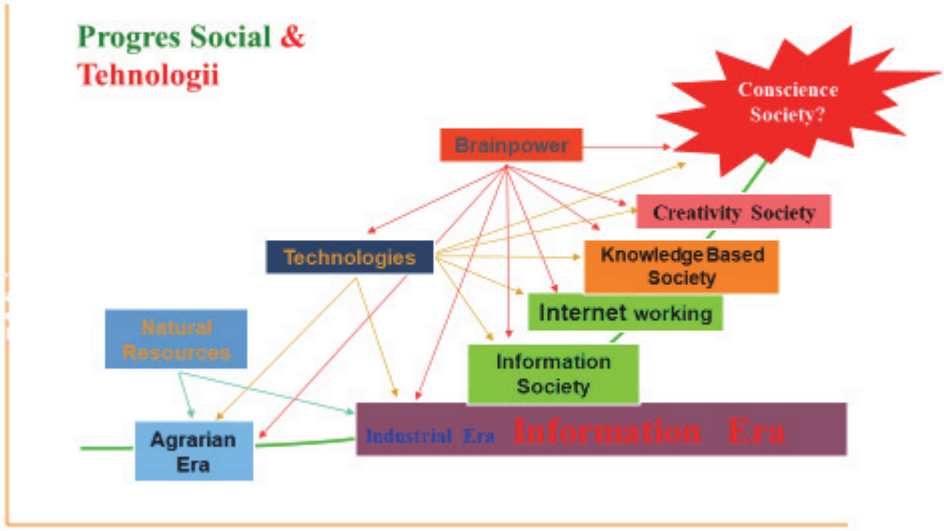


Figure nr. 2. Information Society (1970) ... Creativity Society (2019) ... Conscience Society (2023-2035)

- reţele orăşeneşti (metropolitan area network – MAN), care se extind la nivelul unui oraş. Se folosesc în comun medii de transfer pentru diverse tipuri de comunicaţie, astfel ca transferul să se facă direct de la sursă la destinaţie.
- reţele largi (wide area network – WAN), au extindere zonală, sunt eterogene şi se interconectează prin închirierea de linii de la operatorii de telecomunicaţie.
- reţele globale (global area network – GAN), sunt interconectări de reţele continentale, folosind sateliţii. Internet-ul este o reţea globală.

În SUA, Departamentul de apărare (***D**epartment **o**f **D**efense – DoD*) a realizat primele conexiuni între calculatoare. Centrele universitare au înfiinţat în 1986 NSFNet, reţeaua *NSF* (***N**ational **S**cience **F**oundation*), pe care au deschis-o utilizatorilor comerciali în 1995. Alte reţele (Usenet, Bitnet) au intrat în această reţea, care a devenit mondială.

În anul 1991, **Tim Berners-Lee** a făcut public proiectul ***W**orld **W**ide **W**eb* (*www*), la doi ani după ce crease HTML, HTTP şi primele pagini web în Elveţia. Browser-ul Mosaic 1.0. (lansat în 1993) deschide interesului public ceea ce era până atunci un Internet academic sau tehnic. În anul 1996 cuvântul **Internet** devine de uz comun, dar este referit de publicul larg doar în sens www.

Deşi are o structură fizică incredibil de complexă, Internet-ul funcţionează datorită contractelor comerciale, precum şi specificaţiilor tehnice (**protocoalelor**) care arată cum trebuie să se schimbe datele. Pentru prima dată în istoria **comunicaţiilor**, protocoalele au un caracter ***agnostic*,** adică nu ţin cont de mediul fizic de transmisie. Această idee fundamentală permite transferul pachetelor de date către orice colţ al lumii, indiferent de tipul legăturilor fizice dintre calculatoare.

Protocoalele Internet sunt rezultatul discuţiilor deschise ale *IETF* (***I**nternet **E**ngineering **T**ask **F**orce*), sub forma documentelor *RFC* (***R**equest **f**or **C**omments*). Câteva dintre cele mai utilizate protocoale sunt: IP, TCP, UDP, DNS, PPP, SLIP, ICMP, POP3, IMAP, SMTP, HTTP, HTTPS, SSH, Telnet, FTP, LDAP, SSL şi TLS. Câteva dintre serviciile Internet

care folosesc aceste protocoale sunt: e-mail, www, grupurile Usenet, Instant Messenger, Gopher, file sharing, session access, WAIS, finger, IRC. Dintre acestea, cele mai folosite sunt **www** şi **e-mail**.

Pasul înainte în conectarea calculatoarelor a fost făcut de firma Ericsson, la începutul anilor '90. Tehnologia ***Bluetooth wireless*** este destinată conexiunii USB pe distanţe scurte, cu transfer intens, consum scăzut de energie şi cost scăzut de utilizare şi menţinere. Această tehnologie este deja un **standard în conectarea telefoanelor mobile**, **PC-urilor**, **laptop**-urilor şi a altor dispozitive electronice mobile. Tehnologia complementară ***WiFi*** este echivalentul wireless al unei conexiuni Ethernet (reţele obişnuite, alcătuite din zeci de sisteme de calcul).

În **1996** firma israeliană Net2Phone a lansat primul serviciu comercial de **telefonie pe Internet**, cunoscută şi ca ***Voice over IP*** (*VoIP*). Acest serviciu *gratis* permitea prietenilor să converseze prin PC, vorbind în faţa microfoanelor şi ascultând în boxele sistemului. Ambele PC–uri trebuiau deci să fie pornite şi să existe conexiunea prin cablu telefonic. Pasul înainte a fost realizat în **2002**, când firma Vonage a lansat un serviciu care permite folosirea telefoanelor obişnuite pentru convorbiri VoIP. Metoda folosită este directarea convorbirilor pe **conexiunea de bandă largă**; utilizatorul primeşte apeluri pe un număr convenţional de telefon, fără a fi nevoie de pornirea calculatorului. Direcţia clasică (VoIP prin calculator) s-a dezvoltat şi ea, prin **Skype**, care oferă convorbiri telefonice internaţionale gratuite printr-o reţea mondială peer-to-peer [***-05].

În **2004**, a urmat un "al doilea val al Internet-ului", sau **"noul Internet".** Marile schimbări sunt aduse pe plan conceptual, prin revitalizarea competiţiei de pe piaţa mondială de software.

La 9 noiembrie **2004**, după câteva luni de testări, Mozilla a lansat **browser-ul Firefox**. Pentru prima dată, un browser alternativ a stârnit extrem de mult interesul utilizatorilor şi al dezvoltatorilor. Realizat în cod ***open-source***, noul browser este semnificativ mai rapid în multe domenii **decât Internet Explorer** şi în multe cazuri, mai uşor de folosit. Interfaţa cu etichete permite deschiderea mai multor pagini în aceeaşi fereastră. **Facilitatea *Smart Keywords*** asigură accesul instantaneu la dicţionare, informaţii financiare sau previziuni meteo. Dezvoltatorii independenţi aduc mereu extensii (*add-ons*) pentru îmbunătăţirea lucrului pe această platformă.

Schimbări mari au avut loc pe piaţa **motoarelor de căutare**. La **sfârşitul lui 2004,** Microsoft a lansat **MSN Search**, sperând să conteste hegemonia Google. La rândul său, Google introduce noi servicii: din septembrie **2004** ***Google Local*** permite căutarea informaţiilor specifice locaţiei utilizatorului. Anticipând succesul acestei funcţii de căutare, Ask Jeeves şi Yahoo au introdus în 2005 unelte similare. **Firma blinx** oferă însă o abordare complet diferită a căutării pe web: ***fără cuvinte cheie.*** Este suficientă deschiderea unui document, mesaj sau pagină web, pentru ca aplicaţia să caute automat după informaţii relevante, pe web dar şi pe propriul calculator [***-05].

Partajarea privată este un nou concept al mileniului III, aflat în legătură cu **tehnologia "liniştii".** Utilizatorilor le place să caute informaţii, dar doresc şi o metodă de a schimba fişiere doar cu persoane pe care le cunosc. Aplicaţiile Grouper, Qnext şi ShareDirect de la LapLink permit schimbul fişierelor de orice tip, fără a fi nevoie de transferul lor pe server sau de ataşarea la un e-mail: fişierele sunt transferate de pe desktop pe desktop.

Acum avem calculatoare personale puternice şi suntem conectaţi la reţele mondiale de calculatoare; timpul şi spaţiul nu mai au aceeaşi consistenţă ca în trecut. Calculatorul mediu aflat pe birouri este de câteva ori mai puternic decât ENIAC. **Revoluţia din domeniul calculatoarelor este cea mai rapidă schimbare tehnologică din istoria omenirii**.

2. Surprize tehnologice

Următoarele trei exemple ne vor arăta că surprizele apar din modul în care oamenii folosesc noile tehnologii, din ceea ce oamenii consideră că este interesant sau depăşit.

Pentru început, să ne imaginăm că îi arătăm lui **Henry Ford** automobilele de azi. Nu va fi impresionat de modificările de aspect, deoarece va vedea tot patru

roţi, un volan, transmisii şi un motor cu ardere internă. Dar va fi surprins când va vedea ce modificări a adus automobilul în viaţa de zi cu zi: autostradă, mall, fast-food, aglomerare în trafic – sunt noţiuni induse de automobil.

Alexander Graham Bell nu va fi surprins de telefoanele actuale, deoarece au şi acum receptor, microfon, furcă, mecanism de formare a numărului. Dar va fi mirat când va vedea schimbările de comportament induse: cartele telefonice, transfer electronic de bani, telemarketing, fax, cumpărături de acasă.

Thomas Edison nu va fi mirat de actualele becuri şi generatoare, dar va fi surprins de reţelele internaţionale de furnizare a energiei electrice, de radio şi televiziune.

3. Revoluţii tehnologice

Acum 60 de ani, informatica abia îşi definea conceptele de bază. Astăzi o regăsim în toate aspectele vieţii. Astăzi activăm în cadrul **convergenţei tehnologiilor**. Aceasta înseamnă că un obiect care funcţionează într-un mediu să poată funcţiona şi în alt mediu. Un film, un program de televiziune sau de radio, o melodie, un mesaj - deşi sunt diferite - în esenţă pot fi considerate un flux de biţi şi deci **se pot transmite pe un canal**. Această abordare este în evaluție și cu greu putem prognoza unde ne va duce. În cele ce urmează sunt prezentate câteva păreri ale unor celebri informaticieni.

3.1. Legea lui Moore

În 1965, Gordon Moore, şef al colectivului de cercetare Fairchild Semiconductor, a scris un articol asupra dezvoltării de perspectivă a industriei semiconductorilor, cu ocazia celei de-a 35-a aniversări a revistei *Electronics*. În acest articol, a făcut observaţia că produsul cel mai ieftin de pe piaţă şi-a dublat complexitatea în fiecare an din **1959, anul producerii primului prototip de microchip.** Această creştere exponenţială a componentelor de pe un chip a devenit cunoscută drept **legea lui Moore.** În anii '80, legea lui Moore a început să fie enunţată ca ***dublarea numărului de tranzistori de pe chip la fiecare 18 luni***. În anii '90, legea este interpretată ca ***dublarea puterii microprocesoarelor la fiecare 18 luni***, şi apoi: ***puterea calculatoarelor de un cost fixat se dublează la 18 luni.***

Legea lui Moore este folosită pentru a sublinia schimbările rapide din domeniul tehnologei informaţiei. Creşterea complexităţii procesoarelor şi reducerile de cost au dus la schimbări importante la nivel economic, organizaţional şi social. Se consideră că la momentul actual necesităţile de prelucrare sunt acoperite de capacităţile tehnice.

Dublarea repetată duce la **creştere exponenţială**, ceea ce conduce la ideea că limitele fizice ale microelectronicii se apropie rapid. Unii cercetători văd astfel posibilitatea sfârşitului legii lui Moore, într-un viitor mai apropiat sau mai îndepărtat. Un grup de experţi şi-a făcut publice ideile sub forma ITRS 2001 (International Technology Roadmap for Semiconductors): cele mai multe dintre tehnologiile actuale şi-au atins sau îşi vor atinge limitele în următorii 15 ani. Aceasta înseamnă că legea lui Moore va deveni în viitor invalidă.

Există însă cercetători care consideră că tehnologii aflate la început **(calculul natural, calculul cuantic)** permit considerarea momentului în care legea lui Moore va deveni invalidă, foarte îndepărtat în timp. Acest punct de vedere extinde aplicarea legii de la domeniul semiconductorilor la o gamă mai largă de echipamente de procesare, multe dintre ele imaginabile cu greu.

Legile care dublează pot fi înţelese la limită ca fiind dăunătoare: aceste noi tehnologii vor consuma şi resurse în acelaşi ritm. Astfel, costurile la nivel global sunt mult mai mari decât cele efectiv ale produselor obţinute. Istoria arată însă că nu este aşa: noile tehnologii folosesc mai puţine resurse. Oamenii au o capacitate nelimitată de a inventa metode ale viitorului cu care să depăşească barierele trecutului.

3.2. Legea lui Metcalfe

Legea lui Metcalfe spune că utilitatea unei reţele este egală cu pătratul numărului de utilizatori.

Telefonul este de mică utilitate dacă există doar două aparate. Dacă însă un întreg oraş este conectat la sistem, devine mult mai util. Dacă toată planeta este

conectată, atunci utilitatea este imensă. În anul 1931, când companiile telefonice au introdus tonul în aparate şi au renunţat la operatorii care realizau manual legăturile, s-a produs scăderea costurilor şi deci extinderea reţelei telefonice. Mai întâi, folosirea telefoanelor a trebuit să atingă masa critică; la fel se petrec lucrurile în cazul oricărei alte tehnologii. Înainte de atingerea masei critice, schimbarea tehnologică modifică numai tehnologia însăşi. **După atingerea masei critice, schimbarea tehnologică produce modificări sociale, economice şi politice**. Aceasta este ***legea separării***. Aşa s-a întâmplat în cazul **radioului şi al televiziunii**. Aşa se întâmplă în cazul tehnologiilor digitale. De exemplu, **Internet-ul a atins masa critică în 1993**, când erau conectate 2,5 milioane de calculatoare. Cum costurile scad rapid, **numărul de calculatoare legate în reţea creşte exponenţial**; consecinţele sunt modificări în toate aspectele vieţii oamenilor: **comerţ electronic, comunicare instantanee, transferuri bancare on-line sigure, teleconferinţe, ştiri on-line.**

Andrew Odlyzko şi Benjamin Tilly au publicat în 2005 o lucrare în care susţin că legea lui Metcalfe supra-estimează valoarea unei reţele; cei doi cercetători avansează ideea că **valoarea reţelei este proporţională cu n·ln(n),** unde n este numărul de membri. Unul dintre motivele acestei estimări este manifestarea grupurilor în reţea: de obicei conexiunile între membri necunoscuţi nu se realizează [Odl – 05].

În contrast, **David Reed** considera că **legea lui Metcalfe sub-estimează valoarea unei reţele**; un nou membru adaugă reţelei atât valoarea sa individuală, cât şi valoarea pe care o adaugă sub-reţelelor pe care le constituie prin conexiuni; astfel, **valoarea unei reţele este proporţională cu 2^n, unde n este numărul de membri** [Ree – 00].

3.3. Legea lui Bell

Legea lui Bell a fost enunţată în 1972: tehnologiile din domeniile semiconductorilor, a stocării, a interfeţelor-utilizator şi a reţelelor permit realizarea unei noi clase de calculatoare la fiecare 10 ani. O dată formată, fiecare clasă este menţinută ca o structură industrială independentă. Aceste clase sunt: calculatoarele (anii' 60), minicalculatoarele ('70), calculatoarele personale şi staţiile de lucru ('80), reţele de calculatoare ('90), serviciile de reţea (2000), rețelele 5G (2001), rețelele 6G (2023).

3.4. Tenologia „Liniștii”, rețele corporale

Cercetătorii împart **istoria informaticii** în **trei etape. Prima etapă** este caracteristică unor calculatoare puţine şi scumpe; utilizatorii le foloseau pe rând, atunci când aveau de rezolvat câte o problemă. **A doua etapă** este era calculatoarelor personale: fiecare doritor are un calculator pe care îl utilizează când are nevoie. **A treia etapă** este cea a calculatoarelor aflate peste tot: numărul calculatoarelor depăşeşte prin multe ordine de mărime numărul oamenilor; urmaşii noştri vor folosi miloane de calculatoare, care vor deveni invizibile în viaţa lor. Calculatoarele nu vor mai fi surse de nesiguranţă sau haos. Ajungem la tehnologia "liniştii" (***calm technology***).

4. Reţele corporale

Pe măsură ce **produsele electronice** devin tot mai mici, mai ieftine şi cu un consum scăzut de energie, oamenii au început să "poarte" dispozitive de comunicare: telefoane celulare, pagere, jocuri video, asistenţi personali (PDA). La momentul actual aceste dispozitive nu pot partaja date. Legarea lor în reţea ar reduce redundanţele de intre/ieşire şi ar permite apariţia de noi produse şi servicii. Astfel a apărut conceptul de ***reţea corporală*** **(PAN – Personal Area Network**).

Printr-o **reţea corporală**, dispozitivele apropiate corpului uman schimbă informaţie digitală prin curenţi de slabă intensitate, care tranzitează corpul uman. Prin folosirea unei **unde purtătoare de joasă frecvenţă** se elimină posibilitatea interceptărilor şi a interferenţelor. Un prototip PAN permite utilizatorilor să schimbe cărţi electronice de vizită printr-o strângere de mână.

Ne îndreptăm spre un viitor electronic, în care informaţia este accesibilă **oricui, oriunde şi oricând (rețele 6G).** Unele dintre echipamentele necesare vor fi încorporate în haine. Cel care are telefon celular, pager, ceas, CD-player, PDA şi laptop are 5 display-uri, trei tastaturi, două microfoane, două difuzoare şi trei dispozitive de comunicare. Multiplicarea este

rezultatul imposibilităţii partajării resurselor de calcul (a datelor şi a dispozitivelor de intrare-ieşire). Legarea într-o reţea corporală a dispozitivelor menţionate va furniza servicii imposibile echipamentelor izolate.

Se preconizează (în **reţelele 5G şi 6G**) că utilizatorul va purta un dispozitiv care transmite periodic un **cod unic**, care îi permite unei staţii locale să îl identifice, să îl localizeze şi să schimbe mesaje.

Una dintre problemele care trebuie rezolvate este **securitatea**: utilizatorul hotărăşte când activează dispozitivul şi ce informaţii poate acesta să transmită. Rămâne de văzut dacă li se va permite magazinelor viitorului să ofere discount-uri cumpărătorilor care îşi lasă dispozitivul PAN pornit atunci când intră în magazin.

Dispozitivele PAN pot lua forma unor obiecte comune: ceas, carte de credit, ochelari, curea, pantofi. Dispozitive dedicate PAN pot fi fixate pe cap şi pot conţine căşti, microfon, mini-display, proteză auditivă. **Pentru încheietura mâinii** se pot imagina un microfon, o cameră video, un display şi un difuzor. Dispozitive grele ar putea fi **montate pe curea**. Dispozitive medicale de monitorizare a inimii, sângelui şi respiraţiei **se pot ataşa direct pe corp**. **Portofelul poate fi un dispozitiv PAN** pentru stocarea informaţiilor şi identificarea posesorului. **Inserţiile în pantofi** pot genera energia necesară şi pot realiza astfel legătura cu staţia locală de identificare.

Facilităţile oferite de dispozitivele autonome dar interconectate converg către noţiunea de **intrare/ieşire omniprezentă**. Cum porturile de **reţea wireless** devin din ce în ce mai comune, nu mai este cazul să ne preocupe consumul de energie sau capacitatea memoriei. Serviciile wireless folosite de telefoanele celulare şi reţelele locale, care aglomerează spectrul radio, pot fi înlocuite prin comunicarea locală dintre PAN şi staţia apropiată.

5. A treia paradigmă

C**alculul omniprezent** defineşte a **treia etapă a informaticii**, care începe la momentul actual. Ne aflăm de fapt în perioada de tranziţie între perioada calculatoarelor personale şi perioada **calculatoarelor omniprezente**; realizăm pasul între momentul în care omul şi maşina se află faţă în faţă, la masa de lucru şi momentul în care tehnologia de calcul se retrage către **zona nepercepută a vieţii omului**.

În etapa tehnologiei "liniştii" se produce oarecum opusul realităţii virtuale. Dacă realitatea virtuală plasează oamenii într-o realitate generată de calculator, etapa calculatoarelor omniprezente forţează maşinile de calcul să lucreze în lumea oamenilor. Pentru a atinge o asemenea performanţă, este necesară o integrare destul de dificilă cu factorul uman, cu ingineria şi ştiinţele sociale. Această abordare a informaticii poartă numele de "A treia paradigmă".

Calculul omniprezent a fost abordat la nivel teoretic pentru prima dată în anul 1988 de cercetătorul **Mark Weiser** de la Laboratoarele Xerox PARC. În lucrările sale, acesta descrie astfel **viitoarele interacţiuni om-calculator.**

"Inspirată de cercetătorii din domeniile ştiinţelor sociale, al filosofiei şi al antropologiei, această lucrare doreşte să arate cum ar trebui să fie calculatoarele şi reţelele viitorului. Ideea principală este că oamenii trăiesc folosind practica şi cunoştinţele lor astfel încât cele mai puternice elemente sunt cele care sunt invizibile în utilizare. Această idee provocatoare, aplicată în informatică, duce la **a treia paradigmă de calcul.** Primul lucru de realizat este **"activarea":** existenţa a mii de **dispozitive wireless** pentru fiecare persoană, de toate mărimile, formele şi pentru toate scopurile. Împreună cu acestea trebuie să existe **noi sisteme de operare în reţea, interfeţe şi legături**, care să lucreze invizibil şi transparent din punctul de vedere al utilizatorului uman, la nivel structural şi nu la nivel personal.

Până acum, calculatoarele şi interfeţele au fost proiectate în **ideea realizării "dramatice":** să facem un calculator atât de interesant, atât de puternic, atât de minunat încât să nu ne putem lipsi de el. **Direcţia realizărilor "invizibile"** este abordată la momentul actual. Acum cercetătorii se orientează către un calculator atât de natural, atât de potrivit scopului său, atât de integrat altor sisteme electronice, încât să fie folosit fără să ne dăm seama. Acest lucru nu este uşor,

deoarece majoritatea infrastructurilor actuale vor dispărea. În ultimii patru ani am construit în laborator câteva prototipuri; unele de 3 mm, altele de 30 cm, altele de 1 m, denumite Tab, Pad sau Board. Aceste prototipuri uneori au reuşit, dar de cele mai multe ori au eşuat în tentativa de a rămâne invizibile. Cercetările şi realizările ne fac să credem că această direcţie este promiţătoare şi că va deveni **dominantă în următorii 20 de ani."**

6. Conceptul de Cyber-spaţiu

Conform multiplelor cercetări din domeniul Erei informaticii, **până în 2050,** aproape toate informaţiile se vor afla în cyber-spaţiu, inclusiv cunoaşterea şi munca creativă. Informaţiile despre obiectele fizice (oameni, clădiri), procese şi organizaţii vor fi *on-line*. Această direcţie este inevitabilă. Cyber-spaţiul va fi baza pentru noi metode de informare, educare şi divertisment. Sistemele de informare vor raţionaliza comerţul şi vor asigura noi forme de asistenţă personală, socială şi sanitară. Probabil cea mai importantă facilitate va fi comunicarea folosind toate simţurile umane.

În 1947, când s-a inventat tranzistorul, calculatorul cu program stocat era o idee revoluţionară iar tranzistorul – o curiozitate. La mijlocul anilor '60 au apărut circuitele integrate, care au permis fabricarea în masă a tranzistorilor pe substrat de siliciu. Această tehnologie a redus enorm costurile şi a crescut enorm viteza de calcul şi capacitatea de memorie.

Singura formă de procesare mai rapidă şi consumatoare de mai puţină energie este creierul uman. Acesta lucrează la viteza de 10^{15} operaţii pe secundă şi are o capacitate de memorie de 10^{12} octeţi. Probabil că la mijlocul acestui secol vom realiza calculatoare de performanţe apropiate creierului uman. Aceste dispozitive vor putea să-şi amintească orice omul citeşte, vede sau aude.

Unii cercetători prezic că la mijlocul acestui secol vom avea calculatoare de 1000 de ori mai puternice decât cele de azi. Dacă evoluţia tehnologică va respecta în continuare **legea lui Moore**, atunci peste 50 de ani puterea calculatoarelor va fi de $2^{50/1,5}$ (aproximativ 10 miliarde) de ori mai mare decât capacitatea actuală. Se va pune problema atunci dacă omul va putea realiza interfeţe care să folosească deplin aceste capacităţi uluitoare de procesare şi transmisie.

O cale deja antamată este crearea a mii de calculatoare specializate de cost aproape zero, numite *microsisteme* sau *SoC - system-on-a-chip*. Aceste dispozitive se integrează în telefoane, întrerupătoare electrice, motoare, pereţi, pentru a fi "ochi" şi "urechi" artificiale. Reţele specializate conduc vehicule fără şoferi în trafic mixt (ajutate de calculatorul propriu, al celorlalte vehicule şi cel al autostrăzii).

Tehnologia SoC realizează "împachetarea" componentelor necesare într-un unic circuit integrat. De exemplu, un microsistem pentru detectarea sunetului trebuie să conţină un receptor audio, un convertor analogic-digital, un microprocesor, memorie şi control al intrărilor şi ieşirilor, *toate* pe un singur micro-chip.

Această tehnologie se foloseşte în dispozitivele electronice aflate pe maşini de înaltă clasă. Unele dispozitive au o viteză şi o capacitate de memorie mai mare decât un calculator personal realizat în 1995. **Nano-roboţi**i, realizaţi cu această tehnologie, călătoresc prin corpul uman, analizează activitatea celulelor şi eliberează medicamentele necesare, la timp şi în dozele cerute. Dispozitive video sunt legate la creierul orbilor, pentru a le permite vederea; calculatoare autonome realizează legătura radio cu Internet-ul din orice punct de pe suprafaţa planetei. Acestor dispozitive li se vor adăuga realizările altor tehnologii, care vor permite viteze sporite de transfer şi consumuri reduse de energie.

6.1. Cum arată cyber – spaţiul ?

Cyber-spaţiul conţine cunoaşterea umană şi permite realizarea unui calculator complementar omului. La acest nivel, cyber-spaţiul conţine trei tipuri de componente, reprezentate în figura 1.4.

Aceste componente sunt următoarele:

platformele, alcătuite din procesoare, memorie şi sisteme software de bază.

tehnologia care leagă platformele de oameni şi alte sisteme fizice.

tehnologia de reţea care leagă calculatoarele între ele.

Cu viteză şi memorie sporite, calculatoarele pot manevra tipuri complexe de date. La început, calculatoarele lucrau cu variabile simple (scalari) şi articole. Cu timpul, au început să manevreze vectori, baze de date, obiecte grafice, semnale variabile. În prezent sintetizează realitatea virtuală (**VR - virtual reality**) pentru a observa structura atomică, interiorul unui motor în lucru, structura internă a unei clădiri. De asemenea, au posibilitatea de a analiza forme, de recunoaştere a obiectelor şi de **planificare a lucrului roboţilor**. Nivelurile funcţionale care alcătuiesc structura cyber-spaţiului sunt prezentate în Tabelul 1.1

Limbajele multiple sunt o barieră în comunicare; în plus, o parte a populaţiei planetei este analfabetă. Imaginea, sunetul, gesturile alcătuiesc limbaje universale; îmbinarea de imagini, muzică, filme şi translatarea electronică a vorbirii a devenit o formă nouă, universală, de comunicare. Toate informaţiile se indexează şi rezultatul este accesibil în reţele la orice moment, folosind tipuri complexe de date, performanţe sporite privind viteza şi capacitatea de stocare. Trecerea de la text la imagini şi video a necesitat creşterea de 1000 de ori a performanţelor calculatoarelor (Tabelul 1.2).

Tabelul 1.1. Niveluri funcţionale ale infrastructurii cyber-spaţiului

. Nivel	Descriere
6	**Medii ale utilizatorilor:** Reprezentări geografice, demografice, realizate pentru comerţ, educaţie, divertisment, comunicare, colectare de date.
5	**Context:** De exemplu, proprietatea intelectuală. Foloseşte realizării mediilor utilizatorilor.
4	**Aplicaţii:** Pentru oameni sau alte sisteme, care permit crearea contextului.
3	Platforme hardware, software şi de reţea
2	**Componente hardware:** De exemplu, microprocesoare, discuri, legături de reţea.
1	**Materiale:** De exemplu, siliciu pentru componente.

Tabelul 1.2. Necesităţile de memorie pentru informaţiile manevrate **pe oră, zi şi viaţă**

Tipul de informaţie	**Rata** informaţiei (bytes/sec)	Capacitate de stocare pe **oră şi zi**	Capacitate de stocare pentru **întreaga viaţă**
Text vorbit (120 cuvinte pe min)	12	43 KB; 0,5 MB	15 GB
Text citit, cu puţine imagini	50	200 KB; 2 -10 MB	60 - 300 GB
Discurs (comprimat)	1.000	3,6 MB; 40 MB	1,2 TB
Video (comprimat)	500.000	2 GB; 20 GB	1 PB (10^3 TB)

În următorii 50 de ani vom locui în multiple ***oraşe virtuale*,** definite de criterii geografice, demografice şi intelectuale, bazate pe cele trei componente ale cyber-spaţiului: **platforme, interfeţe şi reţele**.

7. Interacţiunea cu lumea fizică: interfeţe cyberizate

Prima interfaţă a calculatorului a fost **hârtia**. Hârtia este un caz special, datorită versatilităţii folosirii ei în memorare, procesare, dialogare cu omul, interconectare.

Au urmat apoi interfaţa de tip **text a monitorului** şi

la scurt timp, **interfeţele grafice** bazate pe ferestre, mouse şi pictograme.

Marea tranziţie o constituie interfeţele bazate pe **vorbire**. În plus, înregistrarea **gesturilor** sau a mişcărilor ochilor cu ajutorul camerelor video poate îmbunătăţi interfeţele - utilizator.

Pe termen lung, preluarea datelor vizuale sau a imaginilor de la sonar, radar, GPS (**G**lobal **P**ositioning **S**ystem) deschide noi posibilităţi pentru aplicaţiile de portabilitate şi mobilitate. Aceste aplicaţii includ elemente de **robotică** şi **inteligenţă artificială**.

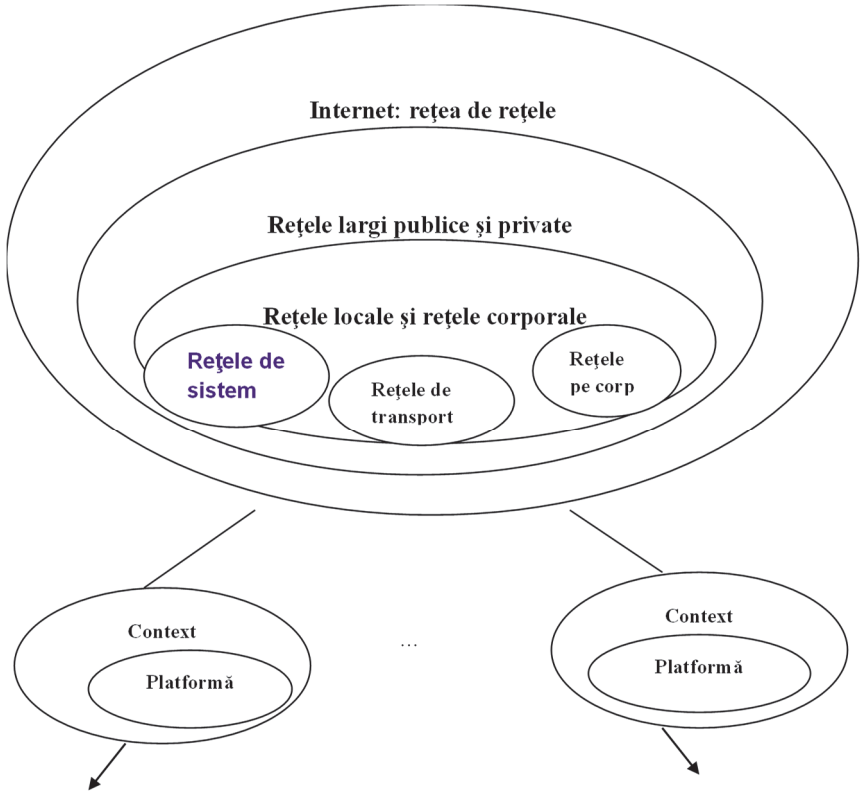


Figura 1.4. Cyber-spaţiul ca ierarhie de reţele

Sinteza vorbirii a fost utilizată pentru prima dată la mijlocul anilor '70 în citirea pentru nevăzători şi pentru **roboţii** telefonici. În prezent utilzăm sisteme de înţelegere a vorbirii şi sisteme telematice instalate pe automobile.

Un **sistem telematic** realizează controlul şi coordonarea proceselor, care se desfăşoară la bordul unui dispozitiv mobil.

Primele sisteme telematice instalate pe automobile erau sisteme de navigaţie controlate GPS. Sistemul **GPS** este alcătuit din sateliţi, care permit localizarea (prin triangulaţie) la nivel de centimetru şi poziţionarea pe o hartă electronică, aflată la bord. Acum, **sistemele telematice** unifică toate sistemele de comunicaţie aflate pe automobile (telefon, sistem audio, GPS), sistemele de comandă şi control, sistemele de confort (climatizare, multimedia) şi sistemele de salvare şi asistenţă rutieră.

Sistemul ***Connect*,** care a primit premiul E-Communication al Industriei Auto în 2001, oferă apel

prin voce şi comutare automată pe ***hands-free*** dacă maşina este în mers.

Traducerea automată între două limbi naturale, existenţa mai multor formate pentru imagini, sinteza scenelor virtuale (de exemplu pentru jocuri şi experimente), analiza obiectelor şi a proceselor desfăşurate în medii dinamice sunt doar cazuri în care se impune **manevrarea imaginilor.**

Calculatoarele care "văd" şi acţionează în timp real în astfel de cazuri, pot asigura supravegherea prin identificarea persoanelor şi a obiectelor din spaţiu, realizează acţionarea vehiculelor şi a altor elemente de robotică, conduc procese în spaţii dinamice.

Interacţiunele Om -> Interfeţe Cyberizate -> Om sunt în continuă dezvoltare, datorită noilor posibilităţi deschise de avansul tehnologic. În Era informaticii au evoluat următoarele trei tipuri de astfel de interacţiuni:

Interacțiunea: Profesionist IT –> Software –>Hardware –> Utilizator specialist a evaluat în interacțiunea: Utilizator specialist –> Software –> Hardware –> Utilizator care, la rândul său a evoluat în interacțiunea: Utilizator –> Software –> Hardware –> Utilizator

Interacțiunea **Om -> Interfeţe Cyberizate -> Om** se preconizează să fie înlocuită cu interacțiunea **Om –> Soft și Hard Robotizat –> Om** în baza rețelelor **mobile 5G**, care treptat vor fi înlocuite cu rețelele **omniprezente 6G**.

8. Tehnologii wireless.

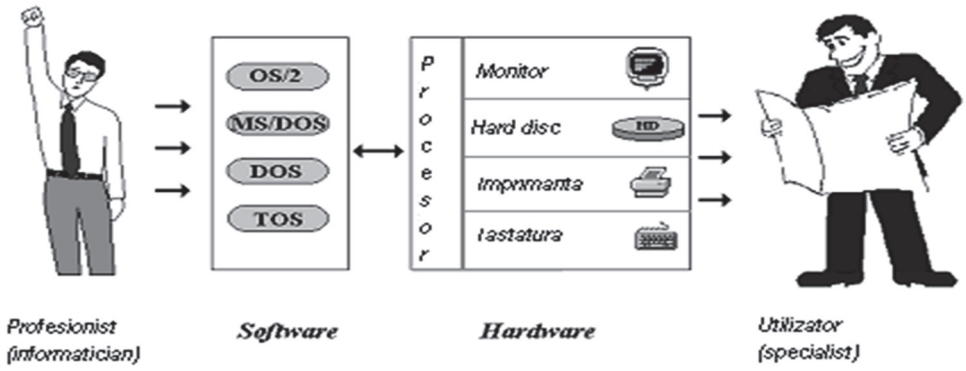
O **rețea celulară** sau o rețea mobilă este o rețea de comunicații în care legătura către și de la nodurile finale **este fără fir**.

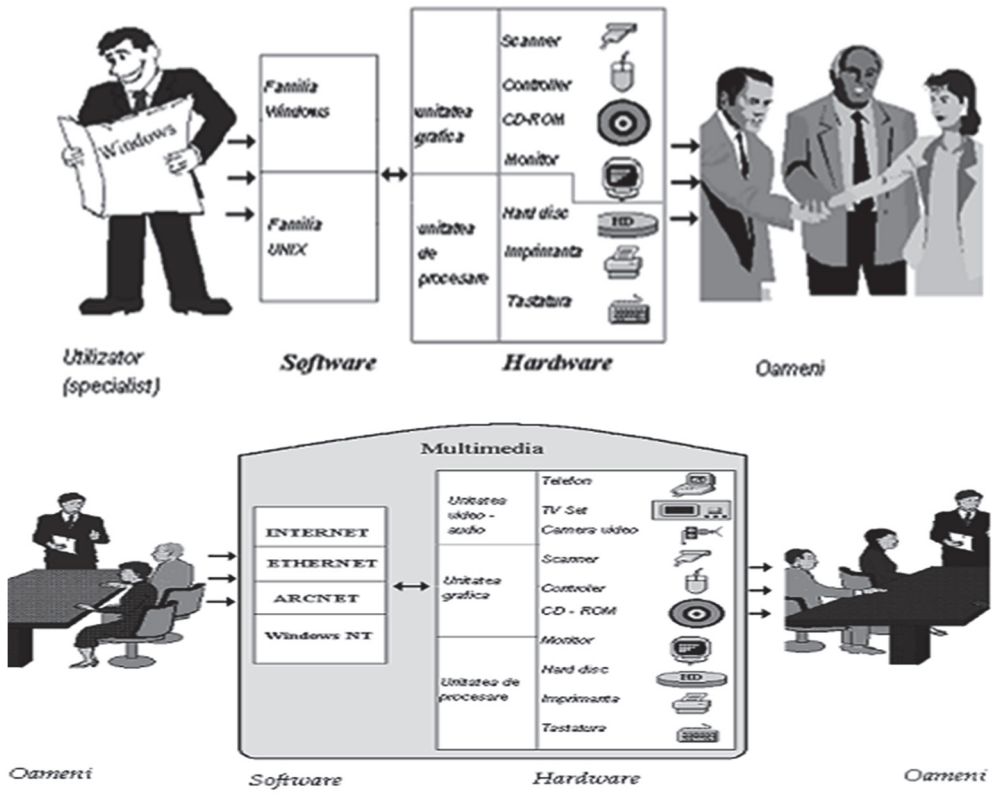
Rețeaua este distribuită pe suprafețe de teren numite **"celule",** fiecare deservită de cel puțin un **transceiver** cu locație fixă (de obicei trei locuri de celule sau stații de **transceiver de bază**).

Aceste **stații** de bază oferă celulei acoperirea rețelei care poate fi utilizată pentru transmiterea de voce, date și alte tipuri de conținut.

O celulă utilizează de obicei un **set diferit de frecvențe** față de celulele vecine, pentru a evita interferențele și pentru a oferi o calitate garantată a serviciului în fiecare celulă. Atunci când sunt unite împreună, aceste celule oferă acoperire radio pe o arie geografică largă.

Acest lucru permite numeroase transceivere portabile (de exemplu, telefoane mobile, tablete și laptopuri echipate cu **modemuri de bandă largă mobilă,** pagere etc.) să comunice între ele și cu transceivere și telefoane fixe oriunde în rețea, prin stații de bază, chiar dacă unele dintre transceivere se deplasează prin mai multe celule în timpul transmisiei.





Rețelele celulare oferă o serie de caracteristici:

1. Capacitate mai mare decât un singur transmițător mare, deoarece aceeași frecvență poate fi utilizată pentru mai multe legături, atâta timp cât acestea se află în celule diferite;

2. Dispozitivele mobile utilizează mai puțină energie decât cu un singur emițător sau satelit, deoarece turnurile celulare sunt mai aproape;

3. O suprafață de acoperire mai mare decât un singur transmițător terestru, deoarece turnurile celulare suplimentare pot fi adăugate la nesfârșit și nu sunt limitate de orizont.

O nouă generație de standarde celulare a apărut aproximativ **la fiecare zece ani** de când sistemele 1G au fost introduse în 1979 și la începutul anilor 1980 până la mijlocul anilor 1980. Fiecare generație se caracterizează prin noi benzi de frecvență, rate de date mai mari și tehnologie de transmisie necompatibile cu cele precedente.

8.1. Rețelele 3G - tehnologie wireless: Anul 2001

Rețelele 3G este a treia generație de tehnologie de telecomunicații mobile wireless. Este modernizarea pentru rețelele 2.5G GPRS și 2.75G EDGE, pentru un transfer mai rapid de date. Aceasta se bazează pe un set de standarde utilizate pentru dispozitivele mobile și serviciile de telecomunicații mobile și rețelele de telecomunicații mobile, care respectă specificațiile Uniunii Internaționale a Teleco-municațiilor Mobile: din 2000 (ITU-2000) ale Uniunii Internaționale a Telecomunicațiilor (International Telecommunication Union).

Primele rețele comerciale 3G au fost introduse la jumătatea anului 2001 [1]*"All about the Technology,,: 17 August 2019*. Rețelele de telecomunicații 3G acceptă servicii, care oferă o rată de transfer de informații de cel puțin 144 kbit/s. Rețelele 3G găsesc aplicații în: telefonie vocală fără fir, acces la Internet

mobil (mobile Internet), acces la internet fără fir fix, apeluri video și TV mobil.

9. Standardul cellular wireless 4G

Standardul celular wireless 4G a fost definit de Uniunea Internațională a Telecomunicațiilor (UIT) și specifică caracteristicile cheie ale standardului, inclusiv tehnologia de transmisie și vitezele de date.

Fiecare generație de tehnologie celulară wireless a introdus viteze crescute de lățime de bandă și capacitate de rețea.

Utilizatorii 4G au viteze de până la 100 Mbps, în timp ce 3G a promis doar o viteză maximă de 14 Mbps. 4G este a patra generație de tehnologie de rețea celulară în bandă largă (broadband cellular network), succedând 3G și precedând 5G.

Prima versiune WIMAX standard a fost desfășurată comercial în Coreea de Sud în 2006 și de atunci a fost desfășurată în cele mai multe părți ale lumii.

Prima versiune a standardului Long Term Evolution (LTE) a fost implementat comercial în Oslo, Norvegia și Stockholm, Suedia în 2009, și de atunci a fost implementat în majoritatea părților lumii.

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Un sistem 4G trebuie să furnizeze capabilități definite de Uniunea Internațională a Teleco-municațiilor (UIT - ITU) in Telecomunicații Mobile Internaționale Avansate (IMT Advanced).

9.1. Uniunea Internațională a Teleco-municațiilor (ITU)

Uniunea Internațională a Telecomunicațiilor este o agenție specializată a Organizației Națiunilor Unite responsabilă pentru toate aspectele legate de tehnologiile informației și comunicațiilor.

A fost înființată la 17 mai 1865 ca Uniunea Internațională a Telegrafului (ITU), fiind cea mai veche organizație internațională.

-ITU a fost inițial menită să contribuie la conectarea rețelelor telegrafice între țări, mandatul său extinzând în mod constant odată cu apariția de noi tehnologii de comunicații.

-ITU și-a adoptat numele actual în 1934 pentru a reflecta responsabilitățile sale extinse asupra radioului și telefonului.

La 15 noiembrie 1947, UIT a încheiat un acord cu nou - creata ONU pentru a deveni o agenție specializată în cadrul sistemului ONU, care a intrat oficial în vigoare la 1 ianuarie 1949.

Cu sediul la Geneva, Elveția, numărul de membri globali ai ITU include 193 de țări și aproximativ 900 de întreprinderi, instituții academice și organizații internaționale și regionale.

ITU:

- promovează utilizarea globală comună a spectrului de frecvențe radio,
- facilitează cooperarea internațională în atribuirea orbitelor prin satelit,
- ajută la dezvoltarea și coordonarea standardelor tehnice la nivel mondial și
- lucrează pentru a îmbunătăți infrastructura de telecomunicații în țările în curs de dezvoltare.

De asemenea, ITUeste activ în domeniile:

- internetului în bandă largă,
- tehnologiilor fără fir,
- navigației aeronautice și maritime,
- radioastronomiei,
- meteorologiei prin satelit,
- difuzării TV,
- radioului amator și
- rețelelor de generație următoare.

9.2. Telecomunicații Mobile Internaționale Avansate: (IMT Advanced)

Telecomunicațiile Mobile Internaționale Avansate (IMT-Advanced Standard) reprezintă cerințele emise de sectorul de radiocomunicații ITU (ITU-R) al Uniunii Internaționale a Telecomunicațiilor (UIT) din 2008 pentru ceea ce este comercializat ca:

- 4G telefon mobil și
- serviciu de acces la Internet.

IMT-Advanced este destinat să răspundă cerințelor de calitate a serviciilor (QoS) și de tarife stabilite prin dezvoltarea în continuare a aplicațiilor existente, cum ar fi:

- Accesul în bandă largă mobilă,
- Serviciul de mesagerie multimedia (MMS),
- Video chat,
- Televiziunea mobilă, dar și noi servicii, cum ar fi
- Televiziunea de înaltă definiție (HDTV).

Tehnologia 4G a fost menită să depășească cerințele Uniunii Internaționale de telecomunicații mobile - 2000, care specifică sistemele de telefoane mobile comercializate ca 3G.

Tehnologia 4G poate permite

- roamingul cu rețelele locale fără fir și
- poate interacționa cu sistemele digitale de radiodifuziune video.

9.3. Dezavantagele 4G

Rețelele 4G introduc un potențial inconvenient pentru

- cei care călătoresc la nivel internațional sau
- doresc să schimbe transportatorii.

Pentru a efectua și a primi apeluri vocale 4G, telefonul abonatului nu trebuie să aibă doar o bandă de frecvență potrivită frequency band (și, în unele cazuri, necesită deblocare: unlocking), ci trebuie să aibă și setările de activare corespunzătoare pentru operatorul local și / sau pentru țară.

În timp ce se poate aștepta ca un telefon achiziționat de la un anumit operator de transport să funcționeze cu acel operator de telefonie,

- efectuarea de apeluri vocale 4G în rețeaua altui operator (inclusiv roamingul internațional) poate fi imposibilă fără o
- actualizare software specifică operatorului local și modelului de telefon în cauză, care poate fi sau nu disponibilă.

O problemă majoră în sistemele 4G este de a face ratele de biți ridicate disponibile într-o porțiune mai mare a celulei, în special pentru utilizatorii care ar fi într-o poziție expusă între mai multe stații de bază.

Această problemă este abordată de tehnicile de macro-diversitate (macro-diversity), cunoscute și sub numele de releu cooperativ de grup (group cooperative relay), precum și de Beam-Division Multiple Access (BDMA: acces multiplu tip Grindă - Divizia).

10. 5G: Standard tehnologic de generația a cincea

În telecomunicații (telecommunications), 5G este

- standardul tehnologic de a cincea generație (technology standard) pentru rețelele celulare în bandă largă (broadband cellular networks),
- pe care companiile de telefonie celulară (cellular phone companies) au început să îl implementeze la nivel mondial în 2019 și
- este succesorul planificat al rețelelor 4G, care oferă conectivitate la majoritatea telefoanelor mobile actuale (cellphones).

Pe lângă faptul, că 5G este mai rapid decât rețelele existente, 5G poate conecta mai multe dispozitive diferite și, chiar dacă oamenii se află în zone aglomerate, serverele vor fi mai unificate, îmbunătățind calitatea serviciilor de Internet.

Se estimează că rețelele 5G vor avea peste 1,7 miliarde de abonați la nivel mondial până în 2025, potrivit Asociației GSM (GSM Association).

Ca și predecesorii săi, rețelele 5G sunt rețele celulare (cellular networks), în care zona de servicii este împărțită în zone geografice mici numite celule.

Toate dispozitivele wireless 5G dintr-o celulă sunt conectate la internet (Internet) la rețeaua telefonică (telephone network) prin unde radio (radio waves) printr-o antenă locală (antenna) din celulă.

10.1. Avantaje.

Principalul avantaj al noilor rețele este că vor avea o lățime de bandă mai mare (bandwidth), oferind viteze de descărcare mai mari (download speeds), în cele din urmă până la 10 gigabiți pe secundă (Gbit/s) (gigabits per second).

Datorită lățimii de bandă sporite, este de așteptat ca rețelele 5G să fie utilizate din ce în ce mai mult ca:

- furnizori generali de servicii de internet (internet service providers: ISP) pentru laptopuri și computere desktop,
- concurând cu ISP-urile existente, cum ar fi internetul prin cablu (cable internet), și, de asemenea,

- vor face posibile noi aplicații în zonele internet-of-things (internet-of-things:IoT) și în zonele machine-to-machine (machine-to-machine).

Telefoanele mobile 4G nu pot utiliza noile rețele, care necesită dispozitive wireless compatibile cu 5G.

10.2. Rețelele 5G sunt rețele celulare, pentru care zona de servicii este împărțită în celule geografice mici.

Dispozitivele wireless 5G dintr-o celulă comunică prin RF în celulă, prin canalele de frecvență atribuite de stația de bază.

Fiecare celulă cuprinde o stație de bază și capete radio de la distanță (antene).

Stațiile de bază, denumite gNB-uri, sunt conectate prin nucleul 5G la centrele de comutare din rețeaua telefonică și routere pentru acces la Internet prin fibră optică cu lățime de bandă mare sau conexiuni wireless backhaul.

Ca și în alte rețele celulare, un dispozitiv mobil care se deplasează de la o celulă la alta este predat automat fără probleme celulei curente.

5G poate suporta până la un milion de dispozitive pe kilometru pătrat, în timp ce 4G acceptă doar o zecime din această capacitate.

Mai mulți operatori de rețea folosesc unde milimetrice numite FR2 în terminologia 5G, pentru o capacitate suplimentară și debite mai mari.

Undele milimetrice au un interval mai scurt decât microundele, prin urmare celulele sunt limitate la o dimensiune mai mică. Undele milimetrice au, de asemenea, mai multe probleme în a trece prin zidurile clădirii.

Antenele cu unde milimetrice sunt mai mici decât antenele mari utilizate în rețelele celulare anterioare. Unele au doar câțiva centimetri lungime.

Mimo masiv (cu intrări multiple de ieșire) a fost implementat în 4G încă din 2016 și a folosit de obicei 32 până la 128 de antene mici la fiecare celulă. Mai multe fluxuri de biți de date sunt transmise simultan.

10.3. Rețelele 5G - trei benzi de frecvență – joase, medii și înalte.

Viteza crescută se realizează parțial prin utilizarea undelor radio suplimentare de frecvență mai mare, în plus față de frecvențele de bandă joasă și medie utilizate în rețelele celulare anterioare. Cu toate acestea, undele radio de frecvență mai mare au o gamă fizică utilă mai scurtă, necesitând celule geografice mai mici.

Pentru servicii largi, rețelele 5G funcționează pe până la trei benzi de frecvență – joase, medii și înalte. 5G poate fi implementat în bandă joasă, bandă medie sau cu unde milimetrice de bandă înaltă de 24 GHz până la 54 GHz. 5G în bandă joasă utilizează o gamă de frecvențe similară cu telefoanele mobile 4G, 600-900 MHz, oferind viteze de descărcare puțin mai mari de 4G: 30-250 megabiți pe secundă (Mbit/s).

Turnurile celulare cu bandă joasă au o gamă și o zonă de acoperire similare cu turnurile 4G.

5G în bandă medie utilizează microunde de 2,3-4,7 GHz, permițând viteze de 100-900 Mbit/s, fiecare turn de celule oferind servicii pe o rază de până la câțiva kilometri. Acest nivel de servicii este cel mai răspândit și a fost implementat în multe zone metropolitane în 2020.

Unele regiuni nu implementează banda joasă, ceea ce face ca Mid-band să fie nivelul minim de servicii.

5G în bandă înaltă utilizează frecvențe de 24-47 GHz, în apropierea fundului benzii de unde milimetrice, deși frecvențe mai mari pot fi utilizate în viitor. Acesta atinge adesea viteze de descărcare în intervalul gigabit-pe-secundă (Gbit/s), comparabil cu internetul prin cablu. Cu toate acestea, undele milimetrice (mmWave sau mmW) au o gamă mai limitată, necesitând multe celule mici. Ele pot fi împiedicate sau blocate de materiale în pereți sau ferestre.

Datorită costurilor lor mai mari, planurile sunt de a implementa aceste celule numai în medii urbane dense și zone în care se adună mulțimi de oameni, cum ar fi stadioane sportive și centre de convenții.

Vitezele de mai sus sunt cele obținute în testele efective în 2020, iar vitezele sunt așteptate să crească în timpul lansării.

10.4. Stațiile de bază 5G la fiecare câteva sute de

metri

5G în intervalul de 24 GHz sau mai mare utilizează frecvențe mai mari decât 4G și, ca urmare, unele semnale 5G nu sunt capabile să călătorească pe distanțe mari (peste câteva sute de metri), spre deosebire de semnalele 4G sau 5G de frecvență mai mică (sub 6 GHz). Acest lucru necesită plasarea stațiilor de bază 5G la fiecare câteva sute de metri pentru a utiliza benzi de frecvență mai mari.

De asemenea, aceste semnale 5G de frecvență mai mare nu pot penetra cu ușurință obiecte solide, cum ar fi mașinile, copacii și pereții, din cauza naturii acestor unde electromagnetice de frecvență mai mare. Celulele 5G pot fi proiectate în mod deliberat pentru a fi cât mai inconspicuoase posibil, ceea ce găsește aplicații în locuri precum restaurante și mall-uri

10.5. 5G - convergența mai multor funcții de rețea

Un beneficiu așteptat al tranziției la 5G este convergența mai multor funcții de rețea pentru a realiza reduceri de costuri, putere și complexitate.

LTE (Long-Term Evolution) a vizat convergența cu banda / tehnologia Wi-Fi prin diverse eforturi, cum ar fi:

- Accesul asistat la licență (LAA);
- Semnal 5G în benzi de frecvență fără licență (care sunt utilizate și de Wi-Fi) și agregarea LTE-WLAN (LWA);
- Convergența cu Radio Wi-Fi, dar capacitățile diferite ale celularei și Wi-Fi au limitat domeniul de aplicare al convergenței.

Cu toate acestea, îmbunătățirea semnificativă a specificațiilor de performanță celulară în 5G, combinată cu migrarea de la Distributed Radio Access Network (D-RAN) la Cloud- sau Centralized-RAN (C-RAN) și implementarea celulelor mici celulare pot reduce decalajul dintre Rețelele Wi-Fi și cele celulare în implementări dense și interioare.

Convergența radio ar putea duce la partajarea variind de la agregarea canalelor celulare și Wi-Fi la utilizarea unui singur dispozitiv cu siliciu pentru mai multe tehnologii de acces radio.

11. 6G- al șaselea standard de generație

În telecomunicații, 6G este al șaselea standard de generație în curs de dezvoltare pentru tehnologiile de comunicații fără fir care susțin rețelele de date celulare.

Este succesorul planificat al 5G și probabil va fi semnificativ mai rapid. Ca și predecesorii săi, rețelele 6G vor fi probabil rețele celulare în bandă largă, în care zona de servicii este împărțită în zone geografice mici numite celule.

Mai multe companii (Nokia, Ericsson, Huawei, Samsung, LG, Apple, Xiaomi), precum și mai multe țări (China, Japonia și Singapore), și-au manifestat interesul pentru rețelele 6G

11.1. 6G: aplicații dincolo de scenariile actuale de utilizare mobilă

Se așteaptă ca rețelele 6G să prezinte și mai multă eterogenitate (să fie chiar mai diverse) decât predecesorii lor și sunt susceptibile de a sprijini aplicații dincolo de scenariile actuale de utilizare mobilă, cum ar fi:

- realitatea virtuală și augmentată (VR / AR),
- comunicațiile instantanee omniprezente,
- inteligența omniprezentă și
- Internetul lucrurilor (IoT).

11.2. Realitatea virtuală (VR) vs Realitatea augmentată (AR)

Care este diferența dintre realitatea virtuală și cea augmentată? Realitatea virtuală (VR) este o lume creată de computer, care poate fi accesată folosind dispozitive imersive - căști, mănuși. Mediul virtual înlocuiește complet lumea reală, fără a reacționa la schimbările sale, în timp ce utilizatorul îl poate influența, scufundându-se, de exemplu, într-un joc video. Realitatea augmentată (AR) adaugă pur și simplu straturi în lumea reală: oamenii pot interacționa în continuare cu mediul fizic, primind informații suplimentare de la dispozitivele lor sau aplicații de realitate augmentată.

11.3. Afaceri descentralizate flexibile pentru tehnologia 6G

Se preconizează că operatorii de rețele de telefonie mobilă vor adopta modele de afaceri descentralizate

flexibile pentru tehnologia 6G, cu:

- acordarea de licențe locale pentru spectrul de frecvențe,
- partajarea spectrului,
- partajarea infrastructurii și
- gestionarea inteligenței automatizată, susținută
- de tehnologiile mobile edge computing,
- inteligența artificială,
- comunicațiile pe pachete scurte și
- tehnologiile blockchain

11.4. 6G pe orbită

Pe 6 noiembrie 2020, China a lansat cu succes un satelit de testare experimentală cu candidați pentru tehnologia 6G pe orbită, împreună cu alți 12 sateliți, folosind o rachetă de vehicule de lansare Long March 6. Satelitul este destinat "să verifice tehnologia de comunicare terahertz (THz) în spațiu", potrivit ziarului Global Times

11.5. 6G sprijină infrastructura AI

Articole academice recente au fost concept-tualizarea 6G și caracteristici noi care pot fi incluse. IA este inclusă în multe dintre aceste predicții, de la 6G care sprijină infrastructura AI la "Proiectarea și optimizarea AI a arhitecturilor, protocoalelor și operațiunilor 6G. Un alt studiu din Nature Electronics pare să ofere un cadru pentru cercetarea 6G, afirmând că comunicațiile mobile centrate pe om vor fi în continuare cea mai importantă aplicație a 6G, iar rețeaua 6G ar trebui să fie centrată pe om. Astfel, securitatea ridicată, secretul și confi-dențialitatea ar trebui să fie caracteristici cheie ale 6G și ar trebui să i se acorde o atenție deosebită de către comunitatea de cercetare fără fir.

12. Comunicațiile instantanee omniprezente

Rețeaua omniprezentă este distribuția infra-structurii de comunicații și a tehnologiilor fără fir în întregul mediu pentru a permite conectivitatea continuă. Această capacitate este o componentă esențială a calculului omniprezent.

12.1. Calcul omniprezent (Ubiquitous computing)

Ubiquitous computing (sau "ubicomp") este un concept în inginerie software, inginerie hardware și informatică, unde calculul este făcut să apară oricând și peste tot.

Spre deosebire de desktop computing, calculul omniprezent poate apărea folosind orice dispozitiv, în orice locație și în orice format. Un utilizator interacționează cu computerul, care poate exista în multe forme diferite, inclusive computere laptop, tablete, telefoane inteligente și terminale în obiecte de zi cu zi, cum ar fi un frigider sau o pereche de ochelari. Tehnologiile de bază pentru a sprijini informatica omniprezentă includ Internet, middleware avansat, sistem de operare, cod mobil, senzori, microprocesoare, noi I / O și interfețe de utilizator, rețele de calculatoare, protocoale mobile, locație și poziționare și materiale noi.

Această paradigmă este, de asemenea, descrisă ca fiind omniprezentă de calcul, inteligența ambientală, sau "everyware". Fiecare termen subliniază aspecte ușor diferite. În ceea ce privește în primul rând obiectele implicate, este, de asemenea, cunoscut sub numele de calcul fizic, Internet of Things, calcul haptic, și "lucruri care gândesc". În loc să propună o definiție unică pentru calculul omniprezent și pentru acești termeni înrudiți, a fost propusă o taxonomie a proprietăților pentru calculul omniprezent, din care pot fi descrise diferite tipuri sau arome de sisteme și aplicații omniprezente.

Calculul omniprezent se referă la calculul distribuit, calculul mobil, calculul locației, rețelele mobile, rețelele de senzori, interacțiunea om-computer, tehnologiile smart home conștiente de context și inteligența artificială.

11.2. Internetul lucrurilor (IoT)

Internetul lucrurilor (IoT) descrie obiecte fizice (sau grupuri de astfel de obiecte) care sunt încorporate cu senzori, au capacitate de procesare, sunt software și alte tehnologii care conectează și fac schimb de date cu alte dispozitive și sisteme prin Internet sau alte rețele de comunicații.

Domeniul a evoluat datorită convergenței mai multor tehnologii, inclusiv a computerelor omniprezente, a senzorilor de mărfuri, a sistemelor integrate din ce în ce mai puternice și a învățării automate. Câmpurile tradiționale de sisteme încorporate, rețele de senzori fără fir, sisteme de control, automatizare (inclusiv automatizarea locuinței și a clădirilor), permit în mod independent și colectiv internetul obiectelor.

Pe piața de consum, tehnologia IoT este cea mai sinonimă cu produsele care țin de conceptul de "casă inteligentă", inclusivdispozitive și aparate (cum ar fi corpuri de iluminat, termostate, sisteme și camere de securitate la domiciliu și alte electrocasnice) care susțin unul sau mai multe ecosisteme comune și pot fi controlate prin intermediul dispozitivelor asociate cu ecosistemul respectiv, cum ar fi smartphone-urile și difuzoarele inteligente.

IoT poate fi utilizat și în sistemele de sănătate.

Există o serie de preocupări cu privire la riscurile legate de creșterea tehnologiilor și produselor IoT, în special în domeniul vieții private și al securității și, în consecință, au început demersurile industriei și ale guvernului de a aborda aceste preocupări, inclusiv dezvoltarea de standarde, orientări și cadre de reglementare internaționale și locale.

Concluzii.

Acest studiu a fost conceput cu scopul de a demonstra multitudinea tehnologiilor informatice de comunicare (TIC) pentru susținera actulă și în viitorul apropriat a Interacțiunii intergeneraționale prietenoase a adulților în cooperarea continuă între generații la locul de muncă până la o vârstă înaintată profundă.

Recunoaștere: Cercetarea actuală a fost evaluată în cadrul ghidului și cu sprijinul COST CA19136: NET4Age-Friendly al cărui scop și obiectiv principal este de a stabili o rețea internațională și interdisciplinară de cercetători din toate sectoarele pentru a stimula conștientizarea și pentru a sprijini crearea și implementarea unor medii interioare și exterioare inteligente, sănătoase pentru generațiile prezente și viitoare.

Rezultatele vor contribui la rezolvarea problemelor și acțiunilor desfășurate în cadrul COST CA 16226, Îmbunătățirea spațiului de locuit interior: Habitat inteligent pentru vârstnici (SHELD-ON), creând astfel o societate mai bună pentru toată lumea.



A Conversational Agent as a personal and professional development tool for healthy aging and sustainable living

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Abstract: We present a pioneering tool in the field of cognitive and mental health promotion that can be integrated with IoT devices to address the need for an adaptable and immersive training experience in formal and informal learning environments, such as large-scale organizations and businesses, schools and universities. It is based on the dialogic form in acquiring knowledge, introduced by Socrates as a training and teaching methodology. The current tool is the product of a transdisciplinary research in the field of ICTs as reflected on Cognitive Science, Neuroscience, Education and the Business Sector. It is also part of an innovative model of personal and professional development, called the 9-Layered Model of Giftedness, which originates mainly in Plato's prompt to discover the nature of excellence and the ability to teach excellence through self-reflection and self-awareness.
Keywords: healthy aging, intelligent tutoring systems, chatbots, cognitive skills

1 Introduction

This app aims at providing a digital tool towards training and assessment of higher cognitive and metacognitive skills to the benefit of a person's personal and professional development. The architecture of this tool is based on the 9 Layered Model of Giftedness, which is an integrated theory of human wellness and societal prosperity [1]. In addition, the architecture of the tool provides a tailor-made user experience as it is structured on a voluminous menu, encapsulating the 21st Century Skills of the European Skills Agenda [2] in combination with the Sustainable Development Goals of the United Nations by 2030 [3]. More specifically, the app offers users the capability to take a test that makes an assessment on their cognitive and metacognitive skills in order to give recommendations on their training needs. Therefore, the app gives users feedback as a navigation route, following a string of replies.

The original conception of the app was founded on the Ancient Greek Philosopher, Socrates and his

method of teaching and thinking [4]. Socrates made questions and sought the answers from his students in an attempt to let them discover what is the truth. For that purpose, Socrates made inquiring and critical thinking questions. Our app induces a holistic perspective in human evolution as we encourage users to embrace a new model of intelligence that encompasses a person's capacities, abilities and skills in combination with certain values and self-beliefs. As a result, our app aims to introduce our theoretical model to a broader audience as well as to emphasize on personal development as a means of social evolution [5]. In addition, our model addresses personal and professional development as an individualized goal for any person that has the will and the perseverance to learn and improve oneself. Thus, if this applies wider, our society stands a better chance to thrive in the future.

2 Context

The app has six pillars: human resources management, 9-Layered Model of Giftedness, mental health training, ICTs & the society, brain training & brain health assessment scales. Each pillar includes a comprehensive amount of knowledge originating from published research with emphasis on cognitive and metacognitive skills, 21st Century Skills as well as the skills related to the Sustainable Development Goals of the United Nations Agenda by 2030.

This tool is in line with the European Skills Agenda of the EU, EU priorities and the Sustainable Development Goals by 2030, such as lifelong learning, healthy aging and social equity [2, 3]. Also, it embraces the standards of the World Health Organization for health promotion [6]. The skills of the European Agenda that are also included in the app are: problem solving and decision making, creative and critical thinking, collaboration, communication and negotiation, intellectual curiosity as well as the ability to find, select, structure and evaluate information. In addition, another critical skill that the European Union and our app embraces is to make citizens independent citizens, who are responsible, persevering, self-regulating, reflective, self-evaluating and self-corrective. All the skills mentioned are inherent to the lifelong learning skills that make citizens flexible, adaptable and resilient individuals.

The first pillar “human resources management” comprises self-leadership skills as well as incentives that motivate employees, especially in large organizations. By the term “self-leadership skills”, we entail lifelong learning skills oriented towards one’s healthy living and healthy aging in combination with the 21st Century Abilities that form the identity of the citizen of the 21st Century, in Europe and worldwide. In our model, citizens of the 21st Century are initiated into the skills and values that can make them active, creative and innovative both for themselves and the society, in general. Moreover, employee engagement is a very important factor, affecting a person’s professional and personal life in addition to the systemic effects taking place in that person’s environment. More specifically, we embrace the Theory of Existence, Relatedness and Growth (ERG Theory) by Clayton Alderfer [7] as well as Herzberg’s Theory of Motivation [8] to describe how employees working in large organizations can work more effectively in groups and how to improve their working environment through healthy working relations and fruitful cooperations.

The second pillar “9-Layered Model of Giftedness” explains how the model connects to several aspects of cognition, emotion and human behavior, in general. As the app aims at affecting human behavior through developing a person’s skills and values, this pillar presents in detail, a set of higher cognitive and metacognitive skills, values and self-beliefs that can affect all aspects of human life, through combining several scientific fields, such as Brain Sciences, Economics, Human Resources

Management, Education Studies and Psychology. Therefore, the current pillar has an interdisciplinary view on how to succeed in a person's personal and professional development. In addition, our model places certain values and self-beliefs in top priority to the benefit of the person, itself, as well as to the benefit of the entire society as a whole. Moreover, this app introduces our theory and launches an alternative construct of intelligence, more dynamic, trainable and oriented towards a behavior-centered approach [9].

The third pillar "Mental Health Training" emphasizes on the neurophysiological function of the brain, brain health prevention in combination with a person's social and emotional health. More specifically, our theory looks into our mental health both as an innate and a social construct. Therefore, our app embraces three theories that focus on the intrinsic and extrinsic factors that relate to how we build our emotional and social self and how to be happy with it. The theories are: Bandura's Social Cognitive Learning Theory [10], Vygotsky's Theory of Social Constructivism [11] and Sternberg's Successful Intelligence [12]. Moreover, this pillar focuses on cognitive skills training and assessment, methodologies and tests, in combination with informing users of the neurodegenerative diseases that cause severe dysfunction in our basic cognitive function, our memory, such as Alzheimer's Disease and dementia.

The fourth pillar "ICTs & the Society" introduces the role that ICTs can have on the evolution of human intelligence and more specifically, it shows how ICTs train our cognitive and metacognitive skills in addition to promoting the values that serve the needs of the citizens of the 21st Century, such as inclusiveness, resilience, adaptability and social responsibility [13].

The fifth pillar "Brain Training" suggests three principal components in brain training techniques. These include physical training, mental imagery/visualization and mindfulness meditation [14, 15]. The sixth pillar "Brain Health Assessment Scales" presents published assessment scales revealing a full scope of our brain health comprising our healthy living, our brain function, our brain plasticity and the degree of our self-knowledge.

3 Training & learning Methodology

Furthermore, all the aforementioned pillars form a holistic construct, depicting that our skills, our values and self-beliefs are reciprocally related and they all affect the physiological and psychological health of the brain as it reflects on our behavior.

In addition, its dialogic system uses the potential of natural language understanding as a means for physiological and psychological training in combination with the promotion of values/self-beliefs that enhance their cognitive and mental health. It also offers a tailor-made experience to the user through giving them the opportunity to use the Cognitive & Metacognitive Skills Self-Assessment Tool. Finally, the app can offer further support to the users in need of further clarifications and specifications, by the creator of the application.

4 Benefits

The current tool is founded on the 9-Layered Model of Giftedness, an innovative theory about intelligence and consciousness. It can assist in training human cognition and emotion, which involves the acquisition of a set of cognitive and metacognitive skills in combination with the enhancement of other personal characteristics, such as volition, perseverance, wisdom and prudence. It also explains the role of self-consciousness by presenting a holistic model of self-improvement and intensifying the role of knowing ourselves in order to understand other people and capture the meaning of things around us. The tool is characterized by its emphasis on humans' ability to learn from each other, improve each other as well as it promotes the idea that humanism is the ultimate value. More

specifically, its rationale is to encourage sharing knowledge, skills and personal virtues with others in order to live better now and in the future. According to our model, the final goal of reaching our highest potential is to share our skills and knowledge with other people around us and reach universal consciousness. In sum, the current tool provides a tailor-made learning experience with the aim to endorse self-improvement and lifelong learning skills, while preserving public health and transforming future societies.

Furthermore, the originality of the tool stems from the fact that it is a digital, cognitive and mental health promotion tool with a holistic and a broad scope of human behavior as well as a social empowerment tool. It represents a well-illustrated, interdisciplinary overview on cognitive improvement and brain health as it integrates Neurosciences, Philosophy, Economics, Education Studies and ICTs. It initiates a new meaning in the terms “intelligence” and “consciousness” and it can promote lifelong learning among interested stakeholders in the field of public health, politics and education. Moreover, it is a digital library with cutting-edge research in the field of Cognitive Science, Neuroscience as well as Democratic Society.

Furthermore, the tool introduces the 9-Layered Model of Giftedness to the entire world and specifically, aims to make people realize the importance of cognitive skills in combination with personal values in order to form a citizen of the world that respects human rights, acts in respect of equity, peace and considers the protection of the environment and the world, in general, a personal matter. Therefore, this citizen of the world believes in diversity and social sustainability as a means to combat racism, discrimination and violence.

Current circumstances, such as in the case of the pandemic of Covid-19, make resilience and social responsibility vital skills for the survival of humankind. Moreover, resilience and adaptability are irreplaceable skills for any person. Furthermore, applied skills, such as critical thinking, problem solving, communication, teamwork/collaboration, information technology, leadership, creativity/innovation, lifelong learning/self-direction, professionalism/work ethic, ethics, social responsibility, diversity, are not officially taught in greek schools, although they are necessary in any working environment and in any society, worldwide [16]. Therefore, we argue that the current application was designed to have a strong impact on society. The next step of our research is to test it on large companies or organizations with multiple employees/students. We also suggest that school curricula and educational systems worldwide should embrace a holistic education approach [17].

5 Target group

The target group of the app is broad as its potential users are adults, but especially seniors, employees and managers in the labor market, educators, researchers, scientists and everybody in search of healthy aging as well as in need of personal and professional development. Also, managers and stakeholders in the field of human resources can use the app and its theoretical background to invest in human capital and reach their goals for successful management and effective policies. Furthermore, our app should be used by stakeholders in the field of education who have a key role in human evolution because they are responsible for making future citizens set out for a dynamic society. By dynamic society, we mean a society that is founded on a framework of skills, values and self-beliefs that can bring about health and individual success for citizens [18].

6 Use Case Scenarios

Both our theory and our application aspire to launch an integrated model of cognitive and mental health promotion based on our higher cognitive and metacognitive skills training, throughout our lives.

At this point, we present a use case scenario embracing our model.

6.1 Scenario 1: "Transform a business organization"

As cognitive skills and personal strengths are interrelated and both depend on our effort to improve ourselves, self-improvement becomes a top priority for the state and the business sector as well as a personal goal for all people. Large organizations, with numerous staff, develop a very complex and dynamic scenery of relations that demands the presence of a clear cut set of values and skills that all employees need to acquire. The skills that employees of every large organization need to master are: creativity (originality, ingenuity), curiosity (interest, novelty-seeking, openness to experience), judgment (critical thinking), love of learning as well as perspective (wisdom) [19, 20].

Moreover, with self-transcendence as a top level metacognitive skill, employees would be able to share their knowledge and capabilities with their fellow employees, creating a domino effect of change in large organizations. What is more, in order to set an example to others, we need to master our own behavior and the corresponding cognitive status. Self-transcendent employees have reached their top potential as individuals and have the desire to share their knowledge and capabilities with their fellow employees. Furthermore, the 9-Layered Model of Giftedness conceives giftedness as the set of abilities that give a person the potential and the need to share knowledge and skills as a mechanism of intrinsic motivation.

Herzberg's theory and 9-Layered Model of Giftedness have found common ground in the significance they place on human motivation and especially, on our intrinsic motivation. Intrinsic motivation is related to intrapersonal skills as our inner speech forms our self-beliefs, thus intrapersonal skills are the foundation of our motivation. Intrinsic motivation also lies in strengthening our own skills and knowledge in order to be able to promote other people's skills or knowledge to the benefit of the community. According to Herzberg's Theory, employees' free expression of ideas enhances their intrinsic motivation that elevates their job satisfaction and performance levels, thus growing the overall effectiveness of an organization [8]. Therefore, managers can do more than diagnose the motivation problems of employees. They can help their employees to identify exactly why the task seems insurmountable so that they can move past such difficulties.

7 Conclusions

The human mind is a complicated mechanism of physiological and psychological processes that originate from innate as well as environmental factors. By environmental factors, it is suggested that our brain function as well as our mental health can be affected by our everyday routines and habits. More specifically, a healthier lifestyle, including physical activity, healthy eating as well as sustainable consumption and production patterns harnesses both physiological and psychological benefits related to human health, either physical, mental or cognitive [6].

Moreover, this model is harmonized with the goals set by international organizations, such as the World Health Organization [6], the European Commission [2] and the United Nations [3], foreseeing the future of humanity in strengthening the individual mind towards building cooperations among stakeholders and organizations on the grounds of transgenerational values, such as humanity and compasssion. The aforementioned values as well as the terms common good and communal and natural harmony have been introduced to humanity by Plato [21].

Finally, the current app is a prototype with three basic goals that can be used for further research and deployment: first, our theoretic model can be applied to respective scientific fields, second, it can be used to build a machine-learning model

predicting user's training needs based on the data extracted from the Cognitive and Metacognitive Self-assessment Tool and third, it can be integrated in an intelligent tutoring system supported by IoT devices.

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Human ecological manifestations in the Danube Area of the European Union.

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Abstract. The idea of the European Project "Network of ecological human placements" with the aim of ascenting human well-being is based on the requirements, exposed by the European Union through the Transnational Programme to ensure the well-being of the Danube population and section 4.1 thereof: "Improving institutional capacities to face major societal challenges".The project "Network of ecological human placements" is a network composed of human ecological manifestations, represented by SMEs, clubs, centers, associations and other types of ecological human societies with the aim of ensuring the psychological well-being of the inhabitants of the Danube Area of the European Union.These placement centers, intergenerational societies, ensure, first of all, the continuity of the activities of the elderly, of the persons, of the persons, which in the near future, will constitute 50% of the total number of inhabitants of the European Union states.

Purpose: To study the opportunities offered by volunteering both to those who offer help and to those who benefit from the fruits of volunteering; offering possibilities to study new technologies to the elderly and disabled children and those from socially vulnerable families; raising well-being and living standards in rural and urban areas; intergenerational economic and financing development; creating opportunities to benefit from a stable and well-paid thing; improvement of the psychological, intellectual and spiritual state of the population.

Design/methodology/approach: In the research it is indicated how to initiate digitalization in rural spaces, to organize and manage computer science training centers. Raising the level of use of information technologies Adjusting the consciousness of people in the rural and urban space in the necessity and possibility of improving their intellectual and spiritual state with the help of people of specialties of the type "Human psychological well-being". This paper includes four important aspects: Governance structure, Management and logistic organization, Management of the process of creating European-type SMEs in the rural sector of the Danube Area, Sustainability.

Findings: It is known that the rural space in the Republic of Moldova is in a drastic degradation both due to the massive migration of people and because of the limitation in development of educational institutions, of poorly developed infrastructure, of the system persistently aged until now.

It is demonstrated that the problems approached include a large part of society, so there is a need to take measures to create a favorable psychological, emotional, intellectual and spiritual environment within the framework of the evolution of the well-being of man and, first of all, of the elderly.
Implementation environment: This study is carried out within the intergenerational framework of the Association "Seniors of ASEM" and, in particular, within an orphanage in the Republic of Moldova. The need to implement extracurricular activities in most children's homes is to increase the useful knowledge and, consequently, to raise the standard of living in the Danube Area and, in particular, in the Republic of Moldova regarding both orphaned children, the handicapped, elderly people, and the entirely intergenerational population. **Practical implications**: These manifestations within the framework of human ecology, these welfare centers that are proposed in the current research can be taken into the view of the authorities for offering jobs to specialists in different fields, in order to reduce migration, to ensure the continuity of the activities of the older generation, to improve the life of the people and to increase the standard of living in the Danube area.
Value: The results of the researches indicate a desperate need for growth and development of the rural society in the perspective of increasing the economy, raising the standard of living in the rural and urban sector, implementing the correlation of the Moldovan society and culture with the Danube and European society and culture, will help a large part of the disabled and handicapped children to help them discover their potential, will help the development of the state in social, economic and educational terms.
Recognition: The current research has been evaluated within the guide and with the support of COST CA19136: NET4Age-Friendly whose main purpose and objective is to establish an international and interdisciplinary network of researchers from all sectors to foster awareness and support the creation and implementation of intelligent, healthy indoor and outdoor environments for present and future generations
Keywords: Network, ecological human placements, ecological human societies, intergenerational societies, psychological well-being, Danube Area, European Union

Introducere

Este cunoscut faptul ca spațiul rural în Republica Moldova este într-o drastică degradare atât din cauza migrației masive a oamenilor, cât și din motivul limitării în dezvoltare a instituțiilor de învățământ, a infrastructurii slab dezvoltate, a sistemului învechit persistent până în prezent.

Pentru o îmbunătățire a nivelului de viață a populației rurale este benefic de organizat centre de instruire pentru persoanele de toate vârstele în mai multe domenii.

Așa cum tehnologiile informaționale reprezintă o parte semnificativă actualmente, ar fi benefic de organizat cursuri de instruire a bazelor calculatorului, cum ar fi Microsoft Word, Excel, PowerPoint, SQL, Access etc. La fel pentru îmbunătățirea nivelului calității studiilor copiilor din internat, pot fi organizate lecții suplimentare în spații special amenajate, care ar oferi o atmosfera prietenoasă și plăcută pentru copii.

O problemă masivă la fel o reprezintă repartizarea copiilor cu dizabilități în școlile ordinare, care inhibă dezvoltarea acestora atât din partea comportamentului neobiectiv al profesorilor cât și a agresivității din partea colegilor. Astfel pentru crearea unui mediu favorabil pentru persoanele cu dizabilități este nevoie de a deschide școli specializate care ar permite copiilor să se dezvolte după posibilități, să accentueze individual punctele forțe a fiecărui în parte.

La fel pentru persoanele de toate vârstele pot fi organizate centre asemenea unei librării moderne, cu cărți pentru orice categorie, jocuri interactive atât pentru copii, cât și maturi (jocuri de șah, serile de

cinema, workshopuri informative, şezători, etc).

De organizat în cadrul rețelei de bunăstare ecologică a omului o Academie „Bunăstarea ecologică umană" în Satul Cotiujenii Mici din Sângerei cu scopul de a pregăti cadre în domeniu (psihologi, juriști, frizeri, manichiuriste, masori, etc) De asemenea de organizat o întreprindere „Stilistică" în Cluj Napoca, care ar oferi clientelor „Un moment de reculegere", „Un moment de satisfacție", „O împlinire a dorinței de a-și face o frezǎ", „Un dialog de suflet", „O manichiură", etc, persoana venită „Cu probleme" să părăsească „Stilistică" cu o dispoziție bună., fiind primită cu zâmbete și petrecută la fel cu zâmbete.

1. Structura de guvernanță.

Pentru ca ideiile să poată lua amploare este nevoie de analiză și studierea a mai multor criterii unele dintre acestea fiind: spațiile (rural și/sau urban), dezvoltarea economică, situația financiară a oamenilor, corelația intergenerațională locală, regională, republicană și europeană.

Pentru organizarea cursurilor de instruire și învățare, de exemplu, a calculatorului de către oamenii în vârstă sau a persoanelor rurale ne alfabetizate în domeniile informaticii, pot fi amenajate spații în școlile din zonele rurale sau la necesitate pot fi construite centre aparte, cu echipamentul necesar pentru studii; la fel – cursuri de socializare a oamenilor în domenii de IMM-uri europene. Astfel multe persoane instruite în domeniu ar putea activa în aceste centre cu un salariu bun și cu perspectiva de învățare continuă, participarea la workshop-uri internaționale europene ce țin de informatică și TIC în general. Persoanele în etate ar avea posibilitate să-și continue activitățile și după pensionare, ar putea obține locuri de muncă mai bune având cunoștințe moderne de TIC, prin acest procedeu se susține integrarea informațională europeană

Pentru ca în Rețeaua de plasamente uman ecologice să fie amplasate școlile pentru copii invalizi, trebuie de studiat și analizat situația și de calculat numărul de copii invalizi atât în regiunea rurală cât si urbană. De analizat situația financiară a părinților acestor copii pentru a vedea dacă vor putea suporta unele cheltuieli, deoarece o școală pentru copii invalizi poate fi costisitoare. Este nevoie de cadre didactice specializate pentru copii invalizi și condiții special, care pot necesita finanțare mai multă decât școlile obișnuite

Crearea unor centre specializate pentru recreere și reculegere psihologice se propune pentru sectorul rural și urban. Se vor cerceta necesitățile și posibilitățile de evaluare în localitati în dependență de numărul locuitorilor, locul amplasării și organizarea sustenabilă a acestor centre cu condiții uman ecologice, cu cafenea și spațiu pentru conferințe, workshop-uri, prezentări, etc.

Studierea necesităților și posibilităților de crearea a Academiei în spațiul rural de pregătire a cadrelor "Bunăstarea ecologică umană", selectarea cadrelor de profesioniști pentru evaluarea Academiei și alegerea cursanților normanzilor, care vor fi educați în domeniul bunăstării ecologice a omului sunt primă necesitate în cadrul creării rețelei de plasamente uman ecologice.

De asemenea, va fi efectuată studierea spațiului urban și cel rural în posibilitatea de a crea întreprinderi de tip „Stilistică" cu scopul uman de activitate în cadrul ofertei „Efortului psihologic pozitiv" de bunăstare umană pentru spațiul dunărean al Europei

Scopul voluntariatului de ocrotire a copiilor rămași fără tutela părintească constă în oferirea de oportunități de a dezvolta potențialul copiilor orfani prin organizarea activităților extracurriculare, care vor ajuta acești copii să se integreze mai ușor în viața socială și în același timp să obțină noi cunoștințe. Proiectul European „Rețea de plasamente uman ecologice" include și crearea cluburilor, care vor organiza evenimente de seară pentru copii ca divertisment, care se vor realiza într-o manieră educativă/distractivă.

2. Management și organizare logistică.

Ajustarea conștiinței oamenilor din spațiul rural și urban în necesitatea și posibilitatea de a-și îmbunătăți starea intelectuală, spirituală și psihologică pozitivă cu ajutorul oamenilor de specialități de tip „Bunăstarea psihologică umană": psihologi, peisagiști, frizeri, cosmetologi, consultanți, juriști este o cerință a timpului în evaluarea Spațiului Dunărean al Europei.

În primul rând prin crearea școlilor pentru copii invalizi, Proiectul European „Rețea de plasamente uman ecologice" creează noi locuri de muncă, bazată pe egalitatea socială de a constata, că oamenilor invalizi au succese în ciuda faptului că au dizabilități. De asemenea eliminăm batjocura, deoarece în prezent copii invalizi studiază în școli normale și sunt mereu judecați pentru problemele pe care le au. Aceasta idee va fi apreciat de oricine, în special de părinții acestor copii, care vor ști că copiii lor vor fi în siguranță și vor avea șansa la studii de calitate.

Centrele de instruire în domeniul TIC din cadrul Proiectul European „Rețea de plasamente uman ecologice" vor permite specialiștilor în domeniul informaticii a Societății cunoștinței, în care trăim, să activeze la locul de trai, unde oamenii în etate ar putea obține noi locuri de muncă datorită cunoștințelor obținute în cadrul cursurilor, copii s-ar putea determina să se dezvolte în această direcție și să activeze în domeniul tehnologiilor informaționale fiind remunerați potrivit și sporind economia. Întreprinderile de tip „Stilistică" din cadrul Proiectului European **„Rețea de plasamente uman ecologice"** vor putea angaja localnici, pregătiți și cu suportul Academiei „Bunăstarea ecologică umană", nu vor fi nevoiți să se deplaseze la serviciu la distanțe mari. Aceste ÎMM-uri vor putea servi persoanele din sate dar și din afara localității, inclusiv din orașe. Va fi posibilitatea de a servi o cafea într-o zonă departe de ambuteiaje și mai aproape de natură. Aceste întreprinderi, ca și Academia „Bunăstarea ecologică umană" se vor axa la fel și pe prezența online și vor atrage creatori de cursuri, seniori din domenii de activitate în cadrul activităților de bunăstare a omului.

Prima etapă de realizare a Proiectului European „Rețea de plasamente uman ecologice" constă un alcătuirea unui chestionar, scopul cărui este de a determina, dacă intențiile vizate în proiect coincid cu așteptările, dorințele oamenilor de diferită vârstă, și, în primul rând al persoanelor în vârstă și a copiilor.

În acest scop, de exemplu, au fost chestionați 25 de elevi (clasele 11 și 12), cărora li s-a oferit subiectele, care, după părerea organizatorilor, ar fi cele mai interesante pentru ei. În plus, elevii au putut să indice și alte subiecte, instruirii, activități, care nu au fost incluse în chestionar. În continuare a fost organizată o lecție experimentală care a durat 2 ore. Echipa de voluntari a decis să înceapă prin predarea cursurilor de informatică. Administrația liceului „Dimitrie Cantemir" ne-au oferit gratis laboratoarele de calculatoare pentru partea practică a lecției. Constatări: În baza analizei efectuate s-a constatat că cel mai dorit subiect e informatica.

3. Managementul procesului creării ÎMM-lor de tip european în sectorul rural al Spațiului Dunărean..

1. Pentru cursuri de instruire și învățare a calculatorului, este nevoie de a amenaja într-un mod agreabil spațiul destinat cursurilor, este nevoie de echipament, și anume calculatoare, mese, scaune, proiectoare, table interactive. La fel pentru sălile pentru odihnă și socializare este nevoie de mobilierul respectiv.

2. Este nevoie de a angaja profesori competenți în domeniu predării cursurilor prestate.

Consider că implementarea acestei idei poate avea loc sub forma unei petiții online, în care oamenii vor vota, da dorim școli pentru copii invalizi, în urma căreia dacă se adună destule voturi să fie trimisă la

autoritatea competentă pentru a o discuta cu consiliul și de a vedea care este șansa de succes a acestui proiect și dacă poate fi realizat în urma prezentării argumentelor și necesității școlii pentru copii invalizi.
Pentru că acest proiect să lucreze avem nevoie de a organiza atmosferă plăcută pentru studenții noștri. Să le permită de a se juca un pis, să nu să se teamă de a da întrebări. Principalul este să le oferim oportunitatea de a înțelege că nu e internat dar e școală unde toți îi înțeleg și respectă.

3. Pentru centrele de recreere e nevoie de respectat următorii pași:

- Identificarea localității unde se va amplasa acest centru.
- Găsirea spațiului. Proiectarea centrului. Reparație și amenajare.
- Angajarea personalului.
- Începerea activității centrului și promovarea acestuia.

Scopul este de a genera profit pentru ca centrul să funcționeze în continuare fără suport financiar.
Pentru aceasta se va lucra la identificare serviciilor adiționale pentru generare profit.

4. În comuna Cotiujenii Mici găsim un local pentru a construi un campus pentru Academia bunăstării ecologice a omului.
Proiectăm Campusul (inclusiv și cerințele financiare) cu toate necesitățile, căminul, cantina, aparatura etc
Construim Academia ...
Angajăm cadrele pentru pregătirea specialiștilor cu titlul ”Bunăstarea ecologică a omului” cu specializari in masaj, frizerie, psihologie, etc.
În ianuarie 2023 începem cursurile de pregătire a cadrelor în domeniul bunăstării psihologice a omului.

5. Același lucru îl facem și în spațiul urban din Cluj-Napoca. Construim ÎMM de Stilistică
Arătăm necesitățile financiare. Angajăm specialiști în stilistică, psihologie, masajare etc
Producem: numărul clientelor care au beneficiat de servicile noastre este considerabil ...
În anul 2023 beneficiarii proiectului vor fi de un număr considerabil pentru a susține sustenabilitatea afacerilor și după sfârșitul finanțării Europene

Rezultatele lucrării sunt sustinute de exemple practice și studiu comparativ care scot în evidență necesitatea implementării organizării muncii extracurriculare, ajutându-i astfel să se auto actualizeze și să primească noi cunoștințe, ținând cont de investițiile necesare, cheltuieli de întreținere și de administrare. Noutatea și originalitatea științifică: Copiii care au început să se antreneze cu noi vor lucra și se vor dezvolta special pentru anumite companii,pe care le aleg singuri, vor ajuta compania - membrii își îndeplinesc sarcinile mai eficient. Suntem siguri că acest lucru va afecta imaginea de ansamblu a economiei statului nostru, care, fără îndoială, va demonstra realizarea tuturor obiectivelor stabilite pentru echipa noastră.

6. Concluzii și sustenabilitatea

In totalitatea, proiectul acesta consta din următoare beneficii:
-Ridicarea nivelului de trai în sectorul rural și urban, implementarea corelării societăţii şi culturii moldave cu societatea şi cultura dunăreană și europeană
-Va ajuta o bună parte din copii invalizi , pentru ai ajuta sa își descopere potențialul
-Dirijarea procesului de europenizare a societăţii moldave și a spațiului Dunărean: societatea, economia, educaţia, cultura, ecologia,
-Constituirea centrelor moderne de instruire în spațiul rural.
-Va oferi locuri de muncă
-Ajută la dezvoltarea statului pe plan social și educațional
-Monitorizarea proceselor de oprire a migraţiei forţei de muncă şi de întoarcere a forţei de muncă

-Micșorează rata copiilor invaziei fără studii
-Implementarea strategiilor de ecologizare, economisire și industrializare după modelul european a sectorului rural din Republica Moldova
-Micșorează rata copiilor marginalizați
-Crearea locurilor de muncă pentru specialiști tineri.
-Constituirea centrelor moderne de instruire în spațiul rural.
-Dezvoltarea infrastructurii rurale pe seama workshopurilor.
-Învățarea efectivă a bătrânilor.
-Monitorizarea proceselor de oprire a migraţiei forţei de muncă şi de întoarcere a forţei de muncă
-Crearea întreprinderilor medii şi mici (ÎMM) de tip european în sectorul rural și urban creare a noi locuri de muncă şi ocupare acestora cu salarizare europeană.

SUSTAINABLE AND WIDE-SCALE IMPLEMENTATION OF E-/D-LEARNING IN TECHNICAL VOCATIONAL EDUCATION

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Abstract. The sustainable development strategy includes simultaneous progress in four dimensions: economic, human, environmental and technological. The paper presents an express-study of good practices of sustainable and widespread implementation of electronic, mobile, distance Learning (e-/m-/d-Learning, EDL) in technical vocational education (TVE). For the successful implementation of EDL in TVE of the Republic of Moldova (RM), making changes, motivating, stimulating and continuously improving teachers, reducing the digital divide, etc. appropriate strategies and policies are urgently needed, both at national and local level for schools. *Purpose:* The paper aims to promote a conscious and responsible attitude towards e-transformation of TVE in the RM. *Methodology/approach:* The paper contains a brief analysis and synthesis of new challenges, trends and e-transformation solutions of TVE. Their awareness would allow a better targeting of the digital e-transformation of TVE from the RM. *Research Implications:* The post-pandemic world will have a greater demand for EDL. But many of the old paradigms, teaching-learning-assessment platforms, organizational solutions etc., need to be reviewed, rethought and adapted to the new conditions. Thorough analysis of good e-transformation practices of TVE is required in order to identify, adapt and apply appropriate solutions and scenarios under the conditions of TVE in the RM. *Practical implications:* Identifying transparent and effective ways/scenarios for preparation and provision of innovative education in TVE trough sustainable and widespread implementation of EDL in vocational schools of the RM. *Originality/value:* A scenario of organizational e-transformation of IPT and sustainable implementation of EDL in IPT in the RM is proposed.

Keywords: Electronic-mobile-distance learning (EDL), EDL Platforms, Information and Communication Technologies (ICT), Sustainable Development, e-Transformation, Digital Educational Resources (DER), Continuous training of teachers.

1. **Introduction**

In the last five decades after the 1970s there have been elaborated and implemented various innovative e-/m-/d-Learning solutions: Learning

Management Systems (LMS platforms, e.g., Moodle, ATutor, ILIAS), MOOCs educational services (Massive Open Online Courses, e.g., Coursera, edX, Udacity), micro-learning, gamification and virtualization of educational content, etc., which led to reform and grow the educational productivity at all levels. This has allowed online distance learning to become the basic remedy in the situation of the COVID 19 pandemic crisis, which has forced the massive and "overnight" transition of traditional education to EDL. At the same time, this process deepened the digital divide, found a relatively poor level of preparation of the education system for organizational e-transformations of TVE in an emergency and in conditions of limited resources, insufficiency of teachers with the necessary qualifications. *Sustainable and widespread implementation of e/d-Learning in TVE requires the approval of an appropriate national strategy and corporate policies for e-Transforming TVE, automation and intellectualization of the development of digital educational resources, in-service teacher training, etc.*

According to UNESCO, rapid changes in the education sector, driven by COVID-19, have affected more than 70% of the total students. The rules of social distance have forced the replacement of face-to-face lectures with online solutions. "Physical closure" of schools, universities, colleges, etc. the "overnight distance" deepens the existing disparities in the education system and the emergence of others, some quite severe. For example, most PI do not have the necessary staff, ICT infrastructure and financial resources. Many students have limited access to computers, Internet, Wi-Fi. And where Wi-Fi is used as an Internet connection, it's not high-performing and reliable enough. Frequent interruptions of synchronous activities cause stress for teachers, parents and trainees, who are not yet accustomed to ICT.

In this context, the old paradigms, teaching-learning-assessment platforms, including syllabus-technical solutions, need to be reviewed, rethought and adapted to the new conditions. A thorough analysis of the good international practices of e-transformation of TVE is required in order to identify, adapt and apply the appropriate solutions and scenarios in the conditions of the RM.

2. EDL as an innovation and e-transformation remedy for TVE

According to bibliographic studies, the concept of EDL is used in a broad and narrow sense. In a broad sense, EDL means the totality of educational situations in which the ICT means are used significantly. In a narrow sense, EDL is a type of distance education, as a planned teaching-learning experience organized by an institution that provides mediated materials in a sequential and logical order to be assimilated by students in their own way [1].Thus, the original term taken from the Anglo-Saxon literature with the primary meaning of e-learning, is now an umbrella term [2-3] extended to the intersection of several educational actions mediated by modern ICT, gadgets, Internet and Web, Cloud Computing etc. *(Fig. 1).*

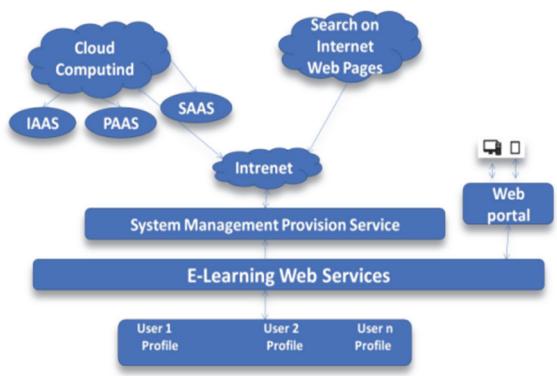

Figure 1.e-Learning services using cache management and Cloud computing [3]

Cloud consists of SaaS *(Software Application as a Service),* PaaS *(Platform as a Service),* IaaS

(Infrastructure as a Service). One of the biggest problems for the sustainable implementation of EDL in TVE is the lack of the necessary ICT infrastructure, qualified staff, limited finances, etc. [3]. According of many researchers, developers and software providers [4], [5], [6] the advantages, the benefits by using Cloud are multiple. Many educational institutions of various levels widely use EDL for academic courses, continuing education, corporate, vocational training, etc. Benefits for **students, teachers, and why companies are migrating to Cloud** services include:

- Minimal cost - Cloud means a significant decrease in the user's software and hardware resources, eliminates the entity's expenses for the acquisition and maintenance of ICT infrastructure, creation of IT departments, IT data centers, highly qualified ICT staff, etc. Everything the user needs - is a personal gadget (*notebook, smartphone etc.)* connected to the Internet;
- Cloud allows organizations to easily evolve to the scale needed to align with the requirements by accessing the relevant volume of resources at the right time, e.g., computing resources, storage, bandwidth, etc.
- High productivity and performance of those involved - Cloud eliminates the need to manage their own ICT infrastructures, no need for internal ICT assistance. Cloud services are configured-provided by professionals to the required parameters;
- Perfect collaboration in a distributed way - offered by the very essence of the Cloud and which is ideal for collaborative, remote EDL, but with reliable and secure learning platforms and resources, managed on the Cloud.

Basically, EDL in the Cloud is defined as a service. The service can be of the required quality, provided very quickly and at much lower costs, comparable to the time, speed and expenses required to deploy your own infrastructure. For the end user Cloud requires:

- An Internet connection;
- Create an account with a username and password (by filling out a form);
- Agreement with the terms and conditions of use.

According to [7, 8], Cloud enabled organizations must have high-speed Internet.

In conclusion, Cloud EDL would be the "life-saving" solution for innovative e-Transform of TVE. Centrally managed digital educational platforms and resources in the virtual space on the Cloud save resources, increase their quality and allow the essential improvement of ICT-mediated teaching-learning-assessment processes. At the same time, it is worth mentioning that EDL, either with its own TPS infrastructure or in the form of Cloud services, with all their variety of digital tools, does not completely replace face-to-face classical education, but can significantly improve it and provides new interactive and effective forms of education.

3. Trends of Sustainable Development

The sustainability as a concept is the most often associated with sustainable development, a term introduced by the 1987 Brundtland Commission Report [9]. According to this document, sustainable development has three dimensions: *ecological, economic, equity and is understood* as a sum of actions through which "current needs are met without compromising the ability of future generations to meet their own needs" [10].

According to the PK-12 Model of Open Educational Resources for the New America on creating sustainable systems [11], the sustainability is based on four pillars: Access, Skill, Policy and Motivation *(Fig. 2).*

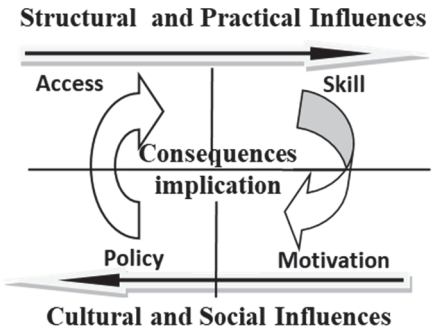

Fig. 2. Graphic representation of a sustainable process

The main activities of digital e-transformation of sustainable education and sustainable development strategies are exposed at European and national level.

At the global level sustainable development of the instructional-educational process is set out in 2030 Agenda for Sustainable Development [12], with the 17 sustainable development goals, which can be achieved by transforming unsustainable practices globally. The 2030 Agenda is an inter-governmental commitment and "a plan of action for people, planet and prosperity". For these reasons, UNESCO launched under the auspices of global education, the concept of education for sustainable development, which can contribute to a sustainable society by including the principles and values that underpin sustainable development in educational processes at all levels and ages [13]:

- Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all;
- Focus on effective learning and the acquisition of relevant knowledge, skills and competencies;
- New focus on the relevance of learning, both in terms of vocational and technical skills for decent work;
- Concentration of all management systems *(government, united nations, society)* to address educational challenges and establish inclusive and relevant systems for any participant in the educational process throughout life.

At the national level for the RM**,** Sustainable education development strategy for the years 2021-2030 [14] provides for the following factors:

- Connecting to international education policies: Implementing lifelong learning; implementing education for sustainable development as a key tool for achieving the goals of sustainable development; Ensuring the quality of inclusive and equitable education, etc.
- Analysis of the real situation, general and specific problems, the potential and opportunities of the education system to achieve the goals of sustainable development and to effectively achieve its functions.
- Establishing the prospects and opportunities for the socio-economic development of the country, which, for the most part, also determines the prognoses for the development of the education system.

In this context, education, which is both an end in itself and a means of contributing to the achievement of the country's goals of social and economic development, must be seen as a foundation, in relation to other sectors of society; as a value and a tool for the production and promotion of values, ensuring continuity in the sustainable development of the country.

4. Sustainable implementation of EDL in TVE

Logic of the process of sustainable and large-scale implementation of EDL in TVE *(Fig. 3, Fig.4)* is based on ISO 20121 standard [15].

This specifies requirements for an event sustainability management system (SMS) for any type of event or event-related activity, and provides guidance on conforming to those requirements. SMS can be continuously improved according PDCA approach *(Plan-Do-Check-Act model).*

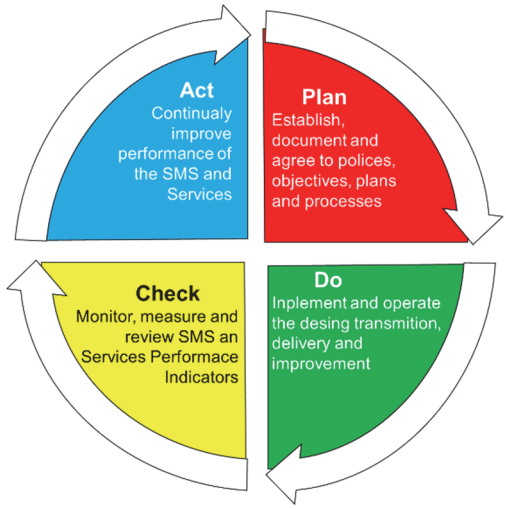

Figure 3. The PDCA cycle of continuous improvement of implementation events of EDL

For the TVE innovation process to be sustainable and widespread, it should be shaped by a well-defined strategy with sustainable innovation guidelines and policies:

- Defining the main goal according to modern trends;
- Determining the infrastructure appropriate to the needs and possibilities of technical vocational school (TVS);
- Appreciation of the level of awareness, continuous training and promotion of innovative EDL by top management, teachers and students;
- Control, maintenance and continuous improvement of EDL.

According to the results of the survey [16] and the data of MER (https://mec.gov.md/ro/content/institutii-de-invatamant-0), TVE in the Republic of Moldova consists of 13 Centers of Excellence, 36 Colleges and 42 Vocational Schools. According to the evaluation of the use of ICT in TVE [17] and the "Minimum Standards for ICT endowment of institutions in Technical Vocational Education" approved by the Ministry of Education and Research (MER) by order 1043 of 2015, the ICT endowment of TVE provides:

- Maximum 20 students per 1 computer; 50% of computers older than years;
- Minimum 25 computers per institution (15 computer science class + 10 administration);
- 3 computers for management staff; 4 computers used by teachers; 2 computers in the methodical office; 1 computer in the library;
- Minimum 2 printers per institution; 1 projector per TVE; 1 projection board.

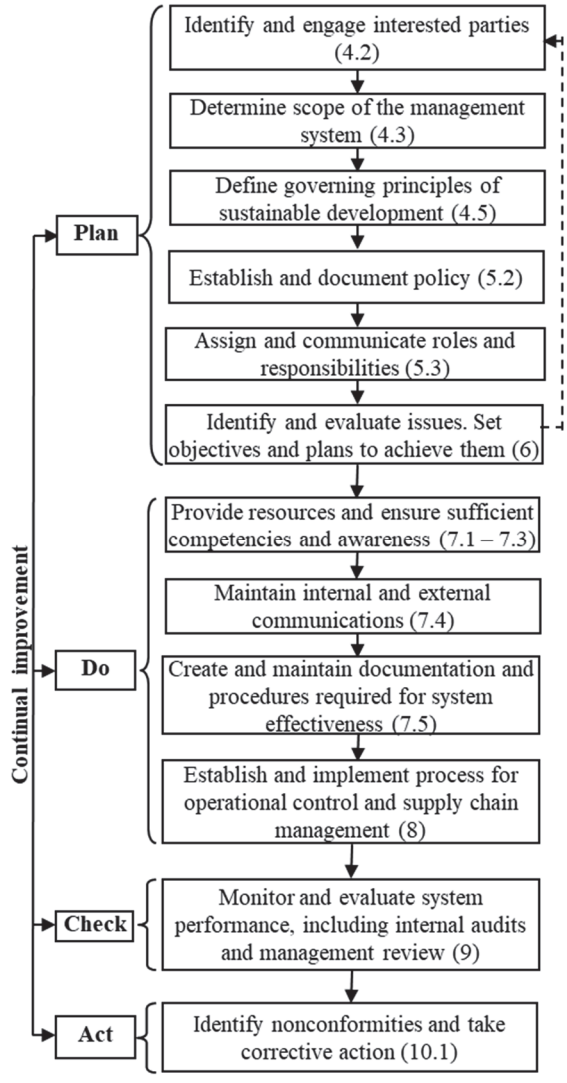

Figure 4. Event sustainability management system model for EDL [15]

But this endowment does not solve the problem of distance learning. For the development of EDL it is necessary that every teacher and every student involved has a gadget that can be connected to the Internet. The indicative assessment of the costs of equipping TVE with totally separate infrastructures and in the conditions of the MER Single Center is presented in Table 1, based on the total number of 91 institutions, each with an average of 650 students, 50 teachers and 7 *(in the lowest current prices).*

Table 1

Indicative assessment of the cost of local infrastructure for the implementation of EDL in the TVS/Single Center for EDL Management

Product/service name	**Unit price (lei)**	**Cost for an institution**	**Costs at the MER level (lei)**
Gadgets for students	4000/ 3200	2600000/ 2080000	236600000/ 189280000
Notebooks for teachers	7000/ 5600	350000/ 280000	31850000/ 25480000
Internet connection (Fiber Mix 1000)	230/ 184	1610/ 1288	370300/ 296240
Serving the EDL platform	600000/ 10000	600000/ 10000	5460000/ 910000
EDL platform administration	3000/ 3000	3000/ 3000	273000/ 273000
Continuous training (for teachers)	350/ 15000	17500/ 0	1592500/ 75000
Google g-suite for education	1200/ 72000	1200/ 0	109200/ 72000
Total			276255000/ 216321440

We see that it is a rather large and unrealistic amount for TVE in the Republic of Moldova. The comparative analysis of the minimum endowment requirements of each teacher and student with at least one laptop/notebook in order to consolidate a sustainable EDL system with respect to the minimum standards of endowment of TVS, approved by MER, shows that the expected performance of ICT infrastructure is very weak, practically insufficient, even if the minimum endowment standards involve a lot of costs and the separate infrastructures are difficult to manage.

We appreciate that creation of a single EDL center next to MER, which would manage all the necessary set of hardware-software resources, educational platform and DER for all TVS in the RM would significantly reduce costs (near 60 mln), at least for the problem of local VTS infrastructure.

The basic idea is that personal gadgets / laptops

should be cared for and belong to the individuals, and the care of the center is to facilitate/smooth the procurement and use of them and the centralized resources for the realization of VTE. Instead of dispersing resources, it is proposed to concentrate them and disseminate good practices.

ICT for VTS, could be delivered centrally by MER, in installments over a period of 2-3 years for students and up to 5 years for teachers. In turn, MER could directly contract the manufacturers for long periods of time, which would reduce the purchase, service and renewal prices of the ICT fleet. Google can also be contracted for the use of Google-suite, training on the territory of the RM, etc. Therefore, the only perspective for the sustainable and widespread development of EDL would be the creation of a Management and Control Center at the level of the TVE Directorate, which could:

- Collect the required amount (from centralization account) and reduce the summary cost at the level of each VTS (from the account of scaling and sharing);
- Implement and manage a unique platform for EDL, develop-manage-broadcast centralized DER, consult users, coordinate\ensure teacher training etc.;
- Organize common space for projects and teaching materials, organize competitions, exchange of good practices, etc.

A simple analysis of the alternatives shows a colossal saving difference of 59868760 mdl.

ICT technology can be purchased by the EDL Center directly from the manufacturer at a reduced price of about 20% compared to the commercial network. In addition, students or teachers may return used devices to the manufacturer for disassembly and modernization at the expense of new ones. But the most significant factor would be the sustainability of this system and the possibility of scaling, practically without any additional costs. The EDL Center would be an ideal solution, the most perfect and suitable, both for each of the VTS and at the national level, ensuring the 4 dimensions of sustainable and large-scale development: economic, human, environmental and technological.

An example for the EDL Center would be https://sime.md/, which is a statistical data collection system, has a virtual catalog of videos, a user guide, and offers courses or seminars to reduce operating gaps. and data processing.

DER promotion competitions can be used as development opportunities, **organized by** Prodidactica (http://DER.prodidactica.md, http://profesor.md, https://educatieonline.md), by the ATIC Association (https://tekwill.online), Erasmus + (http://erasmusplus.md) and so on.

5. Results and discussions

Today, there is a wide and varied range of EDL platforms and solutions, including DER development. Identifying within each TVE a motivated team, concerned with the integration of ICT and EDL in educational processes, including motivating students, increasing the attractiveness of the learning process, increasing the satisfaction of students and teachers, efficiency in the use of ICT is crucial for:

1. Creation of the necessary conditions for launching and running EDL on a large scale by creating a Center;
2. Continuous training of teachers by categories *(e.g., beginners, advanced, experts).* TVE experts can carry out initial training for beginners, can conduct workshops with advanced ones in order to increase their skills;
3. Examining successes and failures, establishing the perspectives of EDL development-promotion, approving the good practices of continuous and sustainable innovation, etc.

Final conclusions

The post-pandemic world will have a higher demand for EDL, e-Transformation, e-Learning, e-Teaching, e-Training, etc. The integration of ICT in

TVE in the RM, sustainable and large-scale implementation of e-/d-Learning is a good development opportunity, but also an increased risk of failure, in the absence of awareness of new challenges and trends in post-COVID-19 education transformation.

The scattered activities of implementing EDL in TVE, carried out mainly in various scattered projects, local and isolated, are no longer effective. For the successful implementation of EDL in TVE in the RM, for change, motivation, stimulation and continuous improvement of teachers, reducing the digital divide, etc., sustainable strategies and policies are needed, both nationally and locally. of IP TV; coordinated efforts, involvement, commitment of the top management and teachers of IP TVE, systemic support at the level of the Ministry of Education and Research and other line ministries are required.

At the same time, today's EDL still cannot perfectly replace traditional face-to-face education, leaving room for further discussion, research and development, which we expect to happen in the near future. This involves the adoption of EDL implementation policies, the establishment of continuing education centers in the field of EDL, which will play a key role both in promoting innovative EDL and in developing new innovative forms of effective integration of ICT in the education of new generations.

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ANGAJAT, ASOCIAT, AFILIAT
„REGLEMENTAREA STATUTULUI DE PENSIONAR ȘI ACTIVITATEA ACESTUIA PRIN LEGE”

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Abstract. The senior **employee** is the adult person, who works during the last 5 years before retirement. The **associate** senior is the pensioner with continuous activity at the parent enterprise. The **associate** senior is the retiree with volunteering at the parent enterprise. The senior employees, associates and affiliates being still with activities at the parent enterprise require from a social, material, intellectual, psychological and spiritual point of view to activate according to the approvals of the legislation. In the present paper is analyzed the legislative situation of seniors in the states of the world, including in the USA and the EU with implementation in the Republic of Moldova. The legislative and psychological situation is exemplified in the conditions of continuity of the activities of the seniors from the Association "ASEM Seniors" [1] with activity in ASEM until now.

Keywords: senior, employee, associate, affiliate, continuity, activity, psychological well-being, legislation, **JEL: C54, C63, C8, C91**

Introduction.

Connecting older adults to the community was discussed in 5-6 March 2022 at the final [2] **meeting of the SHELDON COST CA16226** „Loneliness and low wellbeing of older adults could be improved with different approaches that promote social engagement and physical activity by connecting older adults with their communities. This connection could be established and strengthened through age-friendly trails, rest areas, open and green spaces, community meeting areas, virtual meeting places, accessible local events, and mobile applications that facilitate navigating those spaces and events. Public transport should be made more accessible, affordable, socially focused, and convenient”

Conectarea adulților în vârstă la comunitate

Singurătatea și bunăstarea scăzută a adulților în

vârstă ar putea fi îmbunătățite cu diferite abordări care promovează implicarea socială și activitatea fizică prin conectarea adulților în vârstă cu comunitățile lor. Această conexiune ar putea fi stabilită și consolidată prin trasee prietenoase cu vârsta, zone de odihnă, spații deschise și verzi, zone de întâlnire a comunității, locuri virtuale de întâlnire, evenimente locale accesibile și aplicații mobile care facilitează navigarea în acele spații și evenimente. Transportul public ar trebui să devină mai accesibil, la prețuri accesibile, mai concentrat din punct de vedere social și mai convenabil [2].

Asociația „Seniorii ASEM" [1] – o nouă paradigmă de conlucrare intergenerațională.

Trecerea oricărui om de la o etapă de activitate în viaţă la alta este paralelizată cu o stare mai tensionată a vieţii. In deosebi aceasta se referă la etapele de trecere la pensie, de la o activitate de pre-pensionare spre o altă etapă - de pensionare şi de acolo la o a treia etapă - de post-pensionare, sunt psihologic foarte încărcate. Nu e vorba doar de partea economică, care e una dintre cele mai acute în timpurile noastre în spaţiul Republicii Moldova de azi, dar şi, ce e mai important – sferele, care ţin de spiritualtate, intelectualitate şi socialitate – cele 8 ore de activitate „personală", care în afară de 8 ore necesare pentru somn și 8 ore de activitate în unitățile de producere, constituie o treime din viaţa omului.

Colaboratorii ASEM, îndeosebi profesorii seniori, nu constituie o excepţie. În ASEM aceste componente a vieţii contemporane, în deosebi a oamenilor, care au profesionalizat o etapă foarte îndelungată în ASEM - a profesorilor seniori - rădică încordarea psihică a profesorilor în vârstă la un nivel foarte înalt, dat fiind specificului nostru de profesor universitar.

Profesorii seniori ai ASEM, sunt dotaţi cu ocupaţii intense de cercetare şi educaţie şi nu prea sunt implicați în timpul activității în ASEM la activităţi de alt gen. Profesorii ASEM nu trag mare atenție și la alte activităţi decât cercetarea şi predarea şi la momentul pensionării se situiază în fața necesității de intrerupere a activităților de toate zilele şi atunci apare întrebarea: cei de facut?

Procesul de îmbătrânire a profesorilor universitari nu trebuie să afecteze psihologic nici persoanele, care sunt în perioada de ieşire la pensie, nici profesorii, care sunt deja la pensie şi sunt şi în activitate part-time la ASEM şi nici profesorii, care sunt pensionaţi şi nu activează în continuare. Aceste 3 grupe de profesori formează nivelul senioral al profesorilor ASEM. Ei sunt oameni cu o experienţă mare în cercetare şi în sfera didactică de excepţie, persoane cu o cultură stabilă şi de mare valoare profesională și socială exemplară pentru generaţiile tinere, nu numai pentru studenţime, dar îndeosebi, şi e foarte important, pentru doctoranzii şi profesorii tineri din ASEM – seniorii ASEM în perspectivă.

Continuitate ... Scumpă Libertate ... reprezintă emblema continuității activităților seniorilor din Asociația „Seniorii ASEM" [1] a ASEM.

Bătrânețea este o etapă specială de viață pentru persoanele în vârstă și o abordare adecvată de către societate a acestui fenomen este foarte necesară.

Profesorii adulți din ASEM, cu sprijinul Administrației instituției, au format o asociație de profesori, care funcționează după principiile „ASEM este casa mea" și „Casa mea este ASEM ". Modalitatea de a realiza aceste deziderate este de a permite persoanelor în vârstă din ASEM să lucreze la institutul său natal până la adânci bătrânețe. Aceste deziderate reprezintă o noua paradigma originala de organizare a activităților CONTINUE ale persoanelor in vârstă.

Profesorii adulți din ASEM sunt împărțiți în trei categorii: ANGAJAȚI – profesorii, care vor împlini vârsta de pensionare în următorii cinci ani, ASOCIAȚII – profesorii, pensionari și lucrează în ASEM Part-Time și AFILIAȚI – profesorii, care lucrează după pensionare în ASEM în mod voluntar. Toți activează ca AFILIAȚI ai ASEM până la adânci bătrânețe, conform deciziei Senatului ASEM

din decembrie 2019 de a organiza Asociația „SenioriI ASEM " cu un Regulament special de activitate în cadrul ASEM.

Asociația „Seniorii ASEM" funcționează cu succes în acești doi ani, chiar dacă de cele mai multe ori a funcționat în condițiile pandemiei de COVID-19. Afiliații ASEM ai Asociației „Seniorii ASEM " sunt împărțiți funcțional în trei grupuri de activitate cu scopul de a sprijini ASEM - instituția de origine, care tinde să devină în viitoarea instituție de cercetare-educație în domeniul economic al Republicii Moldova. „Auditul profesoral", „Sprijinul WEB al IMM-urilor" și „Din studii în producție" sunt trei subdiviziuni ale Asociației „Seniorii ASEM ", care funcționează cu succes sub estimarea principală a CONTINUITĂȚII activităților profesorilor adulți ai ASEM până la adânci bătrânețe fericite.

Association "Seniors of ASEM" [1] – a new paradigm of intergenerational cooperation.

The transition of any person from one stage of activity in life to another is paralleled with a more tense state of life. In particular it refers to the stages of transition to retirement, from one pre-retirement activity to another stage - retirement and from there to a third stage - of post-retirement, are psychologically very loaded. It is not only about the economic part, which is one of the most acute in our times in the space of the Republic of Moldova today, but also, what is more important – the spheres, which are related to spirituality, intellectuality and sociality – the 8 hours of "personal" activity, which besides 8 hours of activity necessary for sleep and 8 hours of activity in the production units, constitutes a third of man's life.

ASEM collaborators, especially senior teachers, are no exception. In ASEM these components of contemporary life, especially of people, who have professionalized a very long stage in ASEM - of senior teachers - laugh at the psychic tension of elderly teachers at a very high level, given our specificity as a university professor.

The senior teachers of ASEM are endowed with intense research and education occupations and are not really involved during the ASEM activity in other activities. ASEM teachers do not pay much attention to activities other than research and teaching and at the time of retirement they are faced with the need to interrupt the daily activities and then the question arises: what to do? The aging process of university professors should not affect psychologically either.

The ageing process of university professors must not affect psychologically either the people, who are in the period of retirement, nor the teachers, who are already retired and are also in part-time activity at ASEM, nor the teachers, who are retired and do not continue to work. These 3 groups of teachers form the senior level of ASEM teachers. They are people with a great experience in research and in the exceptional teaching sphere, people with a stable culture and of great exemplary professional and social value for the younger generations, not only for the students, but especially, and it is very important, for the PhD students and young professors from ASEM – the ASEM seniors in perspective.

Continuity... Expensive Freedom... represents the emblem of the continuity of the activities of the seniors from the "ASEM Seniors" Association [1] of ASEM.

Old age is a particular life stage for older people and an appropriate approach by society to this phenomenon is very necessary.

The adult profesors in AESM with the support of the Administration of the institution have formed an association of professors, which operates according to the principles "AESM is my home" and "My house is AESM". The way to achieve these Desiderata is to enable the elderly people of AESM to work at his native institute until deep down in their old age. These desiderata represent an original

new paradigm of organizing THE CONTINUE activities of older people.

The adult professors in AESM are divided into three categories: EMPLOYEES – professors, who are going to reach retirement age in the next five years, ASSOCIATES – professors, who are retired and work in ASEM Part-Time and AFFILIATES – professors, who work after retirement in ASEM voluntarily. All of them work as AFFILIATES of AESM until old age according to the decision of the ASEM Senate in December 2019 to organize the Association "AESM Seniors" with a special Regulation of activity in AESM.

The Association "AESM Seniors" operates successfully during these two years even though most of the time it operated under the conditions of the COVID-19 pandemic.

The AESM affiliates of the Association „AESM Seniors" are functionally divided into three activity groups with the aim of supporting the AESM - home institution, which tends to become in the future research-education institution in the economic field of the Republic of Moldova. "Professor audit", "WEB support of SMEs" and "From studies in production" are three subdivisions of the Association "AESM Seniors", which operate successfully under the main estimate of CONTINUITY of AESM adult professors activities until happily old age.

Principiile „Întreprinderea este casa mea" și „Casa mea este Întreprinderea ".

Vârsta de pensionare, nu este un impediment, mereu este un job care le permite persoanelor aflate deja în statut de pensionar să activeze. Facilitățile, de care dispun cetățenii oricărei țări, sunt impuse de lege, în conformitate cu care se stabilește dacă persoana este capabilă de a activa în calitate de angajat, ce venit îi revine persoanei, ce pensie va avea aceasta la urma anilor munciți, care este jobul potențial și de ce beneficii va avea parte la acel job.

Pentru început, este necesar de a înțelege, că fiecare stat sau uniune de state, au condiții impuse prin lege, care sunt individuale la fiecare stat în parte.

Vârsta de la care și până la care se permite de activat într-o oarecare funcție, pachetul de beneficii aplicat, asigurările, concediile, condițiile de accedere în funcție, sau demisionare / concediere din funcție sunt, de asemenea, individuale pentru fiecare stat în parte.

Toate condițiile posibile, care influențează astăzi posibilitățile oricăruia, sunt legate strâns între ele. Angajatorii deseori preferă **angajați** cu cunoștințe, capabili de orice: să soluționeze o problemă apărută din senin, să fi mereu în mișcare și permanentă dezvoltare, să fie energic, să utilizeze cât mai productiv timpul.

Experiența și anii munciți compensează lipsa multor caracteristici care le lipsesc persoanelor cu vârsta de până la pensionare.

Pentru a atinge scopul de a efectua o activitate remunerată, persoana, mai întâi de toate, trebuie să studieze legea țării, în care urmează de a fi efectuată activitatea, apoi trebuie să cunoască condițiile, care ar face posibilă executarea acestei activități și interdicțiile, și, în final, necesită cunoașterea beneficiilor, de care poate dispune persoana, ce remunerare și scutiri sau compensații, pe care le poate primi persoana, care îndeplinește activitatea.

The principles "Enterprise is my home" and "My home is enterprise".

The retirement age is not an impediment, it is always a job that allows people already in retirement status to work. The facilities, available to citizens of any country, are imposed by law, according to which it is established whether the person is able to work as an employee, what income belongs to the person, what pension he will have after the years worked, what is the potential job and what benefits he will receive at that job.

To begin with, it is necessary to understand, that each state, or union of states, have conditions

imposed by law, which are individual to each state individually.

The age at which and up to which it is allowed to work in any position, the package of benefits applied, the insurances, holidays, the conditions for taking up office, or resigning / dismissing from office are also individual for each state separately.

All possible conditions, which today influence the possibilities of any, are closely related to each other. Employers often prefer employees with knowledge, capable of anything: to solve a problem that arose out of the blue, to be always on the move and permanent development, to be energetic, to use time as productively as possible. The experience and years worked compensate for the lack of many characteristics that people with the age up to retirement lack. In order to achieve the goal of carrying out a paid activity, the person, first of all, must study the law of the country, in which the activity is to be carried out, then must know the conditions, which would make it possible to carry out this activity and the prohibitions, and finally, requires knowledge of the benefits, which the person may have, what remuneration and exemptions or compensation, that you can receive the person, who performs the activity.

1. DIFERENȚE ÎN DREPTUL DIFERITOR STATE

Republica MOLDOVA

Relațiile de muncă în Republica Moldova sunt dirijate de către dreptul muncii.

Dreptul muncii ramură a sistemului de drept alcătuită din ansamblul normelor juridice care reglementează relaţiile individuale şi colective de muncă, atribuţiile organizaţiilor sindicale şi patronale,conflictele de muncă şi controlul aplicării legislaţiei muncii. Toate relațiile și raporturile juridice fiind înscrise în Codul Muncii, care ușurează aplicarea măsurilor de menținere, dirijare și ocrotire a relațiilor de muncă.

Conform Constituției Republicii Moldova:

Art. 43: Dreptul la muncă şi la protecţia muncii

(1) Orice persoană are dreptul la muncă, la libera alegere a muncii, la condiţii echitabile şi satisfăcătoare de muncă, precum şi la protecţia împotriva şomajului.

(2) Salariaţii au dreptul la protecţia muncii. Măsurile de protecţie privesc securitatea şi igiena muncii, regimul de muncă al femeilor şi al tinerilor, instituirea unui salariu minim pe economie, repaosul săptămânal, concediul de odihnă plătit, prestarea muncii în condiţii grele, precum şi alte situaţii specifice.

(3) Durata săptămânii de muncă este de cel mult 40 de ore.

(4) Dreptul la negocieri în materie de muncă şi caracterul obligatoriu al convenţiilor colective sunt garantate.

Art. 44: Interzicerea muncii forţate

(1) Munca forţată este interzisă.

(2) Nu constituie muncă forţată:

a) serviciul cu caracter militar sau activităţile desfăşurate în locul acestuia de cei care, potrivit legii, nu satisfac serviciul militar obligatoriu;

b) munca unei persoane condamnate, prestată în condiţii normale, în perioada de detenţie sau de libertate condiţionată;

c) prestaţiile impuse în situaţia creată de calamităţi ori de alt pericol, precum şi cele care fac parte din obligaţiile civile normale, stabilite de lege.

Izvoarele dreptului muncii sunt:

Acte Normative:

1. Constituția RM.
2. Legile şi hotărîrile Parlament-ului Republicii Moldova;
3. Decretele Preşedintelui ţării;
4. Hotărîrile şi dispoziţiile Guvernului RM;

Contracte Normative

1. Contractul Colectiv de muncă
2. Convenția Colectivă

Uniunea EUROPEANĂ

UE vine în completarea inițiativelor adoptate de fiecare stat membru prin stabilirea unor standarde minime. În conformitate cu TRATATULUI PRIVIND FUNCȚIONAREA UNIUNII EUROPENE, UE adoptă directive care stabilesc cerințe minime referitoare la:
condițiile de muncă și de încadrare în muncă;
informarea și consultarea lucrătorilor.

Izvoarele dreptului muncii sunt:

1. Constituția (oricărui stat membru al UE supus analizei)
2. Legile şi hotărîrile Parlament-ului (oricărui stat membru al UE supus analizei)
3. Decretele Preşedintelui ţării (oricărui stat membru al UE supus analizei)
4. Hotărîrile şi dispoziţiile Guvernului (oricărui stat membru al UE supus analizei)
5. TRATATULUI PRIVIND FUNCȚIONAREA UNIUNII EUROPENE art. (153-159)

Statele UNITE ALE AMERICII

În SUA, nu există un cod, principalul act legislativ care să reglementeze domeniul de aplicare al relațiilor dintre angajat și angajator.

O parte a cadrului de reglementare care reglementează aceste relații este cuprinsă în titlul 29 din Codul SUA, "Legislația colectivă a muncii", altele în legi:

- Legea privind munca echitabilă (1938)
- Legea privind egalitatea de remunerare (1963)
- Legea drepturilor civile (1964)
- Legea privind discriminarea în funcție de vârstă în domeniul ocupării forței de muncă (1967)
- Legea privind sănătatea și securitatea la locul de muncă (1970)
- Legea privind persoanele cu handicap (1990)
- Legea privind concediul medical și de familie (1993)

2. CONTRACTUL INDIVIDUAL DE MUNCĂ

Contractul individual de muncă - este înţelegerea dintre salariat şi angajator, prin care salariatul se obligă să presteze o muncă într-o anumită specialitate, calificare sau funcţie, să respecte regulamentul intern al unităţii, iar angajatorul se obligă să-i asigure condiţiile de muncă prevăzute de prezentul cod, de alte acte normative ce conţin norme ale dreptului muncii, de contractul colectiv de muncă, precum şi să achite la timp şi integral salariul.

Republica MOLDOVA / Uniunea EUROPEANĂ

Contractul Individual de muncă poate fi:

Format:
-Scris
-Oral
Durată:
-Determinat
-Nedeterminat
Tip:
-Ucenicie
-Formare Profesională

Timp de muncă:

-de 5 zile pe săptămînă – repartizarea timpului de muncă în cadrul săptămînii este, de regulă, uniformă şi constituie 8 ore pe zi, timp de 5 zile, cu două zile de repaus.

-de 6 zile pe săptămînă – la unităţile unde, ţinîndu-se cont de specificul muncii, introducerea săptămînii de lucru de 5 zile este neraţională, se admite, ca excepţie, stabilirea, prin contractul colectiv de muncă şi/sau regulamentul intern, a săptămînii de lucru de 6 zile cu o zi de repaus.

Statele UNITE ALE AMERICII

Legislația americană nu prevede obligativitatea unui contract de muncă scris, astfel încât acesta poate fi încheiat folosind una dintre următoarele trei forme: scris (contract de muncă), contract verbal

,contract implicit. Cele mai frecvente forme sunt contractele verbale și implicite. Forma scrisă a contractului de muncă este obligatorie doar în cazul angajării navigatorilor pentru munca pe nave mari. Se consideră că un contract verbal a fost încheiat atunci când angajatul și angajatorul se înțeleg asupra tipului de muncă ce urmează a fi prestată, asupra datei de începere a acesteia și asupra salariului. Cu toate acestea, în cazul în care apare un litigiu într-o astfel de situație, este foarte dificil pentru angajat să dovedească în ce condiții a fost încheiat efectiv contractul verbal. Un contract implicit, spre deosebire de un contract scris, nu este un document unic, ci o combinație de acorduri scrise și verbale încheiate între angajator și angajat pe parcursul angajării. Legislația din SUA nu limitează durata unui contract de muncă și nici circumstanțele în care părțile pot încheia sau rezilia un astfel de contract. De asemenea, nu există o limită de durată a contractului. Angajarea poate fi reziliată de oricare dintre părți în orice moment. De asemenea, în SUA nu există nicio prevedere privind perioada de probă, care permite angajatorului să stabilească o perioadă de orice durată. Angajatul nu are nicio răspundere. Despăgubirile pentru daunele cauzate de un angajat sunt plătite de companiile de asigurări.

Legea privind munca echitabilă stipulează un timp de lucru maxim de 40 de ore pe săptămână. În practică, angajatorul poate cere angajaților să lucreze ore suplimentare dacă este necesar, dar trebuie să plătească cel puțin o dată și jumătate din salariul normal.

La nivel federal, nu există nicio garanție că angajații au dreptul la concediu anual plătit în SUA. Potrivit datelor din 2016 ale Biroului de Statistică a Muncii, durata medie a concediului plătit pentru funcționarii publici a fost de 8 zile, pentru angajații de stat și municipali de 11 zile, iar în sectorul privat de 8 zile (minim - 5 zile în sectorul serviciilor, maxim - 12 zile în sectorul educației). De regulă, dispozițiile privind concediul anual plătit sunt stabilite la nivel local. Durata concediului variază în funcție de vechimea în muncă și de timpul petrecut în aceeași companie.

De cele mai multe ori, nu sunt prevăzute indemnizații de boală. Un angajat aflat în incapacitate temporară de muncă din cauza unei boli este plătit de compania de asigurări. Angajatorul sau angajatul plătește asigurarea de sănătate. Nu este neobișnuit ca angajatorul să plătească doar salariul minim, care nu include indemnizația de boală.

3. PENSIONARE. Vârsta de pensionare în diferite țări

Țara	Vârsta	
	Bărbați	Femei
Moldova	63	60
România	65	61
Austria	65	60
Belgia	65	65
Bulgaria	64,6	61,4
Danemarca	65	65
Franța	62	62
Germania	65,7	65,7
Spania	65 / 65,6	65 / 65,6
Italia	67	67
Grecia	67	67
Olanda	67	67
Polonia	65	60
Suedia	61-67	61-67
SUA		
Anul nașterii	Vârsta	
	Bărbați	Femei
< 1937	65	65
< 1955	66	66
< 1960 <	67	67

(Anul de referință a datelor din tabel: 2021)

4. Activitatea pensionarilor în calitate de angajați în conformitate cu legile din Republica Moldova

În conformitate cu Codul Muncii al RM, angajatorul poate semna contract de muncă cu persoană pensionată pentru limită de vîrstă ori

vechime în muncă (sau care au obținut dreptul la pensie pentru limită de vîrstă ori vechime în muncă), poate semna contract individual de muncă pe o perioadă determinată până la 5 ani, cu posbilitatea de al prelungi la acordul părților (art. 54(2),55(f)).

Persoana care a atins vârsta de pensionare poate executa orice funcție în orice domeniu, la acordul dintre el în calitate de angajat și angajator, unde nu există risc pentru sănătate, sau este nevoie de capacități fizice concrete, fiindcă există un rând de profesii cu pensionare înainte de termen pentru munca care poate provoca sau provoacă daune fizice:

-Mineri;

-Îmbogățirea, prăjirea, sinterizarea minereurilor;

-Operațiuni de cocsificare, cocsificare chimică și cocsificare;

-Fabricarea metalelor neferoase și feroase;

-Toate activitățile generatoare de gaze, atât industriale, cât și metalurgice;

-Inginerie electrică: reparații și fabricare

-Producția de radio;

-În activitatea din industria chimică;

-În activitatea și fabricarea explozivilor, a prafului de pușcă, a agenților de inițiere;

-Industria gazului și a petrolului; prelucrarea șisturilor bituminoase, a condensatului de gaz și a cărbunelui

-Industria transporturilor;

-Producția de materiale de construcție;

-Fabricarea în domeniul medical: substanțe materiale biologice, medicamente și preparate biologice

-Industria tipografică;

-Interacțiuni cu substanțe care conțin mercur și de origine radioactivă;

-Lucrătorii din industria energetică și atomică; manipularea elementelor radioactive;

-Industria sticlei și lucrul cu produse din faianță, ceramică și porțelan

-Prelucrarea lemnului și industria celulozei;

-Lucrul cu fibre artificiale și sintetice.

Excepție: în cazul cadrelor didactice şi a cadrelor din organizaţiile din sfera ştiinţei şi inovării stabilirea pensiei pentru **limita de vârstă este temei de încetare a contractului de muncă**.

În final din cele expuse rezultă, că **totul depinde de angajator și angajat**.

Angajatul poate demisiona odată cu atingerea limitei de vârstă sau vechimii în muncă, iar angajatorul, este în drept deplin să-l concedieze pe angajat în baza aceluiași temei, conform legii, **dacă nu există acordul între părți** de a semna un contract nou sau de al prelungi pe acel vechi.

În Republica Moldova legea îi favorizează pe cetățenii săi, de a crea relații și raporturi juridice de muncă, independent de vârsta atinsă, dar impun cetățenii unor limite concrete la anumite perioade de vârstă pentru a minimaliza riscul creării unor incidente, asigurând siguranța și ordinea publică indirect prin anumite restricții. De exemplu un șofer de curse lungi care a atins limita de vârstă, care poate și este capabil de a conduce un vehicul dar, ochii nu văd tot așa de bine cum era la o vârstă mai mică, reacționarea la starea de pe traseu sau în cazul apariției unor circumstanțe este mai lentă, aceasta creând riscuri, care ulterior amenință siguranța în societate. În acel caz duce răspundere angajatorul, care îi oferă acea posibilitate, rezultativ generând un anumit număr de riscuri. Astfel statul impune cetățenii dornici să activeze într-un oarecare domeniu să fie responsabili de starea sănătății și oferirea unui post de muncă în limita posibilităților angajatului.

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Acceleration of digital innovations within the framework of the Smart Village concept in the Republic of Moldova

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Abstract: The global epidemiological crisis COVID-19 has intensified the process of digital transformation in the economic and social spheres. This article analyses best practices of digital innovation in achieving regional and cross-border interoperability in terms of the **Smart Village concept** to be implemented in the Republic of Moldova. It proposes to build on the experience of a project in Scotland that encourages young people in rural areas to join focus groups to develop innovative Smart Villages. This approach focuses **on young and local people** to form a sustainable, dynamic, creative and localized digital ecosystem together. Multilevel management of innovative development and adaptation of smart learning in human settlements could be built on the experience of the MobiReg Regional Mobility project, funded by the European Commission. In the context of smart specialization approaches, digital innovations in rural areas will reach consumers - local initiative groups - faster, creating synergies between national funds and international programs at regional level. In turn, the development and implementation of distance learning modules in the digital economy will facilitate the recognition of innovative qualifications and skills acquired through mobility projects and other relevant measures. This will stimulate entrepreneurship development, modernization of rural services and digital mobility of young people.
Keywords: economy, smart village, digital mobility, distance learning

Introduction

The main purpose and motivation of the study was to present international approaches to smart village concepts to local public administrations, innovation organisations, business associations and farmers' associations. An important aim of the publication is to achieve, through an adaptation of the selected concepts, synergies between the national programmes of the regional development fund and the research and innovation programme for 2020-2023. Currently, the Government of the Republic of Moldova has launched the European Village programme within the local development support measures for the first level local authorities responsible for planning the development of rural settlements. Experience in building interaction with local public administrations, civil society organisations, business associations and farmers' associations has revealed a number of problems, which are associated with a low level of knowledge in the sectors of digital economy, which affects the formation of innovative public-private partnerships in rural areas.

Smart connectivity

The capacity of private and public actors to conduct modern technological research and innovation varies between EU member states and Eastern Partnership countries. The innovation gap between EU innovation leaders and Eastern Partnership countries, does not allow the EU to use its research and development potential to the fullest extent in these territories, including EU regions, and thus poses a serious threat to economic growth, prosperity and social stability in the regions of EU associated countries. Cooperation with potential

partner organizations will help to improve methodological approaches and capabilities for initiation and implementation of cross-border innovation digital platforms [1], in the framework of comparative analysis of international and European initiatives, as well as of the "National Programme for Innovation and Research 2020-2023". Currently, in the Republic of Moldova, there is a growing interest in consumer-friendly technologies. First of all, this is due to the need to reduce the environmental burden of excessive consumption, lack of resources, rising energy and fuel costs, asked to develop digitalization and informatization. The digital approach, based on an interdisciplinary innovative public-private partnership, will help build a multilevel coordination of international innovative technical support for infrastructure projects of local initiative groups in the programs of national funds. Stimulation of creation of digital ecosystem of consumer clean technologies in regions, activation of innovative enterprises and communities, are necessary to increase digital competencies and skills of companies' personnel. Identification of new ideas and best international practices in the sectors of local entrepreneurship, allows innovative public-private partnerships in a coordinated way to identify and solve the problems of the innovation gap of each particular locality of the territory of the Republic of Moldova.

The international nature of the digital cooperation platform can be related to the concept of "Smart Connection" [2], which was presented at the Three Seas Virtual Summit in Estonia in 2020. This was Estonia's additional contribution to finding ways to expand digital components in key infrastructure, including in rural areas, which in turn should support new business models and technologies, such as real-time remote operation to manage the local economy, smart grids with renewable energy, smart logistics and traffic management. It is about making future-oriented investments in energy and transport and increasing the competitiveness of the Three Seas (3S) regions [3]. The Republic of Moldova and Ukraine, represented by the presidents, have expressed interest in joining their countries to the "Three Seas Initiative" [4]. Therefore, for our countries are becoming relevant research opportunities for the planning of interoperability of data models of information transboundary exchange, management and control [5], contributing to the sustainable economic development of the regions. Realizing this ambitious vision involves adhering to the same principles throughout the Three Seas region in building transportation, energy, and information infrastructure (figure 1) and will require a greater emphasis on the open exchange of new, updated data and the use of accumulated data.

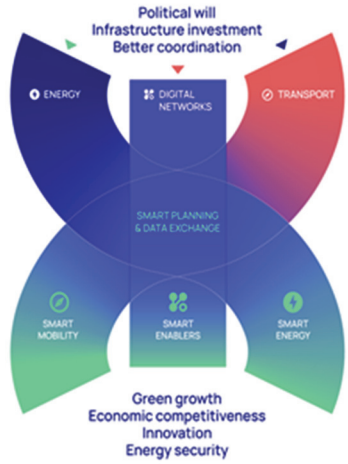

Figure 1. Intelligent communication of the "Three Seas" region (Ref: 3 Sea) [2]

COVID-19 has brought difficult and uncertain times, accelerating the process of digital transformation. This involves, among other things, equipping SMEs, farms with digital tools. It is also necessary to provide for the appropriate harmonization of legislation and the formation of technological incentives, modernization of lifelong learning approaches available at the country and/or regional level. Realizing this ambitious vision

involves adhering to the same principles throughout the Three Seas region in building transportation, energy, and information infrastructure (figure 1) and will require a greater emphasis on the open exchange of new, updated data and the use of accumulated data.

Stimulation of distance learning digital transformation

A systematic comparative marketing analysis (benchmarking) of best practices of international projects, based on digital spatial planning [6], contributes to the modernization of localized digital educational products/services. This approach achieves an acceptable level of collaborative decision-making in sectors of the local economy, corresponding to the data model of information exchange for management, control and advice of member countries and NATO Partnership for Peace partner countries [7]. Short timeframes for ICT-based management decisions can significantly reduce the costs of infrastructure projects and reduce the risks of financial losses, poor execution of works in the regions of non-EU countries. The "rural youth project in Scotland" [8], under consideration, encourages young people to join a focus group to help create a pioneering "world's first" youth-focused smart village that will encourage young people to work together to build a dynamic, creative and sustainable rural economy where they live. Smart villages, a concept put forward by the European Rural Development Network, are rural digital villages that bring together physical and digital communities to enhance their sustainability by building on local strengths and opportunities.

The Smart village Scotland digital community platform, in partnership with rural youth in communities across Scotland, has created Smart village, a project for rural youth that functions as a space for young people to connect. This is intended to foster a cyberspace that, according to [9], is a connected global network, supported by computers, generated by them and managed by them, a multidimensional set of overlapping virtual communities. It is clear that in such a space, thanks to multitasking, it is quite common to be virtually present in two or more places at the same time. This contributes to the development of new cognitive abilities. Above all, this applies to computer-educated youth, who are able to perceive several programs displayed simultaneously on a monitor and to synchronize texts by combining different types of media.

In the conditions of the pilot regions of the Republic of Moldova, it is proposed to take into consideration the results of the European project "Decent work for youth" [10], in order to develop and adapt a methodological approach of interregional and transnational knowledge exchange, based on digital technologies, implemented in several districts of the Republic of Moldova. The project aims to improve the socio-economic situation of young people in Moldova by empowering youth and civil society. The training experience of the mobile team members will also be useful [11]. The results of the project rely on the physical mobility of trainees from different districts. They are intended to share best practices of training with local target groups, volunteers. The adaptation of digital distance learning tools will ensure sustainable cognitive mobility, contributing also to the digital transformation [12] of small and medium-sized enterprises, farms participating in infrastructure projects programs "National Fund for Regional Development" and "National Fund for Agriculture and Rural Development".

The initiation of inter-regional and international cooperation on online learning, for the benefit of certain localities of development regions could be done directly with the participation of the regional administration. This will help local authorities to participate in the coordination of voluntary mutual learning processes concerning the promotion and support of mobility, as a major component of education and training policies, with particular

attention to digital mobility, internships and youth in general.

The European practice of the project "MobiReg Regional Mobility" [13] on the organization of interregional physical and virtual mobility, designed for the three regions of cooperation in mobility, is of great interest for the involvement of universities and university innovation educational centres, in order to achieve their objectives. In addition, the innovative public-private partnerships [14] can work on the definition of procedures for interregional virtual, digital cooperation. Such cooperation will aim at promoting mobility modules, according to the needs of infrastructure projects in R.Moldova, and guarantee the recognition of the obtained online qualifications and competences [15]. It will also contribute to the development of other related and supportive measures and distance learning modules.

Digital benchmarking

Production methods are changing and improving all over the world, both in urban and rural areas. In addition to automation, the integration of systems and the use of artificial intelligence in production is increasing. These activities are often classified, by keywords, as "Intelligent Manufacturing" or "Industry 4.0," "Agriculture 4.0." Thus, the line between manufacturing and IT companies is increasingly blurred [16]. In this context, the considered best practice in education can motivate a series of future benchmarking projects, so that not only manufacturing companies, but also non-manufacturing companies registered in the regions of Moldova can be involved in infrastructure projects at sub-regional and local level. This will give them the opportunity to participate and share their experience regarding digital innovation in certain smart specialization priorities, sectors of the local economy, as well as in the training of company personnel and educational organizations.

The processes of digital transformation cannot fail to affect university organizations [17], which play the role of key actors and agents that stimulate local innovation activity, competitiveness in the regions. The process of university modernization has historically emphasized the need to provide support structures to facilitate contacts and relationships between research groups and the external environment, in order to increase the quantity and improve the quality of collaborative research activities. Therefore, it is necessary to identify needs, challenges and opportunities for the internationalization of R&D [18] in order to attract investment, new technologies and innovation. As part of the technical support of the EU and the integration into the European Research Area, it is impossible not to talk about the compatibility of approaches in the management of digital transformation.

Public administrations have the responsibility and authority to identify local needs. The results of their initiation, innovative partnerships with universities, research organizations and NGOs - potential operators of public-private partnership projects, serve as the basis for the development, implementation and adaptation to local conditions.

The first steps towards internationalization can be "Internal Knowledge Transfer Offices" [19] - having the appropriate digital infrastructure connected to the territorial spatial data infrastructure. Universities create these internal innovation structures within a typical administrative culture. Although the advantages of such structures are undeniable, a number of national peculiarities have emerged that need to be considered as part of a holistic picture the development of the knowledge transfer system. One of the key roles of an "External Knowledge Transfer Office" structure is to promote and strengthen research partnerships. As the knowledge transfer system develops, it fosters a collaborative and creative working environment in which both multidisciplinary researchers and companies can work together to generate new

knowledge and technological innovation.

The results of cross-regional research on best practice and development options, according to [20], can lead partners from the Associated Country regions to new perspectives, approaches and opportunities, especially for manufacturing companies in rural areas. In general, however, research can target companies from all industries and regions. The goal is to identify companies of successful practices that best apply digital technologies in their field.

Software for project management

The data model of information exchange for management, control and consultation, involves achieving compatible cross-border interoperability of **national information systems** related to collaborative project management processes. Studies related to the development of information systems, territorial digital business ecosystems, standards, increasingly draw attention to the need to adapt project management methodologies, based on localized software. At the European level, we see our neighbours in the Southeast European region already integrating into the ISA² Programme, [21] an initiative of the European Commission that supports the development of digital solutions that enable public administrations, businesses and citizens across Europe to benefit from interoperable cross-border and cross-sector public services.

The management of knowledge transfer processes to localities in the regions of the Republic of Moldova remains the legislative prerogative of nationally and internationally accredited universities. Speaking of benchmarking best practices, it is proposed to consider the methodology of project management "OpenPM²" [22], developed by the European Commission. It aims to enable project teams to manage their projects effectively and to provide solutions and benefits to their organizations and stakeholders. Although the methodology is suitable for any type of project, it is ideal for projects related to the public sector or EU programs and grants implemented in the regions. OpenPM² is a free version of PM², developed by the Commission in 2007. It includes elements of internationally recognized best practices, standards and methodologies. Note that PM² is an initiative supported by ISA² to bring the PM² methodology and its benefits closer to a wider stakeholder and user community. OpenPM² provides open access to PM², expanding the range of beneficiaries across Europe and enriching the methodology with additional best practices and examples. It aims to improve the competence of project management in the EU. Depending on the nature of infrastructure projects, the information system "SIMA" and the program "Academic Departmental Agreement" [23], initiated by researchers and IT4BA-Trimetrica Ltd innovation incubator resident, include distance learning modules and technological solutions of ESRI IT (USA), which has a representative office in the Republic of Moldova. The main objective of these initiatives is to provide the educational institutions with ESRI software products in order to be acquainted with their capabilities, to implement them in the curricula and to conduct scientific research. The 12 months license includes all the key components of ArcGIS platform: ArcGIS Enterprise, ArcGIS Desktop, ArcGIS Online, as well as a lot of web and mobile applications. The program is divided into three levels: 5, 50 and 100 users. The proposed innovative digital products, with the participation of the representatives of the American company ESRI in the Republic of Moldova - ArcGIS [24], will support researchers in the development regions, in the visualization (presentation in the form of a digital map) of large amounts of statistical information (created and updated data) with a geographical reference. Owning such a set of methodological and software, the innovative community has enhanced the synergies between the National Funds and the External Support Programs.

Conclusions

The implementation of digital solutions in the

rural areas **based one results** of international best practices, will contribute to:

- preparation of regions, local initiative groups for the digital transformation and mobility policies as part of regional, national action plans;

- solving the target policies [25] of potential smart villages projects in the regions of the associated countries EU;

- compatibility of localized software solutions in the planning of international mobility activities, as smart infrastructure, software and digital educational products, project management services, expertise are localized.

The beneficiaries of the proposed solutions in digital benchmarking can be regional SMEs, farms, companies with foreign capital, educational institutions. The following results are expected:

- compilation of consumer summaries for enterprises (example: Big Data research) [26];

- comparing performance with companies in the industry and with successful practices at the national and international level;

- developing incentives and ideas for business improvement with respect to digital technology and smart manufacturing.

Depending on the performance, the staff of the companies participating in the platform can be selected as candidates to participate in "Best Practices" projects at the national and international level, which will allow to:

- learn best practices from other companies at home and abroad;

- establish contacts with other staff, managers and experts from the industry and science (networking) in the country and abroad;

- participate in discussions about local, sectoral and international challenges and opportunities, as well as explore and find new approaches to business and career development.

The implementation of these approaches will have a positive impact on the cross-national and cross-regional compatibility of digital innovation, guaranteeing the high quality of publicly available cross-border and cross-sector electronic services and easier exchange of information between national electronic registries, including cross-border exchange with EU registries related to rural development.

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Smart home as a telemedicine tool for senior healthcare

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Abstract: The development of IT solutions has generated an infiltration of them in all areas of life. Smart home technology can be a real benefit in help out and really start to take care of seniors. Essential aspects of telehealth in smart home were designed. Healthcare scenarios, using wearable devices, were applied for different use cases. Smart displays, tablets and smartphones are used as the main control and teleconferencing tool with medical professionals.
Keywords: IT, Smart Home, wearable technology.

Introduction

Our health is the most important thing in our lives. As we age, it is important to understand how diseases affects the mind and body. Immediate emergency response has become the only way to save lives.

For last two years hospitals, physicians and the medical community has been overwhelmed. Social distancing and quarantine measures have forced more doctors to cancel routine and non-emergency appointments. Thus, more and more governments, private institutions and organizations are turning to telemedicine solutions in order to meet the new challenges.

Health care systems has been stretched to the brink. It might be getting all the headlines, but patients are getting sick from other diseases and injuries. In this situation, doctors had to look for other ways to treat them. It is important to be able to reduce the number of contacts with patients. Smart home offer good opportunities for this purpose by providing a monitored environment. It use a combination of technologies to generate solutions for remote patient care. Therefore, it can become a powerful tool in fighting disease and prolonging human life.

All smart homes devices are designed to make life more convenient. A readjustment of existing devices and the development of new ones will make our lives healthier.

Essential aspects

Telemedicine means providing healthcare services using information and communication technologies when the healthcare professional and the patient - or even two healthcare professionals - are not in the same place. It is about the secure transmission of medical data and information in the form of text, sound, images or other forms that are necessary for the prevention, diagnosis, treatment and follow-up of patients.

On March 3rd 2011, the National Consortium for

eHealth and Telemedicine was established in the Republic of Moldova, which aims to strengthen the efforts to maintain an open and engaged dialogue between civil society organizations, educational institutions and state institutions for the development of eHealth to bundle, which will really contribute to strengthening the health of the population of the Republic of Moldova. [1]

A special development of this field has taken place in the last two years. "Telemedicine" has been launched in Moldovan hospitals. This means that doctors will be able to exchange information online about the treatment of coronavirus-infected patients and will be able to consult with reputable specialists in severe cases.

The implementation of this project will minimize the unnecessary transport of patients to long-distance hospitals. Using the images, experts can virtually examine a patient and make recommendations on the best treatment plan.

Telemedicine as a medical care option during the pandemic

Another technology that has become increasingly popular during the last period is telemedicine. Here you can talk to your doctor via special portals and do not have to come to the practice for a consultation or to have a new prescription issued, thus avoiding unnecessary contact. In addition, the application can be seen as a great support in everyday life and enables more efficient and intensive care of patients. Speech therapy, for example, can be held online.

On the one hand, the contact restrictions are observed, but on the other hand, the patient or therapist saves the trip to the practice/to the patient. This type of tele-speech therapy thus opens up opportunities to optimize care, especially in rural areas, in the outpatient sector but also in care facilities, and thus to counteract the shortage of therapy places and staff. The fact that medical consultation hours via video telephone, virtual contact with therapy or nursing staff or the Ambient Assisted Living (AAL), which will be addressed later, does not replace a visit to the doctor or physical care, is nevertheless obvious and must be made clear (Figure 1) [2]. However, telemedicine can still be used as a supplement to improve the provision of comprehensive, needs-based medical care close to home.

Figure 1. Video conferencing technology

Environmental sensors

The systematic literature research has made it clear that the largest selection of smart home solutions can be found in the field of environmental sensors. They can be installed in a variety of forms in the house, for example as pressure sensors under the floor and carpet or set up in different rooms as a camera. The elderly behavior monitoring system uses magnetic switches to record movements in rooms, infrared sensors to detect activities, and sound sensors to determine the type of activities [3]. These systems can distinguish living people from non-living objects and thus carry out targeted measurements.

So far, these technologies have mainly been used to detect falls and to monitor the activities of the residents of a house. Their functions include assessing gestures, touches, actions and circumstances and can use these to influence the well-being of residents. The data received can be transmitted via wired or wireless systems for further processing to a central node such as a gateway integrated in the house and sent to the respective recipients. These can include doctors,

nurses or family members, who can then act accordingly.

Monitoring and security through a smart home

In addition to telemedicine, there is also the possibility to make the home safer with the help of AAL and to contribute to enabling a largely independent life or living. Smart home systems in particular are used for this. There are now networked carpets that use integrated sensors to detect whether people have fallen and are lying motionless on the floor and then, for example, call the outpatient care service.

For other surfaces which a not covered with carpets, a sensor based floor where proposed. The floor-based sensor system includes the sensor data acquisition, data manipulating, data reading, storage, display, and communication. [4]

A monitoring and communication system can also be installed on the bed for people who are severely restricted in their mobility, which measures values such as blood pressure or heart rate and continuously transmits them to the responsible nursing station. This enables remote monitoring and avoids additional contact during the pandemic situation. It is also possible to contact a nurse or doctor via the screen if you do not feel well. In addition to these very advanced technologies, there is also the option of emergency call bracelets with which the wearer can call a stored emergency number after a fall or similar. There is also the option of just informing a relative, who can then decide, for example, whether an ambulance is needed.

Wearable devices and data acquisition

The second most popular portable device is smart watch (Figure 2) [6]. Nowadays, it can perform the functions of such medical devices as: body scale, heart rate monitor, blood pressure monitor, electrocardiogram, oximeter, fetal Doppler. It is important to mention that downward trend in the price of smart products has slowed in recent years. This is caused not only by the price of the built-in sensors but also by the software component.

Figure 2. Smart watch as data acquisition tool

Handheld devices have radically changed the patient-reported outcomes (PRO) landscape and accelerated the transition to electronic patient-reported outcomes (ePRO) data collection. Smartphones make up the majority of portable devices. They have become the main tools of ePRO data collection. Especially for remote PRO data acquisition, they offer significant advantages due to their mobility and touchscreen functionality. These devices support access to web-based data collection portals (e.g. interactive web response systems) through downloading apps with ePRO capabilities or through device-based systems. It should be noted here that the tool automatically adapts to the operating system, browser and screen size of the device when accessing a data collection portal. Primarily, the collected data from portable devices was synchronized offline, i.e. the data was temporarily stored on the device until uploaded to a local or central server. With advances in cellular and mobile phones, data can now be instantly stored on a central server or database [5].

Conclusion

The use of smart devices in the medical sector allows the creation of a preventive and proactive healthcare system focused on prevention. Hence, telemedicine use technology to deliver care from a distance.

Older people are not a burden or a problem, but are valuable members of society who just need some support to continue living a full life in their own homes. It is therefore the task of scientists and the younger part of society to continue researching in these areas. In this way, they are above all helpful to their

fellow human beings, but at the same time provide for their own future.

The results of this scientific work indicate that a smart home system can serve as health, safety and well-being services for the users in their own home using modern technologies such as environmental and medical sensors, actuators and wireless communication platforms.

Smart homes could enable continuous, remote observation and monitoring of the health and well-being of older people at low cost. This would allow older people to stay in their comfortable home environment instead of moving to expensive and limited healthcare facilities.

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Digitalization and sustainable growth in the quality of life

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Goal: to improve the quality of life of people by increasing the level of digitalization of society.
Design/methodology/approach: The concept of "quality of life of the population" is one of the main social indicators of the economic security of the state. In the context of the digital transformation of society, this indicator does not yet have a generally accepted interpretation and needs to be clarified. The article examines the impact of information and communication technologies on the indicator of the quality of life of the population, its possible boundaries and ways of measuring it. The article attempts to synthesize an indicator of improving the quality of people's lives through digitalization through the prism of many existing indicators of the development of a digital society, such as providing the population with digital goods, digital competencies, quality of working life and the social sphere in the context of digitalization, the quality of electronic public services to the population and the security of information activities of the population.

Conclusion: In modern conditions, digital transformation is the most important factor in the socio-economic development of the global information society (GIS). Today, there are many methods, measurement indicator systems and bodies for monitoring the progress of GIS construction: network readiness index (NRI, WEF), e-government readiness index (e-GRI, United Nations), Knowledge Economy Index (KEI, World Bank), Knowledge Index (KI, World Bank), ICT Development Index (IDI, ITU), Global Competitiveness Network (GCN, WEF), ICT Price Basket (IPB, ITU), Human Development Index (HDI, United Nations), Digital Divide Index (DDI, ITU) and others. This variety of indicators is best used to measure people's standard of living in GIS:

Limitations/implications of research: The transition from spontaneous to controlled digitalization and sustainable growth in the quality of life will raise many questions related to improving the digital culture and literacy of the population, reducing the digital divide, etc., the solution of which will require the definition of specific goals and corresponding indicators that allow to assess both the dynamics and the level of progress towards achieving the goal.

Practical implications: Measuring the quality of people's lives by measuring INDICATORS of GIS development, digital culture, digital literacy, digital maturity of the population and other available indicators of digitalization.

Originality/Value: Since there is virtually no end to the penetration of ICTs into all areas of human activity, and since it is crucial for the development of GIS, measuring the impact of digitalization on people's living standards is very valuable. The article takes an original approach to the implementation of such measurements and assessments.

Keywords: information society, electronic index, pair-rank correlation, ICT
Development Index, index structure
Recognition: The study is conducted as part of a doctoral program at the Doctoral School of Economic Sciences by graduate student Denis Kravtsov under the coordination of Associate Professor Mikhail Gyrley.

Keywords: information society, electronic index, digitalization, indicator systems, level of happiness, global information society

Introduction

Digitalization is a powerful factor affecting all the key components of the quality of life - material living conditions, health, level of education and the availability of various skills, personal activities, civil rights, social ties and relationships, the state of the environment, economic and social security. In everyday life, information and communication technologies (ICT) are extremely widely introduced: online communications, organization of personal document flow, implementation of labor activity, education, realization of creative potential, self-expression, recreation. The impact of the quality of life on digitalization is also beyond doubt: digital solutions are created and implemented by people, and the future of the digital economy depends on how educated, professionally trained, socially responsible the population is, has the material opportunities for this [1].

The crux of the problem: to find out how ICTs affect the level of happiness and vice versa, how they interact and condition each other, how to measure it.

1. General condition of the problem

Economic development creates a transition from maximizing economic growth to maximizing happiness. But there is a threshold at which economic growth no longer brings a significant increase in subjective well-being, i.e. although higher incomes are associated with a higher level of happiness in the country, the average level of happiness for the country does not seem to increase over time in line with the increase in average income [2]. Material well-being is important, but it is far from the only determinant of happiness.

For developing countries, where income has a relatively low weight in the level of happiness of the population, it is very important to pay attention to those determinants of happiness (indicators of well-being) that do not require large resources and can be realized in the short term, since the ultimate goal of most people is not to be rich, but to be happy and healthy.

The concept of "level of happiness" is one of the important measurable indicators of how suitable and comfortable this particular society is for people's lives [3]: the maximum possible level of happiness for as many people as possible is the goal and task of social policy, public and state institutions, as well as a measure of the effectiveness of their work in most modern states.

In the context of economic activity, digitalization has radically changed and continues to change the lives of people, communities and the whole society, transforming business models and the nature of consumption and interaction. The range of digital transformation is vast, affecting almost every aspect of people's lives. Its impact also manifests itself in different ways – from minor corrections in everyday life to potentially transformational changes in fundamental values and processes.

2. Measuring the level of digitalization and the relationship with the level of happiness

Faced with many of the challenges and questions raised by digital transformation, national statistical offices and other stakeholders are seeking to push the boundaries of our understanding of "well-being" and the ability to measure it. Trying to combine many issues related to well-being and digital transformation, we find ourselves in the words of Gluckman and Allen (2018) in "... a new, unexplored field."

The digital divide is reaching serious proportions and already threatens to lead to a new form of global inequality. Such disappointing conclusions were voiced by the President of the 75th UN General Assembly Volkan Bozkir [4]. Almost half of the world's population does not have access to a huge layer of knowledge, entertainment and a variety of services. The problem is most acute in developing countries.

In order for everyone and everywhere to benefit from the use of digital technologies, it is necessary to bridge the continuing digital divide, especially in the area of Access to the Internet.

If we pay attention to a special socio-demographic group: the elderly, then the elderly as a group are on the negative side of the digital divide.

Lower levels of computer and Internet use among older adults have important social and financial implications. As ICT becomes increasingly integrated into everyday life, people who do not use the Internet are more likely to become more disenfranchised and disadvantaged.

In the literature, the digital divide affecting older people is explained by the internal characteristics of older people, such as lower levels of computer literacy, anthropophobia, and lack of perceived utility.

The problem of assessing the level of happiness in countries with the help of international ratings is dealt with by many organizations, here are just some of the indicators for a comprehensive assessment of the well-being and quality of life of the population:

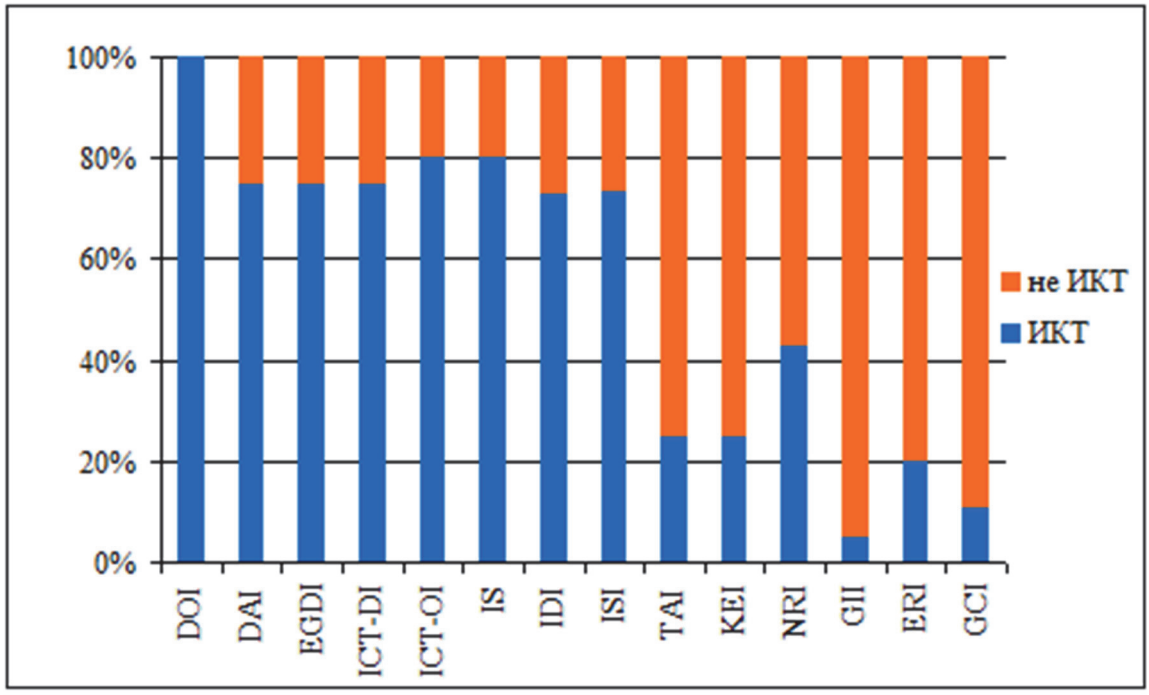
- Better Life Index;
- Prosperity Index / Legatum Prosperity Index;
- World Happiness Index / World Happiness Index;
- Quality of Life Index;
- Gallup-Sharecare Global Wealth Index.

Also today, there are many methods, measurement indicator systems and bodies for monitoring the progress of the global information society (GIS):

- Network Readiness Index (NRI, WEF),
- E-Government Readiness Index (e-GRI, United Nations),
- Knowledge Economy Index (KEI, World Bank),
- Knowledge Index (KI, World Bank),
- ICT Development Index (IDI, ITU),
- Human Development Index (HDI, United Nations),
- Digital Divide Index (DDI, ITU), Global Innovation Index (GII) and others.

In the early stages of information society research, the focus was exclusively on information infrastructure.

At present, due to the multidimensionality and complexity of issues related to the information society, the number of variables in the composition of composite indicators that are not directly related to the dissemination and use of ICTs has increased [5]. A comparative analysis of the most common indices of the information society made it possible to consider the share of ICT indicators in the total volume of partial indicators constituting indices (see figure 1).



Drawing. 1. Composite indices are analyzed depending on the number of partial indicators directly related to ICT [5]. Of the 14 composite indices analysed, only one (DOI) uses only partial ICT-related indicators, the remaining 13 combine them with indicators describing the socio-economic characteristics of society: indicators of well-being. For six of them (GII, GKI, ERI, KEI, TAI, NII), more than half are indicators that are not directly related to ICT. If we consider the Global Innovation Index (GII), which analyzes 81 indicators, it consists of more than 80% of indicators that are not directly related to ICT.

This suggests that the nature of the information society is quite complex and cannot be measured only by indicators of the use of information technologies, since the successful use of ICT depends more on characteristics that do not have a clear connection with ICT (for example, the level of education, logistics, the political environment and the effectiveness of public administration, the business environment, trade and lending, the entertainment market and others), and not only in terms of information infrastructure parameters.

At the same time, happiness indicators practically do not take into account the peculiarities of the development of the information society. The potentially significant impact of new technologies – and in particular on user welfare – is largely ignored (Castellaci et al., 2005).

The table below provides an overview of only those parts of the 81 indicators in the GII index that show that ICTs depend on indicators of well-being, but it is very difficult to identify indicators that take into account the group of older persons, despite the fact that older persons are the fastest growing group of Internet users. The table shows the strengths and weaknesses of the Republic of Moldova in the Global Innovation Index (GII) 2021 [6]

Table 1. Strengths and weaknesses of the Republic of Moldova [6]

	Strengths				**Weaknesses**	
Code	**Indicator Name**	**Rank**		**Code**	**Indicator Name**	**Rank**
1.3.1	Ease of starting a business	12		2.3.3	Global corporate investors in R&D, top 3, us$ million	41
2.1.1	Public expenditure on education, % of GDP	13		2.3.4	QS University Rankings, Top 3	74
2.1.2	Government Funding/Student, Secondary Education, % GDP/Limit	18		3.2.2	Logistics efficiency	108
2.1.5	Student-teacher ratio, secondary school	31		3.3.1	GDP/Unit of Energy Consumption	107
6.1.1	Patents by origin/billion GDP by PPP	31		4.3.3	The scale of the domestic market, billion PPP$	116
6.1.3	Useful Models by Origin/Billion PPP$ GDP	1		5.1.3	GERD operated by business, % of GDP	76
6.3.4	Export of ICT services, % of total trade	15		5.2	Innovative Connections	119
7.1.1	Trademarks by origin/billion PPP% of GDP	14		5.2.1	Cooperation between universities and industry in research and development	116
7.1.3	Industrial designs by origin/billion PPP% of GDP	9		5.2.2	State of development and depth of the cluster	126
7.3.4	Creation of mobile applications / billion GDP at PPP	20		7.1.2	Global Brand Value, Top 5,000,% of GDP	80
				7.2.2	National feature films/million pop. 15–69	101

Many other potentially important channels through which ICTs can generate wealth have not yet been explored. Research on this important topic currently lacks a coherent and holistic structure that brings together ideas from different disciplines and guides future research.

In a recent evaluation of innovative research, Ben Martin points to **twenty challenges for future research**, one of which is the need to study how advanced technologies affect human well-being. "*Innovative scientists will need to shift the focus of our empirical work from innovation for wealth to innovation for well-being" (Martin, 2016).[7*]

Conclusion (regarding the interrelation-mutual influence of the level of well-being and digitalization)

Many literatures in recent years have looked at the extent to which wealth differs between individuals, social groups, and countries, and a set of factors that may explain these differences. Among other factors, these studies focused on differences in absolute and relative incomes between people, their quality of working life, their social relationships and characteristics, and the quality of their physical and socio-institutional environment.

Interestingly, the literature on happiness flourished independently of innovative research, and the two strands of research did not interact with each other. In happiness research, technological innovation is definitely not one of the many variables that have been explored in the mainstream explanatory system.

In the review "The Impact of ICT on Well-Being" (8), the authors say that:

First, a new and largely unexplored question of great social importance is raised, which is of great interest to innovative research. Second, a new theoretical framework for the analysis of this question is being created, bringing together ideas from different fields of research and various disciplines interested in human well-being, such as economics, psychology, organizational research, and information systems research.

Most people actively use ICTs in both private and working life, lacking adequate information and awareness of how they affect their well-being. Research on this topic is still underdeveloped and highly fragmented.

Second, most research on the determinants of well-being so far has focused on factors related to specific areas of life. However, one important point is that the impact of ICTs on well-being in different spheres of life can be mediated by a set of personal characteristics specific to each individual, and in particular by abilities, psychological functioning and conditions of formation (culture and beliefs). Therefore, the most important aspect that future research should analyze is the interaction between the activities of people in different areas of life and their individual personal characteristics. This is especially true for the elderly, especially since the internal characteristics of this group are quite well studied.

It is this interaction that explains why the use of ICTs in various spheres of life can have a stronger positive impact on the well-being of some people and social groups than others. Studying these complex interactions requires the collaborative efforts of well-being researchers with different backgrounds and disciplinary orientations, and in particular psychologists, economists, and innovation researchers.

It is difficult to distinguish the effect of digitalization from the many factors affecting well-being. It is often possible to measure not so much the impact of information and communication technologies (ICTs) on well-being as the level of well-being itself. However, it is the impact that may be of interest to national policymakers who decide where to invest in order to maximize the impact on welfare [9].

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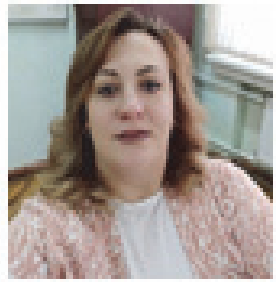

Implementarea unui coș de cumpărături în JavaScript

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Abstract: Pentru crearea unui magazin online complex este necesară folosirea mai multor tehnologii și adăugarea mai multor funcționalități decât în cazul în care dezvoltăm un website informațional. Un element cheie desigur că este coșul de cumpărături. Prezenta lucrare cuprinde destul de detaliat aspecte teoretice și practice ale modalităților de concepere și implementare a coșului de cumpărături folosind JavaScript.

To create a complex online store, it is necessary to use several technologies and add more features than if we were developing an informational website. A key element of course is the shopping cart. This paper covers in great detail the theoretical and practical aspects of how to design and implement the shopping cart using JavaScript.

Keywords: Computer Science, JavaScript, Shopping Cart.

Introducere

Pentru crearea unui magazin online complex este necesară folosirea mai multor tehnologii și adăugarea mai multor funcționalități decât în cazul în care dezvoltăm un website informațional. Un element cheie desigur că este coșul de cumpărături. În acest proiect am analizat cum cu ajutorul limbajului de programare JavaScript putem adăuga produsele în coș, cum adăugăm funcțiile pentru modificarea numărului de produse în coș, ștergerea produselor din coș și pentru ajustarea prețului total. Pentru ca toate acestea să funcționeze, este necesară stocarea informației pe server și manipularea acestora cu tehnologii precum Node.js, Express.js, etc. Atunci când lucrăm cu proprietăți precum prețul produsului, este important ca acestea să nu fie pe partea de front-end, căci devine ușor pentru alți utilizatori să modifice valoarea acestora. În capitolul 1, am descris tehnologiile utilizate pentru crearea acestui proiect, caracteristicile principale ale acestora, avantajele și cum pot fi folosite. În capitolul 2, subcapitolul 1 am arătat cum dezvoltăm partea de front-end, iar în subcapitolul 2, am demonstrat cum putem trece lista produselor de pe partea client, pe partea de server.

Tehnologii utilizate

Reprezintă o scurtă introducere a principalelor noțiuni legate de Internet. Sunt explicate tehnologiile utilizate pentru dezvoltarea front-end și cele de back-end.

1.Descrierea HTML și CSS – care au fost utilizate pentru dezvoltarea front-end.

2.Protocolul HTTP – unde este explicat cum lucrează acest protocol și cum se realizează comunicarea dintre client și server.
3.Limbajul de programare Java Script – o introducere în limbajul JS și cum putem folosi localStorage pentru stocarea datelor.
4.Node.js – acest subcapitol descrie caracteristicile cele mai importante ale mediului Node.js și de ce el este o alegere perfectă pentru programatori.
5.Express.js – subcapitol ce descrie Express.js și cum funcționează acesta.
6.Gateway de plată pentru website – include explicarea noțiunii de gateway de plată (eng. Payment gateway).

Tehnologii utilizate în proiectarea paginilor web pe baza de client

HTML (Hyper Text Markup Language) este un limbaj folosit pentru crearea paginilor web ce utilizează un set de tag-uri de marcare pentru a descrie pagini web, nefiind considerat un limbaj de programare. Tag-urile de marcare HTML sunt de obicei numite tag-uri HTML. [1]
CSS (Cascading Style Sheets) este codul care stilizează conținutul web. La fel ca HTML, CSS nu este un limbaj de programare. Nici nu este un limbaj de markup. CSS este un limbaj de foaie de stil. CSS este ceea ce utilizați pentru a stiliza selectiv elemente HTML. [1]

Protocolul HTTP

HTTP (Hypertext Transfer Protocol) este protocol folosit pentru accesarea datelor pe World Wide Web (www), și anume este responsabil pentru comunicarea dintre web servere și clienți. Clienții și serverele comunică prin schimbul de mesaje. Mesajele trimise de client, care de obicei este un browser Web, se numesc cereri (eng. Requests), iar mesajele trimise de server ca răspuns, se numesc răspunsuri (eng. Responses).not number the pages. [2]

Limbajul de programare JavaScript

JavaScript este un limbaj de scriptare foarte puternic. JavaScript este utilizat în principal pentru îmbunătățirea interacțiunii unui utilizator cu pagina web. Cu alte cuvinte, o pagină web devine mai interactivă, cu ajutorul JavaScript. JavaScript este, de asemenea, utilizat pe scară largă în dezvoltarea jocurilor și dezvoltarea aplicațiilor mobile.
JavaScript a fost dezvoltat de Brendan Eich în 1995, care a apărut în Netscape, un popular browser de atunci. Limbajul a fost numit inițial Live Script și ulterior a fost redenumit JavaScript. Există mulți programatori care cred că JavaScript și Java sunt la fel. De fapt, JavaScript și Java nu au nicio legătură. Java este un limbaj de programare foarte complex, în timp ce JavaScript este doar un limbaj de scriptare. Sintaxa JavaScript este în mare parte influențată de limbajul de programare C. [3] JavaScript localStorage – HTML DOM Windows localStorage este furnizat de Browser și ne permite să stocăm date ca perechi cheie-valoare în browserul nostru web folosind un obiect. Datele sunt stocate ca pereche cheie-valoare, iar cheile sunt unice. Cheile și valorile sunt întotdeauna în formatul UTF-16 DOM String care este stocat în localStorage. LocalStorage deține datele fără dată de expirare, care sunt disponibile pentru utilizator chiar și după închiderea ferestrei browserului. Este util în diverse situații, cum ar fi păstrarea datelor coșului de cumpărături sau păstrarea datelor utilizatorului logat.

Mediul de execuție NODE.JS

Node.js este o bibliotecă și un mediu de rulare JavaScript open-source, multiplatformă, pentru rularea aplicațiilor web în afara browserului clientului. A fost dezvoltat în 2009 de către Ryan Dahl. Programatorii folosesc Node.js pentru a crea aplicații web pe partea de server și este perfect pentru aplicațiile care folosesc intens date, deoarece utilizează un model asincron, bazat pe evenimente. [4]

- Node.js folosește programare asincronă: toate API-urile bibliotecii Node.js sunt asincrone (adică,

neblocante), așa că un server bazat pe Node.js nu așteaptă ca API-ul să returneze date. Serverul apelează API-ul și, în cazul în care nu sunt returnate date, serverul trece la următorul API, modulul Events din Node.js ajută serverul să obțină un răspuns de la apelul API anterior. Acest lucru ajută și la viteza Node.js.

- Node.js este foarte rapid: fiind construit pe motorul JavaScript V8 al Google Chrome, biblioteca sa este extrem de rapidă pentru execuția codului.
- Cu un singur thread: Node.js folosește un model cu un singur thread cu buclă de evenimente. Ca rezultat, poate oferi servicii unui număr mult mai mare de solicitări decât serverele tradiționale precum Apache HTTP Server.
- Foarte scalabil: serverul Node.js răspunde într-un mod neblocant, făcându-l foarte scalabil, în contrast cu serverele tradiționale, care creează fire limitate pentru a gestiona cererile.
- Node Package Manager (NPM): Node Package Manager are peste 50.000 de pachete, astfel încât orice funcționalitate este necesară pentru o aplicație poate fi importată cu ușurință din NPM.
- No buffering: Aplicațiile Node.js nu tamponează niciodată date. Aceste aplicații pur și simplu scot datele în bucăți.
- Licență: Node.js este lansat sub licența MIT.

EXPRESS.JS

Express.js este un Java script Framework gratis si open-source, bazat pe Node.js, care suporta dezvoltarea pe partea de server si pe partea de client. Express ne ajută să setăm rutarea și să gestionăm ciclul cerere/răspuns. Express este flexibil, deoarece exista numeroase module disponibile pe managerul de pachete (npm), care pot fi conectate direct la Express.

Cum funcționează Express?

Aplicațiile Express funcționează prin trimiterea unei secvențe de apeluri la nivelul mediu. Middleware-ul are acces în două cursuri pentru a solicita obiecte și obiecte de răspuns. Utilizarea cadrului Express oferă control asupra tuturor obiectelor de solicitare și răspuns. [5]

Gateway de plată pentru website

Un gateway de plată procesează cardurile de credit în magazinele online. Transferă informațiile cheie între site-uri web / dispozitive mobile și procesatorii de plăți / bănci și invers. Practic, este o reprezentare online a unui terminal real de punct de vânzare pe care îl vedem în magazinele offline. Pentru a asigura securitatea tranzacțiilor și pentru a proteja site-ul web de fraudă, un gateway de plată criptează toate informațiile sensibile: numărul cardului de credit, data de expirare și codul CVV. Există două tipuri de gateway-uri de– negăzduit și găzduit.

Gateway-uri de plată găzduite

Aceste gateway-uri îndepărtează clientul de pe site pentru a finaliza plata și apoi îl redirecționează înapoi odată ce procesul este finalizat. Ei au grijă de securitatea tranzacțiilor și sunt destul de ușor de integrat în site-ul web. Cele mai cunoscute gateway-uri găzduite sunt PayPal, Wise (fostă TransferWise), Amazon Payments, Stripe, SagePay.

Gateway-uri de plată negăzduite (integrate).

Gateway-uri de plată negăzduite (integrate) sunt acele gateway-uri care se integrează fără probleme în site și cu ajutorul cărora utilizatorul finalizează plata direct pe website. Securitatea vine ca un dezavantaj cu soluțiile negăzduite, deoarece funcționează pe serverul website-ului și stochează de obicei informațiile despre cardurile de credit ale clienților. Astfel, trebuie să fie asigurată protecția împotriva fraudei, stocarea securizată a informațiilor deținătorului de card și conformitatea cu PCI (de preferință). Marea majoritate a gateway-urilor negăzduite vin cu API-uri extinse și module ușor disponibile pentru a fi integrate în coșul de cumpărături. Cu toate acestea, e nevoie programare personalizată pentru integrare, ceea ce înseamnă costuri adiționale pentru afacere. Unele dintre gateway-urile de plată negăzduite: Authorize.net, SagePay Direct, MangoPay, etc.

Implementarea coșului de cumpărături

Partea unui site web cu care utilizatorul interacționează direct se numește front end. Este, de asemenea,

denumită „partea client” a aplicației. Include tot ceea ce utilizatorii experimentează direct: culori și stiluri de text, imagini, grafice și tabele, butoane, culori și meniul de navigare. HTML, CSS și JavaScript sunt limbile folosite pentru dezvoltarea front-end. Structura, designul, comportamentul și conținutul a tot ceea ce se vede pe ecranele browser-ului atunci când site-urile web, aplicațiile web sau aplicațiile mobile sunt deschise sunt implementate de dezvoltatorii front-end. Receptivitatea și performanța sunt două obiective principale ale front-end-ului. Dezvoltatorul trebuie să se asigure că site-ul este receptiv, adică apare corect pe dispozitivele de toate dimensiunile, nicio parte a site-ului nu ar trebui să se comporte anormal, indiferent de dimensiunea ecranului.

Backend-ul este partea de server a site-ului. Stochează și aranjează datele și, de asemenea, se asigură că totul pe partea client a site-ului web funcționează bine. Este partea site-ului web pe care nu o puteți vedea și cu care nu puteți interacționa. Este porțiunea de software care nu vine în contact direct cu utilizatorii. Părțile și caracteristicile dezvoltate de designerii backend sunt accesate indirect de către utilizatori printr-o aplicație front-end. Activități, cum ar fi scrierea de API-uri, crearea de biblioteci și lucrul cu componente ale sistemului fără interfețe cu utilizatorul sau chiar sisteme de programare științifică, sunt de asemenea incluse în backend.

Implementarea front-end

Pagina principală conține logo-ul magazinului, lista produselor în vânzare și un menu în partea dreaptă. La îndreptarea cursorului deasupra fiecărui produs, apare opțiunea de adăugare a produsului în coșul de cumpărături. La adăugarea produsului în coș, se modifică numărul de produse în coș.

Pagina afișează produsele din coșul de cumpărături. Partea header e la fel ca și pe pagina principală. În coșul de cumpărături, avem indicat fiecare produs adăugat – imaginea, numele, prețul în lei, cantitatea, prețul total al produsului și prețul total pentru toate produsele.

Figura 1. Pagina principală.

Datorită funcționalităților adăugate cu ajutorul JavaScript în fișierul main.js, putem modifica cantitatea produsului, la fel și șterge produsul din coș. La fiecare modificare, se ajustează nu doar cantitatea dar și prețul total.

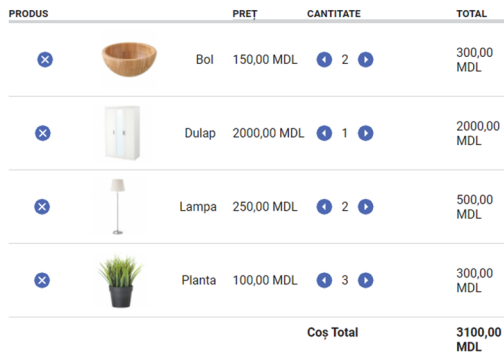

Figura 2. Pagina coșului de cumpărături

Implementarea back-end

Primul pas pentru implementarea back-end a fost instalarea node.js de pe website-ul oficial. Pentru verificarea versiunii node.js sau dacă acesta a fost instalat, putem rula în terminal node –v. După acest pas, am creat fișierul server.js. În terminalul VS Code, am rulat comanda: npm init -y. Această comandă creează fișierul package.json, care mai apoi ne permite să instalăm alte pachete/dependențe.

Următorul pas a fost instalarea severului/express: npm i express. [6]

Organizarea ajută cu adevărat la menținerea coerenței, mai ales într-o echipă mai mare. Consecvența în structura proiectului echivalează cu predictibilitatea

locului în care se poate găsi codul, ceea ce, la rândul său, ajută la productivitatea întregii echipe. Se recomandă de implementat întotdeauna lucrurile ușor previzibile, cu o structură consistentă pentru a minimiza sau elimina presupunerile. În rezultat vom avea un cod ușor de citit și înțeles pentru ceilalți colegi din domeniu. Structura fișierelor după implementarea back-end:

```
>controllers
    pagesCtrlFile.js
    productsCtrlFile.js
>node_modules
>public
    >fonts
    >images
    main.js
    styles.css
>routes
    pages.js
    products.js
>views
    cart.hbs
    index.hbs
package-lock.json
package.json
products.jsserver.js
```

Primul folder este controllers, care va găzdui toate controlerele necesare pentru aplicație. Aceste metode de controler primesc cererea de la rute și le convertesc în răspunsuri HTTP folosind orice middleware, după cum este necesar.

Routes - rutarea determină modul în care o aplicație răspunde la o solicitare a clientului către un anumit punct final. De exemplu, un client poate face o solicitare http GET, POST, PUT sau DELETE pentru diferite adrese URL. În continuare, avem folderul ROUTES care va avea un singur fișier pentru fiecare set logic de rute. De exemplu, pot exista rute pentru fiecare tip de resursă.

Views - acest folder include fișierele html, pentru pagina principală și pentru pagina coșului de cumpărături, doar că a fost schimbată extensia din .html în .hbs (comanda în terminal pentru instalarea hbs npm i hbs).

Public – Images: folderul cu imaginile folosite, în acest caz, imaginile produselor. Main.js: fișierul JS principal, care conține funcțiile care definesc comportamentul paginilor și a tuturor elementelor la interacțiunea cu utilizatorul. Styles.css: fișierul css pentru stilizarea paginilor și elementelor.

Products.js - Acest fișier include lista tuturor produselor.

Server.js

```
const express = require('express');
const path = require('path');
const app = express();
const publicDirectory = path.join (__dirname, './public');
app.use(express.static(publicDirectory));
app.set('view engine', 'hbs');
app.use('/', require('./routes/pages'));
app.use('/products', require('./routes/products') );
app.listen(5000, () => {
console.log("Server is running on port 5000");})
```

În prima linie de cod, am folosit *funcția require* pentru a include „modulul expres”. Înainte de a începe să folosim modulul expres, trebuie să facem un obiect din acesta.

Pentru vizualizarea proiectului, în terminalul VS Code rulăm *comanda npm* start. Vom vedea mesajul din cod: *Server is running on port 5000*. Numărul portului se poate schimba în cod. Respectiv, deschidem *http://localhost:5000/* și se va afișa respectiv pagina principală.

Concluzii

În această lucrare am analizat cum cu ajutorul limbajului de programare JavaScript putem adăuga produsele în coș, cum adăugăm funcțiile pentru modificarea numărului de produse în coș, ștergerea produselor din coș și pentru ajustarea prețului total.

Pentru ca toate acestea să funcționeze, este necesară stocarea informației pe server și manipularea acestora cu tehnologii precum Node.js, Express.js, etc.

ENG: In this paper we have analyzed how using the JavaScript programming language we can add products to the cart, how we add functions to change the number of products in the cart, delete products from the cart and adjust the total price. For all this to work, it is necessary to store the information on the server and manipulate it with technologies such as Node.js, Express.js, etc.

Baza metodologică

Drept bază metodologică și teoretico-ştiinţifică al lucrării, au servit lucrările de profil ale cercetătorilor și specialiștilor din cadrul comunității Web din S.U.A și Rusia, precum și cărțile HTML & CSS și Java script & JQUERY de Jon Duckett.

ENG: The methodological and theoretical-scientific basis of the papers served as the profile papers of researchers and specialists in the web community in the U.S. and Russia, as well as HTML & CSS and Java script & JQUERY books by Jon Duckett.

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THE ROLE OF THE SMALL AND MEDIUM ENTERPRISES SECTOR IN INDUSTRY DEVELOPMENT IN ROMANIA

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Abstract: Small and medium-sized enterprises are a determining factor in economic development, innovation and modernization, achieving a wide range of functions and objectives: they generate the largest share of GDP in each country; generate a large extent of technical innovations applicable in the economy; generates jobs; shows the highest dynamism in the market economy, a situation attested by their evolution, the volume of turnover and the size of the employed workforce, significantly superior to large enterprises; demonstrates high flexibility and adaptability to market demands and changes; provides the main component of an economic background of the market economy, characterized by flexibility, innovation and dynamism. The article presents the role of SMEs in the development of Romanian industry and is based on an analysis of the literature and statistical data. Several indicators are analyzed: evolution of the number of enterprises in the industry, evolution of turnover, staff in the industry, net investment in total industry and SMEs, gross value added at factor cost, gross value added at factor cost per employee, the share of SMEs in direct exports, the number of SMEs in industry by size classes.
Keywords: small and medium-sized enterprises, turnover, net investment, gross value added

Introduction

The small and medium-size business sector plays an extremely important role in a modern economy, being the most active and innovative sector of the economy. Small and medium enterprises are at the forefront of development, they being the most dynamic economic factor. Most of the GDP is produced by small and medium businesses, most of the employed labor force works in this sector. These companies are creating new jobs, most companies are elements of the small business sector, and a large part of the inventions and innovations is generated by these companies. Romania's National Strategy for Sustainable Development 2030 proposes the integration of small and medium enterprises in value chains and foreign markets, the modernization of infrastructure and sustainable rehabilitation of industries for the efficient use of resources, the adoption of green technologies and industrial processes, the modernization of technological capabilities of industrial sectors, the encouragement of innovation. [1]

In Romania, SMEs are an essential segment in the total number of economic agents providing

employment and income and participating in the creation of GDP. The characteristic of the main indicators of SMEs, the evaluation of the potential and the contribution of this sector to the development of industry in Romania and its evolution offer the possibility to identify the activity of Romanian SMEs compared to other European countries, to argue the main directions of their development.

Given the importance of SMEs for the economic development, the article aims to identify the role of SMEs in the development of industry in Romania.

Methods

The research methods applied were analysis and synthesis, through which it was possible to present the impact of small and medium enterprises on the development of the industry. The analysis and synthesis of the publications in the field allowed the formulation of conclusions regarding the role of small and medium enterprises in the development of industry in Romania.

Content of research

Small and medium-sized enterprises operate in all sectors of the economy: in industry, constructions, trade and services. In the Romanian industry, small and medium enterprises operate in the following branches:

- ❖ extractive industry (coal extraction, crude oil and natural gas extraction, metal ore extraction);
- ❖ manufacturing industry (food industry, beverage manufacturing, tobacco manufacturing, textile manufacturing, garment manufacturing, footwear manufacturing, fur preparation and dyeing, wood processing, wood and cork manufacturing, straw and other materials manufacturing) wickerwork, paper, printing and reproduction of records, manufacture of substances and chemicals, manufacture of pharmaceuticals, manufacture of rubber and plastics products, metallurgical industry, construction of metal and metal products, manufacture of furniture, maintenance and installation of machinery and equipment, etc.);
- ❖ production and supply of electricity and heat, gas, hot water and air conditioning;
- ❖ water distribution, sanitation, waste management, decontamination activities (collection, treatment and distribution of water, collection and treatment of wastewater, collection, treatment and disposal of waste, recyclable materials recovery activities; decontamination activities and services).

Figure 1 shows the evolution of the number of active enterprises in the industry in total and SMEs, in the period of 2015-2019.

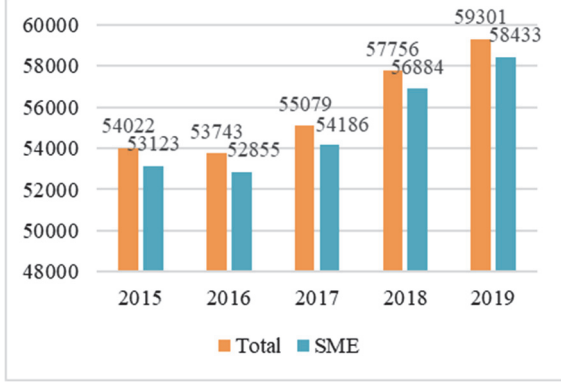

Figure 1. Evolution of the number of active enterprises in the industry in total and SMEs in the period 2015-2019 Source: compiled by the author based on statistical data [2,3,4,5,6]

In the period 2015-2019 the total number of enterprises in the industry increased from 54022 to 59301, the number of small and medium enterprises increased respectively from 53123 to 58433.

Figure 2 shows the evolution of turnover in total per industry and SMEs in the period 2015-2019.

The turnover of small and medium enterprises evolved in the period 2015-2019 from 156096 million lei in 2015 to 185478 million lei in 2019. The small and medium enterprises both in 2015 achieved respectively 36.9% and 33.4% of the total

turnover both in 2015 and 2019. Figure 3 shows the number of staff in the industry in total and SMEs in the period 2015-2019.

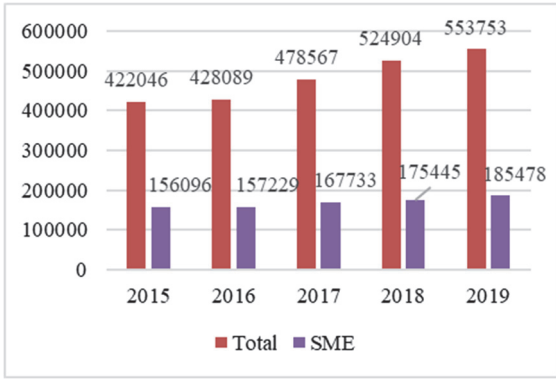

Figure 2. Evolution of turnover in total per industry and SMEs in the period 2015-2019 - in millions of lei for current prices. Source: compiled by the author based on statistical data [2,3,4,5,6]

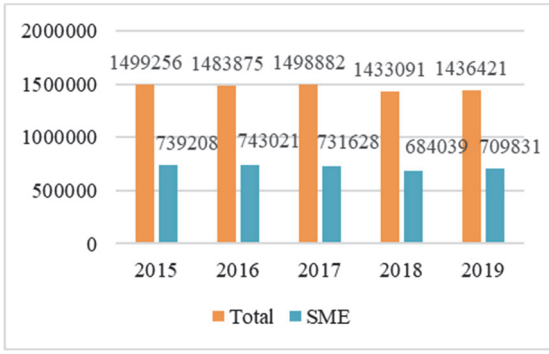

Figure 3. The number of staff in the industry in total and SMEs in the period 2015-2019; Source: compiled by the author based on statistical data [2,3,4,5,6]

The number of staff in small and medium enterprises in the industry has evolved in the period 2015-2019 from 739208 to 709831 people. The small and medium enterprises comprised 49.42% of the total staff of 1436421 as per 31.12.2019.
Figure 4 shows the gross value added at factor cost of the total industry and SMEs in the period 2015-2019.

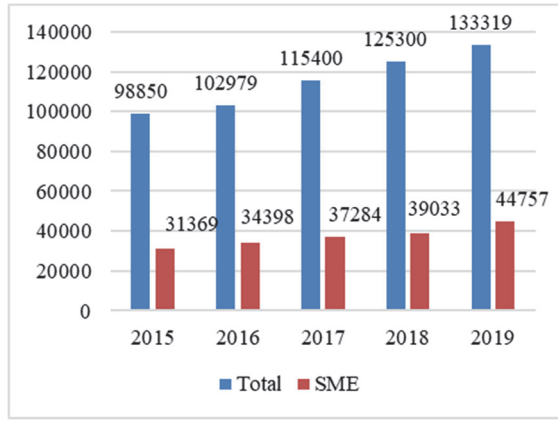

Figure 4. Gross value added at factor cost of total industry and SMEs in the period 2015-2019 - in million lei current prices -Source: compiled by the author based on statistical data [2,3,4,5,6]

The gross value added at factor cost was obtained by small and medium-size enterprises in proportion of 31.7% in 2015 and in proportion of 33.57% in 2019.
Figure 5 shows the gross value added at the cost of factors per employee in the industry in the period 2015-2019.

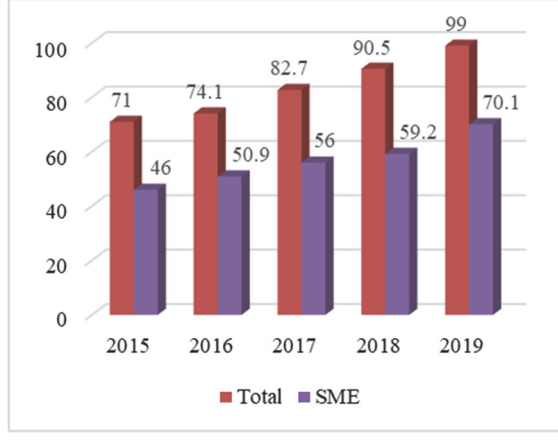

Figure 5. Gross value added to the cost of factors per employee in industry in the period 2015-2019 - thousand lei current prices / employee -Source: compiled by the author based on statistical data [2,3,4,5,6]

Gross value added per employee, *apparent productivity*, recorded lower levels in small and medium enterprises than in total enterprises in the period 2015-2019. Figure 6 shows the net investment made in the total industry and SMEs in the period 2015-2019.

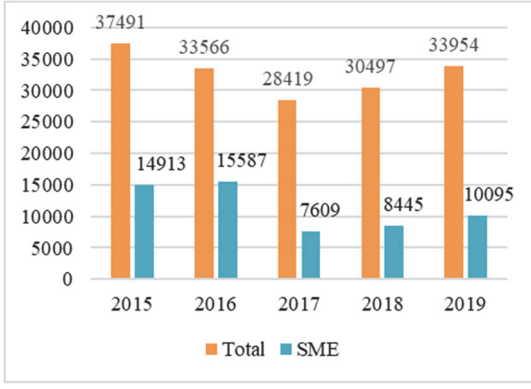

Figure 6. Net investment made on the industry in total and SMEs in the period 2015-2019 - million lei current prices -Source: compiled by the author based on statistical data [2,3,4,5,6]

In 2015, small and medium enterprises had a share of 39.78%, and of 29.73% in 2019. The structure of the net investments in SMEs as financing sources in 2019 was as follows: 38.79% own sources; 61.21% credits.

Figure 7 shows the gross result of the year (profit) in the total industry and SMEs in the period 2015-2019.

The gross result of the year registered (profit) was 13968 million lei in 2015, of which 2446 million lei were obtained by small and medium enterprises, and 9210 million lei out of the total of 28061 million lei obtained by small and medium enterprises in 2019.

Figure 8 shows the direct exports between 2015 and 2019 years.

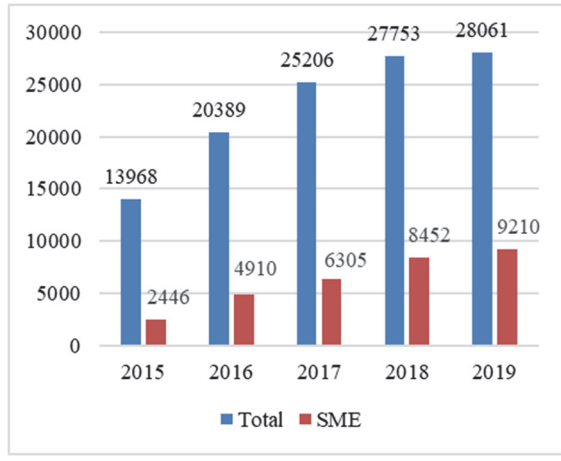

Figure 7. Gross profit per year in total industry and SMEs in the period 2015-2019 - in million lei current prices -Source: compiled by the author based on statistical data [2,3,4,5,6]

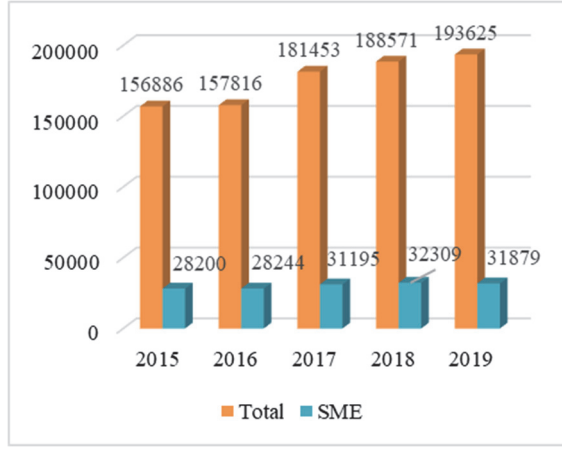

Figure 8. Direct exports of industrial enterprises in the period 2015-2019 - million lei - Source: compiled by the author based on statistical data [2,3,4,5,6]

According to the data from figure 8, the share of small and medium enterprises in the export of industrial products constituted 17.97% in 2015 and 16.46% in 2019.

Figure 9 shows the number of SMEs in the industry by size classes in 2019.

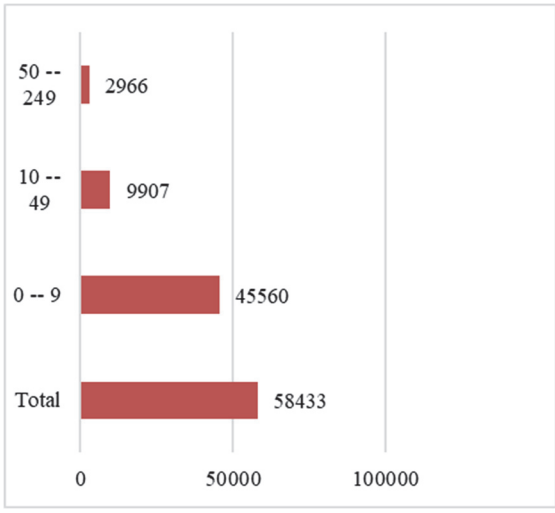

Figure 9. Number of SMEs in the industry by size classes in 2019, Source: compiled by the author based on statistical data [2,3,4,5,6]

According to the data in Figure 9, 5.08% from the total of 58433 SMEs were medium-sized enterprises with a number of employees of 50-249, 16.95% small enterprises with a number of employees of 10-49 and 77.97% micro- enterprises with a number of employees up to 10.

Thus, small and medium enterprises have a major impact on the development of different industries in Romania. Thus, the share of small and medium enterprises in 2019 was 98.5% from the total number of enterprises in the industry. Small and medium enterprises achieved 33.4% of the total turnover in 2019. On 31.12.2019, small and medium enterprises owned 49.42% of the total staff. The gross value added at factor cost obtained by small and medium-sized enterprises was in proportion of 33.57% to the total in 2019.

Conclusions

The SME sector is an area of strategic interest for the economy. Small and medium-sized enterprises are a key factor in economic development, innovation and modernization.

The small and medium enterprise sector represents the barometer of the development of the competitive and sustainable economy, ensuring a uniform evolution by creating new jobs, considerable contribution in net taxes, offering a wide range of goods and services, diversifying the economic opportunities for the population.

Small and medium-sized enterprises:

- are an important part of the infrastructure on which the economy depends;
- contribute to the supply of products from various industries;
- generate jobs;- play an important role in combining factors of production and encouraging investment;
- show dynamism in the conditions of the market economy, a situation attested by their evolution, dynamism of the turnover volume and of the size of the employed labor force;
- have high flexibility and adaptability to market requirements and changes.

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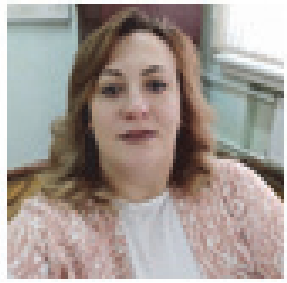

Overview of SaaS platforms for smart home

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Abstract: An analysis of research in the field of "smart home". The key problems of the industry have been identified. Some of existing SaaS systems are reviewed, compared, and the strengths and weaknesses of each system are identified. The key characteristics of the smart home support system have been identified.
Keywords: Internet of Things, smart home, SaaS systems.

Introduction

In the early 2000's, an average of one hundred people owned a smart device. We are currently approaching the condition when a man has a number of 10 smart devices. Thus we are witnessing a technological explosion of different fields of activity, and of course of the habitat environment. As the number of devices increases, so does the complexity of adjusting the interaction between them. It is for this reason that the creation of an universal SaaS platform for smart homes is a current and important task.

We now have the ability to choose smart home products from a variety of manufacturers such as Google, Amazon, Apple, and more. The development of such products is so complex that no giant has managed to take the lead in the market. Therefore, we can see that the outline of the definition of the smart home are still unclear. Therefore, the development of the smart home management software component is current.

The purpose of this paper is to study cloud platforms as part of the smart home management system.

Problems of the industry and SaaS as overcoming these problems

First of all, let's clarify the terms that characterize the scope of our study.

A smart home is a collection of software and hardware that integrates and coordinates the work of all devices in the room, as well as allows us to manage them as a whole. The mini-system in the context of a smart home is a controller combined with a set of sensors and performers, it is the basic unit of a smart home.

A microcontroller is a specialized microprocessor system that includes a microprocessor, memory blocks for storing code and data, I / O ports and blocks with special functions (counters, comparators, ADCs, etc.).

Software as a Service (SaaS) is software as a service, a model of licensing and distribution of software, when a provider creates a web application, deploys it and ensures its stable operation for remote use by customers over the Internet (see Figure 1) [1].

Platform as a Service (PaaS) is a category of cloud computing services that provides customers with a

platform to develop, run and manage applications without the hassle of building and maintaining infrastructure.

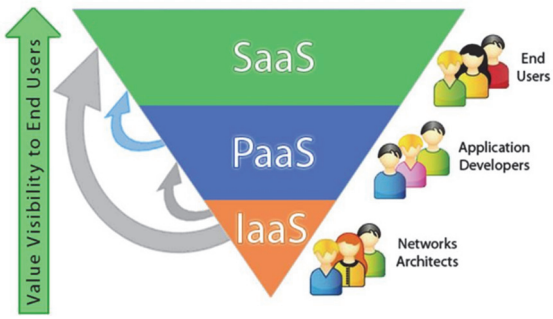

Figure 1. Cloud Computing Service hierarchy

Internet of Things (IoT) is a network of devices, such as vehicles and household appliances, containing electronics, software, actuators and connections that enable connection, interaction and data exchange.

A web service is a service provided by an electronic device to another electronic device through communication between them over the Internet.

The first issue that needs to be highlighted is the high connectivity of device software and hardware. These two parts are very interdependent and are distributed mostly together. In this respect, smart home devices today are very similar to personal computers of the 1970s and 1980s. Experience has shown that high connectivity between software and hardware has significant drawbacks, that is why personal computers have evolved into two interchangeable parts. It has become possible to replace software and hardware virtually independently of each other.

According to this analogy, it can be hypothesized that the future of smart devices for a smart home lies in this model. Yet so far it has not been widely used. The main reason for this situation is the greater difficulty for the end user when interacting with smart devices to update or modify them. If the end user can still handle the software update on a smart device, or the device will do it automatically, then installing other software on the device is a non-trivial task, and sometimes even impossible. Using SaaS can make a big difference: if we bring software to the cloud and provide it as a service, installing new software will be easy to do.

Another issue to note is the lack of generally accepted requirements for the development of software that controls the operation of a smart device. For example, smart home management software solutions are mostly sold with devices. Having chosen one manufacturer, the client will be forced to work only with him, because it is difficult to combine devices from different manufacturers under one roof.

Another problem is the closed ecosystems of device manufacturers and the difference in their architecture.

Creating a SaaS platform to support smart home systems will overcome these problems, as well as provide a number of additional features:

the implemented functionality will be easy to reuse in all other houses connected to the system;

you can buy software in SaaS without buying new hardware;

collection of analytical data and accumulation of experience on the basis of all houses connected to SaaS, which can be used to further improve the system and analyze its weaknesses.

easy scaling of the system to any number of smart homes.

increase the level of information security, as software in the form of SaaS will be automatically updated, and therefore, software vulnerabilities will be resolved as quickly as possible.

Market overview of SaaS platforms for building a smart home

Google Smart Home

Today, Google has one of the most developed smart home ecosystems. It all started with the launch of the Google Home smart speaker in 2017, which was created to compete with Amazon Alexa. Similar to the Alexa ecosystem, Google Smart Home has two types of devices: control and management.

Guides are devices with built-in Google Assistant

software that are able to receive human commands by voice and gesture and turn them into formalized commands for devices that can be touched by a dedicated team. Controlled - devices with some functionality that are able to execute formalized commands from the control device. Controlled devices may belong to the Google ecosystem or be third-party devices.

Unlike Amazon, Google's smart assistant is available not only in a smart speaker, but also in every smartphone with the Android operating system. This fact gives Google a significant advantage over Amazon, as it significantly expands the audience for which the threshold for entering the services of a smart home is almost zero.

Communication between devices is provided through the SaaS platform from Google, which has the following main components: Home Graph - a database that stores and provides contextual data about the house and its devices; device types determine which grammar should be recognized for the device; the declared capabilities of the devices determine the capabilities of the device type; purpose - a simple message format that describes how to execute a command, such as turning off the light; execution - a service that processes the intention and performs the appropriate action [2].

The Home Graph database stores information about the type of building (such as an apartment, house, or office), room (such as a kitchen, living room, or bathroom), and devices (such as a speaker, switch, or light bulb). Also, Home Graph can represent the concept of a house with a kitchen, which contains several types of smart devices from different manufacturers, such as lighting, kettle and stove. This information is available to Google Assistant when executing user queries in the appropriate context [3]. Status data, for example, if the kettle is switched on, is not stored in the long run - these are relative terms that are used and stored only in Home Graph. It is a logical map of a smart home. If the user enters the room and wants to turn on the lights and TV, then Home Graph can simply say "hello Google, turn on the lights and TV" and not to mention the room where the user is now. Benefits of this system:

- implicit commands;
- implicit group positioning.

An important component of Google's Smart Home system is easy command execution. It allows users to control home devices using the Google Home speaker, Google Assistant on a smartphone or other device, and Google Nest Hub.

Google Home Speaker is a smart speaker that understands voice commands to interact with various functions (tasks, information, etc.) through Google Assistant software. The user has access to a large number of features from Google, and from various manufacturers of software or hardware. Google Home provides the same management capabilities, but through a graphical user interface. And with Google Assistant, you can control your voice from your smartphone, watch, laptop, TV and other devices.

The most functional way to control the home is the Google Nest Hub display, which extends the functionality of the Google Home speaker to the ability to receive information not only by sound but also on display, as well as control gestures and use the display for video calls or video surveillance. Gesture control can be especially useful if there is noise in the room and the system is unable to hear the user. This system also uses a camera to recognize people in the room to give them a personalized user experience.

To integrate with Google Smart Home, device manufacturers must provide a web service through which Google must send commands to devices. Google as a SaaS provides the ability to accept commands from the user, process natural language and generate formalized commands, and the device manufacturer must implement these formalized commands.

Google Smart Home's model of work is largely based on third-party services from device manufacturers, the system ensures the full operation of smart homes today.

Muzzley

Muzzley positions itself as a SaaS solution that allows you to integrate all IoT devices into a single user interface. It simplifies the creation of a smart home by subjecting all smart devices to settings in the Muzzley application. Today, the system has more than ten thousand users, which allows it to work with more than two hundred devices from different manufacturers [4]. The main goal of the SaaS platform of Muzzley is to create an effective channel of communication between people and devices for the exchange of information or actions. The platform uses the concept of software services, not only to interact with devices, but the most common software services in the system are the Internet of Things devices. To become a software service in the Muzzley system, you must: obtain credentials from Muzzley, which will identify the software service; learn how to communicate using one of the HTTP or MQTT communication protocols.

The system supports two types of integration:

- Cloud-Cloud - the device manufacturer's service must register your device with Muzzley system and be ready to perform actions with your devices according to the command from the Muzzley service.
- Cloud-Device - the device asks its manufacturer's service to register it in the Muzzley service and already communicates directly with the Muzzley service with the received credentials.

It is worth noting that Muzzley is the only one of the considered systems that supports the integration of Cloud-Device with third-party devices. This approach, combined with the use of the MQTT protocol, makes this platform more resilient and faster than the others discussed in this section, but the lack of its own line of devices may be a weakness in competition with device manufacturers.

Miotta

Miotta positions itself as a PaaS and SaaS solution for IoT. It is designed to control the interaction between devices, data and people. The main goal of the system is to simplify the relationships between the components in order to speed up the development of new solutions. Miotta has created its own SaaS to develop security solutions using IoT devices. The best known solution is Horned.

To date, more than 100,000 Miotta devices have been connected to the company's servers, and more than 30,000 third-party API devices have been registered [5]. According to the Play Market, the Horned app has been installed more than 10,000 times.

Three types of interaction with API system are offered. You can use Miotta-Arp to control and manage your devices, create your own application to control and manage Miotta devices or your own.

The end-user interface is the Horned mobile application. It is a platform of services that provides security against thieves, video surveillance, health care, energy efficiency, automation and protection against emergencies. You can add and manage new devices in the application. It is possible to integrate with Dropbox, Google Home, Amazon Alexa. Easy to set up "if something" rules with smart devices is available. The application is available on Android, iOS and in a reduced form on the Apple Watch.

It can be concluded that the developers of Miotta have managed to implement an integrated ecosystem for a smart home based on the SaaS model, which already successfully ensures the operation of many smart homes.

Conclusion

An analysis of smart home software support systems (CloudMQTT, Myotta, Google SmartHome), which are leaders among software developers, shows the lack of an acceptable integrated solution that would combine SaaS and PaaS services to meet the needs of home residents and end users, and developers of devices that ensure the operation of various smart home systems, as well as the need to develop a new software system.

This platform should combine the benefits of SaaS and

PaaS services, aimed at increasing profits from subscriptions to various blocks of home management functionality, from working with device manufacturers in the role of PaaS. It should optimize cloud-device and cloud-to-cloud integrations and implement APIs to configure http integration and MQTT device management.

The new platform should provide convenient capabilities for building a home management interface in the form of a web application or mobile application with the ability to support multiple homes of one user, accessible voice and gesture control. The module for supporting simple decision-making, subsystems for collecting and demonstrating statistical and analytical information should be effectively implemented.

The platform model should be similar to the AppleAppStore or GooglePlayMarket model with a focus on a single smart device or smart home as a whole.

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FONDUL IFORNMAȚIONAL UNITAR – FORMĂ PERFORMANTĂ DE SOLUȚIONARE DIGITALĂ A ORGANIZĂRII DATELOR PE MEDIUL SISTEMELOR INFORMATICE INTEGRATE

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Abstract: At present, the level of coverage with informatics means and technological methods of mass character informational fields, primordially those economics, is characterized by a rather insufficient including. From this point of view, it comes out that both in theory and in practice, as a rule, through the informatics modality prevalent are achieved and treated particular issues, complex of issues and informational subsystems, the vast majority being predestined and of informative content. At the same time, any unitary financial administration (management, leadership, regulation) process includes not only the object (material, spiritual activities and their components), but also the subject (management system), based on two categories of information: informative and decisional. The first of such information fulfills a passive function (descriptive, reflective) of objects and events, therefore on the basis of only one category of them no decisions can be made, as each in particular describes the existence and evolution of objects (processes) unilaterally (in certain time limits (work hour, shift, day, week, month, etc.) and spatial rays (job, brigade, sector, section, organizational unit, etc.)). In such a situation, in order to formulate a decision, it is necessary to combine two and more varieties of information (for example, in economics: information with planning tasks + information on their fulfillment; information with dimensions of the rates of consumption of goods + information of evidence of their respecting, etc.). Therefore, in order to issue a unit with decisional value, a minimum of two and more types of informational units with informative values must be applied.

As the concept of unitary integrated informatics systems envisages their establishment and functioning according to the systemic approach and integration of the immediate constituents, i.e. in interconnection and analogous interaction (direct), indifferently of the dimensions of space and time rays, more and more accented it demanding elaboration, implementation and operation of each constituent and all constituents of the organizational unit (for example, enterprise, organization, firm, corporation, sub-branch, branch, state, continent, globe). In this authentic context it is joining such a form of organizing information as the Unitary Informational Fund of the Organizational Unit ($U_r.I_l.F.O_g.U_n.$), which in the informatics environment is considered as a database.

According to the theses presented so far and having in view the innovative aspect of the restored material, in this paper, conceptually, the evolution, the necessity, the conception and the stages of the constitution of the given Fund are elucidated. At the base of the analysis, confirmations and statements remaining exemplifications and justifications of the mass informational domains, first of all - of those economic.

Keywords: unitary informational fund, organizational unit, integrated informatics system environment, evolution, necessity, conception, composition, constitution

Introducere

Realizarea automată deplină a tuturor proceselor materiale și informaționale, proprii unității organizatorice (întreprindere, bancă, universitate, etc), poate fi asigurată prin constituirea și funcționarea zi de zi a așa categorie de sisteme informatice, care ar realiza nemijlocit astfel de procese în regim de timp real. În așa caz se impune

tratarea și realizarea tuturor proceselor de orice categorie a resurselor sistemelor nominalizate de pe poziții unitare de integrare, adică, de interconexiune și interacțiune, indiferent de nivel de gestiune și rază spațială a evoluției lor.

Pentru situația creată în prezent sunt caracteristice realizarea discretă în timp și funcționarea spațial separată a sistemelor informaționale și informatice. Ca urmare, sistemul de informații este studiat și prezentat numai la nivel conceptual (imaginar), în realitate fiind fărâmițat pe nivele de gestiune, subdiviziuni ale obiectului unitar, resurse, procese și perioade de timp ale evoluției lor. În **asemenea** condiții, tot mai stringentă devine problema asigurării interconexiunii și interacțiunii dintre unitățile informaționale în cadrul unui tot întreg. Conform nivelului existent al progresului tehnico - științific, se constată așa stare a lucrurilor, când organizarea și evoluția analoagă a activităților umane de orice categorie pot fi valorificate exclusiv prin abordare sistemică, în bază de unitate și integrare a tuturor elementelor constituante, includente în totul unitar. Rolul decisiv în atingerea acestui obiectiv aparține stadiului inițial de procesare a datelor, care se referă la etapa de organizare a unităților structurale informaționale (primare, intermediare (derivate)). La rândul său, în procesul informațional inseparabil, organizarea este de ordin secundar, preliminar solicitând evidențierea primordială a unităților structurale. În continuare, stadiul de prelucrare (incalculă și de calcul) a valorilor acestor unități devine posibil doar în baza anumitei modalități de organizare a informaților inițiale și rezultative. Prin urmare, ocupând poziție tranzitorie, organizarea constituie factorul crucial al procesării (prelucrării).

În contextul celor elucidate, actualmente se atestă faptul, că în majoritatea cazurilor, atât în teorie, cât și în practică, abordarea integrată a proceselor și procedurilor informaționale este realizată parțial, la nivel de problemă, rareori – la nivel de complex și subsistem de probleme. Totodată, în cadrul unității organizatorice de orice tip (de la loc de muncă până la nivel statal, continental și mondial), tot mai insistent se impune astfel de ordonare a informațiilor pe nivele de gestiune, în mediul fiecărui nivel – pe unități organizaționale, tehnologice, resurse ale lor, etc.

Momentan, reeșind din situația formată, concepția de unificare compozițională, structurare autentică și integrare performantă, din punct de vedere a asigurării cu resurse informaționale a sistemului de procesare a lor, în mediul unității organizatorice, impune valorificarea ei sub formă de Fond Informațional Unitar, iar în cadrul sistemului informatic – sub formă de bază de date.

Pentru o fondare cât mai convingătoare a rolului, necesității obiective în astfel de formă și performanțelor ei, în lucrare primordial sunt examinate necesitatea, noțiunea, componența și etapele constituirii Fondului în cauză privitor la unitățile organizatorice materiale economice, care conceptual, într-o anumită măsură, pot fi considerate drept proprii și pentru unitățile pur organizatorice de acest tip (firmă, companie cu potențial economic major, minister, etc.).

Conținut

Evoluția, necesitatea și concepția Fondului Informațional Unitar al Unității Organizatorice

Concretizarea conținutului semantic al informației se realizează prin predestinația ei funcțională (aspectul pragmatic). Atât această predestinație, cât și majorarea semnificativă a volumului și complexității compoziționale, varietății structurale în mod obiectiv au impus specificarea (ramificarea) informațiilor în diverse categorii (feluri).

Ulterior, fiecare categorie de informații au evoluat cantitativ și calitativ, ceea ce în consecință și a condus la necesitatea evidențierii și formării anumitor unități informaționale structurale, prin intermediul cărora se organizează cât mai eficient resursele informaționale [1,60-68; 2, 176-178].

În acest sens organizarea informațiilor cu caracter de masă a parcurs o serie de etape evoluționiste și forme de organizare a funcționării lor, principalele din cele de pe urmă fiind următoarele [2, 189-191; 3, 55-56; 4, 47-96; 5, 307-310]:

1. forme organizatorice, bazate pe unități informaționale elementare, semantic prezentate de rechizite, comunicări, indicatori particulari;
2. forme organizatorice, bazate pe masive informaționale separate (autonome, răzlețe);
3. forme organizatorice bazate pe colecții informaționale, ultimele incluzând în componența sa nu numai atribute, comunicări și indicatori, dar și masive informaționale;
4. forme organizatorice bazate pe principiile organizării suporturilor informaționale, pornind de la specificul lor fizic (documentotecă, cartotecă, discotecă, dischetotecă, etc.)

Pentru majoritatea din aceste forme este caracteristică dispersarea unităților informaționale pe spații și termene temporale, din ce cauză ele și sunt formate, prelucrate și utilizate în mod separat (neorganizat), fără a se ține cont de caracterul sistemic și interconectat al informațiilor de masă.

Treptat, pe măsura creșterii volumului și complicării varietăților activităților materiale umane, grație intensificării relațiilor reciproce dintre diverse subdiviziuni și agenți economici, a fost impusă necesitatea de a constitui și realiza un nucleu informațional unitar integrat, care și este nu altceva decât Fondul Informațional Unitar ($F.I_{l}U_{r}.$) al unității organizatorice ($U_{n}.O_{g}.$) Esența acestui fond constă în acumularea valorilor tuturor unităților informaționale inițiale, care se referă la obiectul gestionat în ansamblu și la orice componentă a lui, cu scopul păstrării, prelucrării și oferirii lor ulterioare. De asemenea, $F.I_{l}.U_{r}.$ asigură cu unități informaționale ($U.I_{l}.$) derivate procesele de formulare a deciziilor. Prin urmare, predestinația de bază a $F.I_{l}.U_{r}.$ constă în asigurarea cu date a oricăror procese de organizare (păstrare), procesare și utilizare a informațiilor concrete.

Faptul că $F.I_{l}.$ este unitar nu înseamnă că organizarea lui trebuie să fie centralizată. Chiar și în așa caz, obiectiv prelucrarea și utilizarea informațiilor masive se produc în mod distribuit, din cauza că sistemul de gestiune dispune de multe nivele și obiecte gestionate, spațial dispersate și temporal discrete. De aceea, în orice situație $F.I_{l}.U_{r}.$ nu este o formă centralizată de organizare a resurselor informaționale, așa cum el este bazat pe principii unitare de organizare a informațiilor pentru toate nivelele și obiectele manageriale.

Toate cele expuse până la momentul de față pronunțat motivează necesitatea organizării $F.I_{l}.U_{r}.U_{n}.O_{g}$ care este fondată, mai cu seamă, și de următorii factori de bază:

1. Schimbarea conținutului funcțional al mediului activităților gestionale, care constă în aceea că majorarea volumului, complicarea varietăților și accelerarea operativității acestor activități solicită perfecționarea formei de organizare a realizării lor, cu soldarea unui sistem nou de gestiune mai performant. La rândul său, astfel de sistem solicită formă nouă de organizare a resurselor informaționale. Așa cum activitățile materiale necesită coordonare în spațiu și timp, și resursele informaționale trebuie să fie organizate distributiv, conform unui concept unitar. De aceea, din punct de vedere organizatoric resursele informaționale ($R.I_{l}.$) trebuie să fie interpretate drept un tot integru interconectat.

Deoarece sistemul de activități materiale economice se realizează sub formă de organism unitar interconectat, respectiv și resursele informaționale, care le descriu și permanent le însoțesc, trebuie să fie organizate sub formă de o așa unitate, care, de asemenea, ar asigura interconectarea unităților informaționale în baza unui concept unitar integrat. Realizarea a așa unitate informațională organizatorică în realitate poate avea loc sub formă de Fond Informațional Unitar al Unității Organizatorice ($F.I_{l}.U_{r}.U_{n}.O_{g}$).

2. Aplicarea concepției $F.I_{l}.U_{r}.$ contribuie la

determinarea celei mai raționale componențe și mai adecvate structuri ale sistemului de gestiune. Aceasta are loc din cauză că organizarea $F.I_{l}.U_{r}$. este de neconceput fără depistarea tuturor unităților informaționale și conexiunilor dintre ele, cu coordonarea și reglarea lor unitară în scop de a deservi calitativ și la timp cu date necesare activitățile decizionale.

3. Perceperea sub formă de obiect unitar condiționează elaborarea logic potrivită și flexibil gestionată a sistemului de informații.

4. Fiind modelul informațional deplin al obiectului gestionat, $F.I_{l}.U_{r}$. asigură autenticitatea, deplinătatea și oportunitatea sistemului de informații și, prin urmare, majorarea nivelului calitativ al resurselor informaționale decizionale.

5. Organizarea sistemului de informații în baza conceptului $F.I_{l}.U_{r}$ de asemenea conduce la economisirea spațiului de memorie informatică, așa cum în această variantă practic sunt excluse orice dublări ale valorilor unităților informaționale ($U.I_{l}.$) și conexiunilor dintre ele.

6. Unificarea $F.I_{l}.U_{r}$ conduce la economie de timp și la reducerea altor cheltuieli legate de înregistrarea, păstrarea și transmiterea informațiilor, așa cum unitățile lor sunt fixate pe spațiul memoriei, ca regulă, numai o singură dată.

7. Realizarea automată a conexiunilor informaționale ale problemelor informative în cadrul $F.I_{l}.U_{r}$ contribuie la automatizarea maximală a proceselor de prelucrare a datelor și de asigurare cu informații a activităților de gestiune. Acest fapt se explică prin aceea că în plan informațional o problemă decurge din alta. Prin urmare, rezultatele soluționării unei probleme pot fi utilizate pentru rezolvarea altei probleme.

8. Aplicarea conceptului $F.I_{l}.U_{r}$ perfecționează esențial tehnologia organizării și prelucrării datelor, transformând-o în proces continuu realizat de mijloacele tehnice informatice.

9. Așa cum $F.I_{l}.U_{r}$. conectează în mod informatic toate problemele informative într-un singur complex unitar, aceasta indirect contribuie și la automatizarea compartimentului informativ al sistemului unitar de gestiune în ansamblu ($S.U_{r}.G_{s}.$). În baza fondărilor și justificărilor efectuate până acum, se poate afirma, precum că $F.I_{l}.U_{r}$. este nu altceva, decât o formă (unitate) organizatorică informațională unitară integrată, predestinată pentru organizarea, transmiterea, prelucrarea și oferirea oricăror informații informative, necesare pentru sistemul de gestiune în ansamblu și orice componentă a lui.

Componența și caracteristica generală a $F.I_{l}.U_{r}.U_{n}.O_{g}$.

Inițial și ,deocamdată, și în prezent sub formă de $F.I_{l}.U_{r}$. sunt organizate acele resurse informaționale economice, care necesită păstrare permanentă în memoria informatică. De aceea, în practica existentă a activităților informaționale economice aria realizării $F.I_{l}.U_{r}.U_{n}.O_{g}$ cuprinde numai o parte din datele cu valori relativ constante și nu se referă deloc la cele variabile, care zilnic sunt fixate, organizate şi acumulate. După volum informațiile variabile sunt enorm de considerabile, comparativ cu cele constante. În așa condiții se poate stabili că actualmente realizarea practică a $F.I_{l}.U_{r}.U_{n}.O_{g}$ se găsește la etapa inițială. Pornind de la acest considerent, componența și conținutul $F.I_{l}.U_{r}.U_{n}.O_{g}$ sunt determinate numai în aspectul lor funcțional în cadrul sistemului de gestiune economică.

Situația creată privind elaborarea și funcționarea $F.I_{l}.U_{r}.U_{n}.O_{g}$ mai este motivată şi de faptul că până acum nu este elaborat sistemul unitar de informații pentru $U_{n}.O_{g}$, nu sunt evidențiate pe deplin și autentic relațiile informaționale funcționale de ordin intern și extern. Totodată, organizarea numai a unei părți de informații relativ constante este avantajoasă, așa cum aceasta contribuie la reducerea consumurilor de timp, de spațiu memorar și de alte resurse anterior caracterizate. Deci, tendința generală de realizare informatică a resurselor informaționale masive se reduce la organizarea

sistemului de informații ale obiectului gestionat sub formă de $F.I_{l}.U_{r}.U_{n}.O_{g}$ Pentru a realiza această tendință e necesar ca mai întâi să fie determinate componența și conținutul acestei forme de organizare digitală a datelor.

De pe pozițiile afirmate mai sus, varietățile informațiilor sistemului de gestiune organizate sub formă de $F.I_{l}.U_{r}$. sunt următoarele:

1. informații de intrare în sistemul de gestiune, recepționate din mediul extern (alți agenți economici);
2. informații de ieșire, derivate de la procesele de prelucrare și de oferire altor obiecte și organisme de gestiune;

Așa cum ambele varietăți de informații sunt de ordin extern, ele se deosebesc prin dificultatea acomodării componenței, structurii și conținutului lor la mediul sistemului de informații al obiectului gestionat.

3. informații interne, ce constituie conținutul sistemului de informații formate la propriu de obiectul gestionat. Valorile lor sunt colectate, prelucrate și utilizate numai în mediul sistemului de gestiune al $U_{n}.O_{g}$. În practică, în prezent conținutul și obiectul organizării $F.I_{l}.U_{r}.U_{n}.O_{g}$ sunt predeterminate de conținutul și componența informațiilor interne.

Din punct de vedere a conținutului, predestinației și rolului în procesul de constituire și funcționare a $F.I_{l}.U_{r}.U_{n}.O_{g}$ și de soluționare a problemelor economice (factorul decisiv), toate informațiile interne pot fi divizate în următoarele două varietăți:

A – informații de bază, ce sunt de caracter informativ, se organizează și prelucrează cu scopul de a obține anumite produse informaționale. De aceea, ele constituie baza informațională a sistemului de gestiune al $U_{n}.O_{g}$., care poate fi realizată și sub formă de $F.I_{l}.U_{r}$.;

B – informații de serviciu, cu ajutorul cărora se efectuează organizarea, transformarea (procesarea) și utilizarea în mod automat a valorilor informațiilor de bază. De aceea, în componența lor intră sistemele, mediile, mijloacele de programare, precum și produsele - program aplicative.

După caracterul funcțional și frecvența implicării, precum și a evoluției valorilor, informațiile de bază, pot fi sistematizate în următoarele două grupe:

- informații cu valori relativ constante;
- informații cu valori permanent variabile.

După conținutul funcțional primul grup de informații include diverse norme de consumuri ale resurselor economice, prețuri, tarife, coeficienți, indicatori de previziune, diverse caracteristici calitative permanent proprii obiectelor (activităților) materiale economice ș.a.

Al doilea grup de informații include diverse unități informaționale ($U_{t}.I_{l}.$) (preponderent indicatori și masive) de caracter operativ, curent şi de lungă durată (arhivate). Toate trei categorii dispun de anumită predestinație funcțională (normare, previziune, evidență, gestiune, analiză ș.a.).

De asemenea, după stadiile de formare a valorilor se evidențiază informații primare, intermediare și rezultative. În așa mod, dacă informațiile de bază aparțin anumitor funcții de gestiune, descriu obiectele și evenimentele, apoi cele de serviciu sunt de caracter programatic și în îmbinare cu resursele tehnice asigură organizarea și funcționarea automată a $F.I_{l}.U_{r}$.

Pornind de la conținutul funcțional și posibilitățile existente de la nivel conceptual componența $F.I_{l}.U_{r}.$ al $U_{n}.O_{g}$. este prezentată în Fig.1 [2, 191-192; 3, 56-57; 5, 310-315]

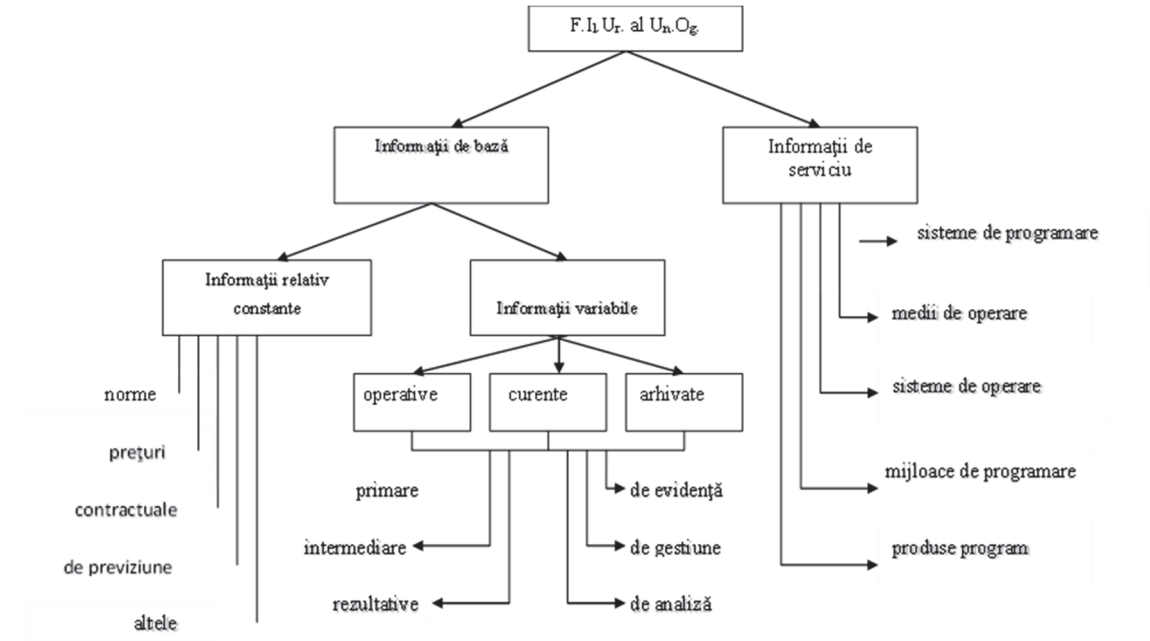

Fig.1. Schema compoziţională a conţinutului fondului informaţional unitar ($F.I_l.U_r.$).

Etapele constituirii $F.I_l.U_r.U_n.O_g.$, conţinutul lor

După volum şi conţinut, în procesul constituirii $F.I_l.U_r.$ al $U_n.O_g.$ se evidenţiază următoarele 3 etape de bază [2, 193-194; 58-59; 5, 314-317]:

1. organizatorică;
2. de elaborare (proiectare);
3. de implementare;

Pe parcursul primei etape se efectuează lucrări predestinate estimării necesităţilor şi posibilităţilor constituiri acestui fond. La rândul său, aşa imperativ este condiţionat de volumul exagerat al informaţiilor, lucrărilor structurale şi de calcul ale datelor, de varietatea şi complexitatea excesive ale problemelor soluţionate.

În plan general, pentru a determina caracteristicile parametrilor cantitativi (de volum) şi calitativi (de componenţă şi diversitate) ale $F.I_l.U_r.U_n.O_g$ este necesar de aplicat un anumit sistem de estimare a lor de nivel expert (aproximativ). În acest scop se calculează valorile diverşilor indecşi şi coeficienţi, în baza cărora se determină categoriile mijloacelor tehnice necesare pentru soluţionarea problemelor reale. După determinarea varietăţilor de mijloace tehnice necesare se calculează numărul lor solicitat pe fiecare categorie. Acest număr se calculează în baza valorilor parametrilor cantitativi ai $F.I_l.U_r.U_n.O_g$ – volumul de informaţii şi de lucrări. Componenţa şi numărul mijloacelor tehnice informatice stă la baza calculelor necesităţilor în resursele umane, financiare şi materiale.

În baza sumei totale a costurilor tuturor resurselor calculate pentru a constitui şi asigura funcţionarea $F.I_l.U_r.U_n.O_g$ se stabileşte dacă $U_n.O_g.$ dispune de volumul necesar de resurse financiare.

În cazul deţinerii de volumul necesar de resurse financiare, se parcurge la etapa a II-a de constituire a $F.I_l.U_r.U_n.O_g$ – de proiectare.

În cadrul acestei etape se efectuează următoarele lucrări în următoarea succesiune:

1. determinarea componenţei şi structurii funcţionale a sistemului de gestiune unitar prin stabilirea funcţiilor proprii lui;

2. determinarea componenței și succesiunii soluționării complexelor de probleme pentru fiecare funcție de gestiune;
3. determinarea componenței problemelor proprii fiecărui complex.

Prin efectuarea acestor lucrări are loc descompunerea pe constituanții săi a sistemului de gestiune unitar, schematic prezentată în Fig. 2.

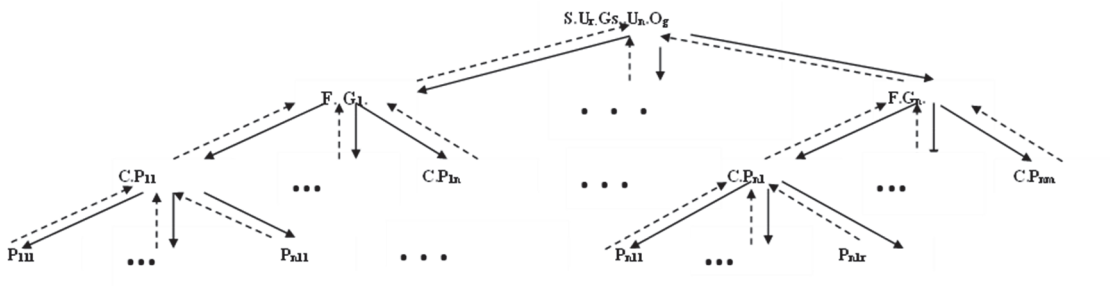

Fig.2. Schema descompunerii, sintetizării și formării resurselor informaționale ale sistemului unitar de gestiune al unității organizatorice (S.UrGs.Un.Og.): ⟶ fluxuri decizionale; ⇢ fluxuri informaționale; **F.G1.,...., F.Gn.** – funcțiile de gestiune ale **S.Ur.Gs.E.**; **C.P11.,...., C.P1n.** – complexe de probleme ale **F.G1.**, **C.Pn1.**, ..., **C.Pnm.** - complexe de probleme ale **F.Gn.**; **P111**, ..., **Pn11** - probleme ale **C.P11**; ....., **Pn11**, ..., **Pn1r** - probleme ale **C.Pn1**.

Prin ea se stabilește componența și structura compartimentului decizional al sistemului de gestiune, care necesită anumite resurse informaționale, ceea ce și constituie conținutul $F.I_l.U_r.U_n.O_g$ Această circumstanță și impune, ca în continuare să fie determinate componența și structura fișierelor de intrare și de ieșire a fiecărei probleme informative economice.

Prin depistarea și raționalizarea conexiunilor informaționale dintre probleme se determină componența și structura resurselor informaționale pentru fiecare complex de probleme.

În continuare, se stabilesc conexiunile informaționale dintre complexele de probleme și, în așa mod, fiind determinate resursele informaționale ale fiecărei funcții de gestiune. În final, prin depistarea și raționalizarea componenței conexiunilor informaționale dintre funcțiile de gestiune, automat se determină compoziția și structura resurselor informaționale ale sistemului de gestiune în ansamblu, ceea și ce și constituie conținutul $F.I_l.U_r.U_n.O_g$

Din cele expuse devine evident că dacă stabilirea conținutului, componenței și structurii funcționale a $S.U_r.G_s.$ economică se produce prin descompunere, fiind orientată de la nivelul superior spre cel inferior, atunci determinarea resurselor informaționale organizate sub formă de $F.I_l.U_r.U_n.O_g$ are loc în direcție opusă – de la nivelul inferior spre cel superior – și nu prin descompunere, dar prin generalizare (sintetizare) a valorilor unităților informaționale.

Efectuarea lucrărilor nominalizate permite de a determina în mod mult mai obiectiv și științific fondat a componenței și conținutului $F.I_l.U_r.$

Însă, pentru a asigura o adecvare mai exactă și o corelare mai reală a sistemului de gestiune și sistemului de informații, e necesar ca concomitent să fie efectuate studiul și analiza sistemului informațional existent. Astfel de abordare se impune din motivul că $F.I_l.U_r.U_n.O_g$ este influențat nu numai de factorul obiectiv, dar și de cel subiectiv. Nu e

exclus ca revizuirea sistemului în funcțiune să fie mai operativă și cu cheltuieli mai reduse, decât elaborarea lui numai conform Fig.2.

Pe lângă aceasta, astfel de studiu și analiză a $S.I_l.$ mai sunt justificate și de posibilitatea de comparare și perfecționare a resurselor informaționale ale subsistemului gestionat real.

La etapa a III –ia - de implementare – se efectuează următoarele lucrări în următoarea succesiune:

1. calcularea volumului (spațiului) de memorie, necesar pentru a repartiza și păstra $F.I_l.U_r.U_n.O_g.$;
2. structurarea și înregistrarea (încărcarea) fișierelor conținutului $F.I_l.U_r.U_n.O_g$;
3. verificarea deplinătății și autenticității conținutului fișierelor de date, înregistrate pe memoria informatică;
4. elaborarea și aplicarea sistemului de protecție, fiabilitate și securitate a datelor $F.I_l.U_r.U_n.O_g.$;
5. elaborarea și probarea schemei tehnologice unitare de implicare a fișierelor de date în procesele de soluționare a fiecărei probleme, complex de probleme, subsistem și sistem informatic al $U_n.O_g$.

În prezent, elaborarea și organizarea resurselor informaționale economice în baza conceptului de $F.I_l.U_r.U_n.O_g$ în mediul real sunt digital realizate preponderent pentru informațiile cu valori relativ constante.

Concluzii

1. Actualmente, sistemele informatice ce operează cu informații massive, structură complexă și compoziție variată, la care prioritar se referă cele economice, acoperă essential insuficient domeniul informational uman.

2. În acest context, la nivel de unitate organizatorică materială (întreprindere, organizație) se atestă realizarea informatică a unor probleme particulare, complexe și partial – a unor subsisteme de probleme informaționale.

3. Concomitent, de pe poziții practice și științifice, tot mai insistent se impune concepția sistemului informatic de realizare în interconexiune și interacțiune nemijlocită toate procesele materiale și informaționale, ceea ce transformă unitatea organizatorică în nucleu material-informațional automat.

4. Ca urmare a situației date, se cere integrarea tuturor resurselor, primar – a celor materiale și informaționale.

5. La baza abordării și realizării a astfel de concepții stă constituirea și funcționarea a așa forme (unități) de organizare a datelor, cum este Fondul Informațional Unitar, care obiectiv și ar repurta nucleul elucidat.

6. Conform celor menționate anterior, la etapa inițială, de importanță decisivă dispun problemele concepției, evoluției, necesității, compoziției și în plan general - a determinării etapelor de creare și funcționare a Fondului dat.

7. La moment, traducerea în viață a principiilor, formularea și respectarea strictă a criteriilor de organizare a datelor ca Fond Unitar practic este ireală. Însă, având în vedere evoluția galopantă a celorlalte resurse informatice, essential – a celor tehnice, de caracterul inovativ și de abordare conceptuală a evenimentelor de orice domeniu științific, obiectiv e necesar permanent de ținut cont și de condus de ele în practică și teorie.

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Some aspects of Software Applications for Incident Analysis

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Abstract: Incident management can improve the quality of IT services by identifying the recurring incidents and logging problem tickets to identify the root cause of the incident/ incidents. If there is any recent incident with no resolution, then a problem ticket is created to identify the root cause and fix it. By identifying the recurring incidents and their associated CI's, availability management or capacity management or information security management, or continuity management can redefine or revise the respective plans and procedures to improve the delivery of services.
Goal: The prime goal of incident management is to resolve incidents either with temp fix or perm fix and bring back the IT service. Resolving the incidents firstly requires registering the incident in the ITSM tool with a unique reference number. Categorization of the incident is done based on hardware, software, etc., and then the incident is assigned to the appropriate team or a person to take quick action. The investigation and diagnosis are made. The resolution is implemented by searching knowledge articles or reference materials or KEDB, and once the issue is resolved, the incident is closed.
Design / methodology / approach: This process is focused on returning the performance of your organization's services to normal as quickly as possible. Ideally, in a way that has little to no negative impact on your core business. This means incidents sometimes rely on temporary workarounds, while you identify the root problem of an incident afterwards.
Finding: No modern system would be truly keeping up with technology if it did not utilize machine learning and AI to continuously improve upon itself, and IMS is no exception.
Limitations / implications of the research: Even though "incidents" may have a negative tone, they do not have to interrupt or shut down your operations. By implementing an incident management system, you empower your enterprise to prepare for the inevitable incidents that will come — and ensure the team can swiftly and effectively remedy any situation.
Practical implications: Help desk and incident management teams rely on a mix of tools to resolve incidents, including monitoring tools to gather operations data, root cause analysis systems, incident

management and automation platforms, and other support products.

The value:

- **Guide and build**: Incorporate autonomous decision-making and consistence culture among teams in identifying, managing and learning from incidents. There will not always be a clear answer, but guiding and building together can move the process along more effectively.
- **Align teams**: Develop an understanding of which attitude is appropriate for each aspect of incident identification, resolution and reflection.
- **Detect**: Continuously monitor and attend to incidents before customers discover them, as issues can be resolved before becoming incidents.
- **Respond**: "Don't hesitate to escalate." It is better to bring awareness of a potential incident even if it does not affect everyone than to stay silent.
- **Recover**: Service will go down time to time uncontrollably; this is understood as long as the incident is resolved as quickly and efficiently as possible.
- **Learn**: In reference to the value above, mistakes or accidents will occur but proper accountability and gained knowledge from those situations can improve for better delivery of service.
- **Improve**: Break down the incident, starting from the exact root cause to the necessary and strategic actions in preventing or reducing the chance of the incident occurring again. Set dates for those actions.

Introduction

IT incident - what is it in simple words?

An IT incident is a technical disruption to a workflow or, in simple terms, an event that is not part of the normal operation of an IT infrastructure. A technical incident can be any incident that has an impact on hardware and software. For example, lack of free space on the hard drive of a work laptop and data leakage with the disclosure of confidential information are IT incidents, but with varying degrees of significance for the enterprise. Incident management strategy (ITSM - IT Service Management, IT service management) is called upon to correct the situation and return everything to normal.

Examples of incidents in the IT field

- Unauthorized access, use, disclosure, modification or destruction of information.
- Interference with information technology (intentional or accidental).
- Violation of policies, laws or regulations relating to IT infrastructure.
- Failure of equipment and software due to various circumstances (force majeure or predictable).
- Identification of deviations and shortcomings in the functionality of hardware and software.

Defining, Prioritizing and Classifying an Incident

An IT incident is typically defined as an unplanned interruption or reduction in the quality of an IT service. Although prioritization of incidents can vary from organization to organization, incident priority is typically determined by two factors:

1. Impact, or degree of failure, and how many end users does the incident affect.

2. Urgency, or the importance of the services affected, relative to the mission of the organization.

Impact and urgency are also influenced by many different factors including:

- Customer or business need
- Financial impact
- Service criticality
- Business risk

- Component failure impact analysis
- Legal requirements
- Et cetera.

Incidents are also typically divided into two buckets:

- Normal Incidents: A scenario in which we have a disruption in context of a service definition such as a SLA. Most, but not all, impact users. Some normal incidents, such as failures that trigger redundancies, do not impact users directly but should be resolved before they do.
- Resolvers work through normal incident management in linear steps: logging, categorization, prioritization, initial diagnosis, escalation, investigation and diagnosis, resolution and recovery, and closure.
- Major Incidents: Incidents have a large, impactful effect on the organization, or have time constraints are defined as major incidents. Working through major incidents involves case management workflows as opposed to linear steps, meaning hypothesis testing and probing through experimentation.

Systems should be categorized by importance and have SLAs around how long they can be unavailable before escalation. Impact and urgency will determine if normal incident or major incident processes are followed, and when SLAs exceeded, the organization has run out of time for experimentation and must move onto the IT service continuity / disaster recovery plan.

Incident Management Roles and Responsibilities

Because the different levels of incident management trigger different processes for response, it is critical to define roles and responsibilities for execution. These roles and responsibilities define who will drive process improvement, report key performance indicators (KPIs), and execute and enforce process workflow. They also define lines of communication between the IT team, the rest of the organization, vendors, and third parties.

Improving IT Incident Management

Minimizing the effects of service interruptions has a direct effect on a business's bottom line. The cost of downtime in businesses can be astronomical. According to Everbridge's State of IT Incident Management Report, the average cost per minute of an unplanned downtime is $8,662 US, which represents more than half a million dollars per hour. In the event of an IT incident, our research has shown that it takes IT organizations an average of 27 minutes, maxing out at 150 minutes in some cases, to assemble the response team. By automating this process, organizations are able to engage the response team in 5 minutes or less, minimizing the negative impacts of an incident and reducing the overall incident management timespan. In the midst of a crisis, there is no time to hunt for the right people or write the message language. IT Service Alerting tools, as defined by Gartner, can reduce "mean time to respond" by automating the manual process typically associated with the response process.

Support staff responsible for managing a critical incident should have the ability to:

- Contact the appropriate teams for any given incident
- Contact those who are on call without hunting for the information
- Immediately start a technical conference bridge with the right people
- Inform the stakeholders and business management
- Notify key customers and impacted users
- Send messaging that is compliant with HIPAA and other regulations
- Apply remedial actions according to predetermined, automated workflows

What are the benefits?

In short, the benefits of Call Management include:

- Improved efficiency and productivity. Your service desk agents use the same process for

handling each incident. This takes away any guesswork.

- More visibility and transparency. By handling incidents according to this process, callers know what's happening to their tickets and when.
- Higher level of service quality. Your agents won't lose track of tickets in a mailbox or pile of post-its again. Agents can also easily prioritize tickets, so the most critical incidents are picked up first. This gives your organization's callers more certainty about the continuity of your (IT) services.
- More insight into service quality. You actively register all incidents in your Incident Management software. As a result, your organization gains valuable insights via monitoring and reporting. For instance, which type of printer gives your callers the most trouble? Or which type of incidents repeatedly aren't resolved on time?
- Meeting SLAs. The Ticketing Management process gives you more insight into your SLAs. And whether you're meeting them. This gives you the opportunity to take action where needed.

Conclusion

In a perfect world, everything would run smoothly, and there would be no such occurrence of incidents. However, the real world has proven endless times that it hides nothing from the possibility of problems happening now and then. With that said, it is important to identify the cause of incidents, develop consistent procedure to resolve among dedicated teams, plan actions that can reduce or prevent re-occurrence, and learn from each one to tackle those situations accordingly.

Abstracts

George I Mihalas

Sonic Representation of Data. Medical Applications of Sonography

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Abstract

Sonification is defined as non-speech audio to convey information or perceptualize data. The scope of sonification is to add supplementary information to that obtained by other methods or replace visualization in certain conditions – for visually impaired or when the visual system is engaged in other tasks (during driving or surgery etc).

Methods. Sonification is formally represented as a function with data space as definition domain and sound space as value domain. The central paradigm of sonification is to define this function. There are several methods to do it; the most common class of methods is the "parameter mapping". Our approach – the "three levels method" – is defined according to the potential values in the sound space: *acoustic level* (A) with continuous spectrum of frequencies and durations, *sonic level* (S) with discrete spectrum of frequencies and durations and *musical level* (M) which adds rhythm and harmony. **Materials**. As input data we have used various biomedical data: biosignals (ECG, pulse wave, heart rate, oxygen saturation), either from our own recordings or from Physiobank data base, as well as molecular sequences (DNA, protein) from NCBI database. **Software**. We have developed a set of programs using MATLAB or PYTHON platforms. Special tools (tempolenses) were also developed for compressing or dilating the original signal.

Results. A library with sonic S-level transformation of various signals and molecular sequences was created. For each signal several parameter mapping schemes were applied in order to select the optimal set for potential practical applications. A study concerning the capacity to recognize or memorize specific types of signals (corresponding to certain physiological or pathological states) was also performed.

Discussions. Like any new system dedicated to capture information, a supervised learning period is necessary. The discriminant power was acceptable for only some ECGs, but was high for the heart rate, both during exercise or for some pathological states (all types of arrhythmias). The user acceptance is limited to some procedures where the training period is short or for specific applications when visualizations is not applicable.

Conclusions. Sonification is a new method with high applicability potential in healthcare, still insufficiently explored. Worth to mention that it is not aimed to replace other ways to represent information (text, visualization) but to supplement them. And we can also add that the musical level (still underdeveloped) can bring new dimensions, being more appropriate for association with the diversity of human physiological or pathological conditions.

Abstract in Romanian: Reprezentarea Sonoră a Datelor. Aplicațiile Medicale ale Sonografiei

Abstract: Sonificarea este definită ca reprezentare audio nonverbală a informației pentru perceptualizarea datelor. Scopul sonificării este de a adăuga informații suplimentare celor obținute prin alte metode sau înlocuirea vizualizării în anumite condiții – pentru cei cu deficiențe de vedere sau când sistemul vizual ocupat (în timpul conducerii mașinii sau în operații chirurgicale etc).

Metode. Sonificarea este formal reprezentată ca o funcție cu spațiul datelor ca domeniu de definiție și spațiul sonor ca domeniu de valori. Paradigma centrală a sonificării este definirea acestei funcții. S-au propus mai multe metode; cea mai comună clasă de metode este „mappingul parametrilor". Abordarea noastră – „metoda celor trei nivele" – este definită conform valorilor posibile în spațiul sonor: *nivelul acustic* (A) cu un spectru continuu al frecvențelor și duratelor, *nivelul sonic* (S) cu un spectru discret pentru frecvențe și durate și *nivelul muzical* (M) care adaugă ritm și armonie. Materiale. Ca date de intrare am folosit diferite date biomedicale: biosemnale (ECG, unda de puls, frecvența cardiacă, saturația de oxigen) fie din înregistrări proprii fie din baza de date Physiobank, precum și secvențe moleculare (ADN, proteine) din baza de date NCBI. Software. Am dezvoltat un set de programe în MATLAB sau PYTHON. Am dezvoltat și instrumente speciale (lentile temporale) pentru comprimarea sau dilatarea semnalelor originale.

Rezultate. Am creat o bibliotecă cu transformări sonice nivel S ale unor diferite semnale sau secvențe moleculare. Pentru fiecare semnal am aplicat mai multe scheme de mapping a parametrilor pentru a selecta un set optim pentru aplicații practice. Am efectuat și un studiu privind capacitatea de recunoaștere sau memorare a unor tipuri de semnale (corespunzătoare unor anumite stări fiziologice sau patologice).

Discuții. Ca pentru orice sistem de captare a informației, este necesară o perioadă de învățare supervizată. Puterea de discriminare a fost acceptabilă pentru unele semnale ECG dar a fost ridicată pentru frecvența cardiacă, atât în timpul probei de efort cât și pentru anumite patologii (tot felul de aritmii). Nivelul de acceptare al utilizatorilor este limitat la anumite proceduri cu perioade scurte de învățare sau pentru aplicații în care nu se poate aplica vizualizarea.

Concluzii. Sonificarea este o metodă nouă, încă insuficient explorată, dar cu potențial ridicat de aplicare în medicină. Ea nu își propune să înlocuiască alte moduri de reprezentare a datelor (text, vizualizare) ci să le suplimenteze. Adăugăm și că nivelul muzical (încă subdezvoltat) poate aduce noi dimensiuni, fiind mai potrivit pentru reprezentarea stărilor specific umane.

From Smart City to Smart Citizen. ICT Innovation for Improving Life in Contemporary Cities.

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In a nutshell, a smart or intelligent city is that where the citizens are provided good quality digital services through efficient ICT solutions. The concept involves urban planning, public services, culture, sports, leisure. But how can administrations turn a city into a smart one? The experience of the multidisciplinary teams that developed smart city strategies revealed several important lessons: the key issues for developing integrated systems of smart city tools are: accessibility, interoperability and ease of use; all citizens' problems must be addressed; efficiency must be followed at all times. Cities can reach their full potential if the focus is on: data, health, education, and cyber security. But it takes time (and money) for a city to become smart. Some cities have created their own concept of "smart city" – there are numerous examples, such as Barcelona, Dublin, Vienna, Leuven, Tallinn, or Tartu. Digitalization depends on the context, and different strategies must be designed according to the local realities, considering every aspect – from legislation to culture. The common denominator of all the successful cases appears to be the trust in progress and the new technologies. Innovation is needed to add value and improve life in our cities. Our paper presents several solution proposed by the master students of the study programme "Informatics Applied in Science and Technology", organized by the Faculty of Sciences, "Vasile Alecsandri" University of Bacău, Romania. The challenge addressed to the students was formulated as follows: How can we shift from "smart city" to "smart citizen" and how can we bring the ICT solutions close to the citizen, so that they can benefit from and have access to data. The students proved to be creative and with a sustainable view: they proposed solutions for the cities of the future.

Acknowledgment: Present research was evaluated under the guide and with the support of COST CA19136: NET4Age-Friendly the main aim and objective of which is to establish an international and interdisciplinary network of researchers from all sectors to foster awareness, and to support the creation and implementation of smart, healthy indoor and outdoor environments for present and future generations. The results will contribute to solving problems and actions carried out within the COST CA 16226, Indoor living space improvement: Smart

Process mapping to integrate an innovative tool in the prescription of adapted physical activity.

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Abstract

Description of the methodological approach used in the process of integrating a digital platform for the prescription of adapted physical activity (AFA) of the AFA programme into the current service delivery context. This innovative tool was initiated in the FP7 funded European project Personalised ICT Supported Service for Independent Living and Active Ageing (PERSSILAA), which aimed at the screening and prevention of frailty in community-dwelling older adults. Four dimensions (physical, cognitive, nutritional and social) were taken into account in the assessment of the health status of older people, and targeted interventions were implemented to improve their quality of life. The development and scale-up of the innovative solution took place within the framework of the twinning activities between the Reference Sites of the European Partnership for Innovation on Healthy and Active Ageing in Twente (The Netherlands) and Campania (Italy).

Design/methodology/approach: We carried out an organizational process mapping including the identification of the key points for the integration of the innovative solution in the current service delivery context. Process mapping implies an analysis of the characteristics of services associated with the pathologies most frequently occurring in older people. Active workflows and possible interdependencies between health and prevention services. Especially from the perspective of frailty prevention, it is necessary to identify actions that can be integrated. Screening activities are functional to the creation of an integrated, multidisciplinary and multidimensional system that is able to customize the prescription of adapted physical activity in a more precise and effective way. In this way the digital platform will be able to manage data and process information useful for both professionals and patients.

Findings: Rehabilitation and secondary prevention programmes are recognized as an integral part of many patients' treatment pathways, and are therefore recommended as useful, safe and effective tools to improve patients' symptoms, functional capacity and quality of life. The development of remote rehabilitation tools allows patients to perform the exercises prescribed by the rehabilitation physician at home, through a web-based platform that also allows the healthcare professional to monitor the patient's adherence to treatment. Currently, following the discharge from the rehabilitation therapy there is no standardized approach to ensure that physical activity regimens are personalized upon individual functional capacity. Despite experiences supporting the effectiveness of digitally supported Adapted Physical Activity customized to specific patients needs are currently available, their large scale uptake has not been implemented yet. The present research provides an overview of the bottlenecks hindering implementation in a specific setting,

such as mainly represented by the lack of digital literacy for the elderly population, organisational gaps, technological gaps involving interoperability, and the lack of training of healthcare professionals in the management of these innovative solutions.

Research limitations/implications: The limitations of this research are due to the current fragmentation of data and the processes and flows in which they are produced. This causes a difficulty in exploitation towards other areas and services where this approach could be used. In fact, this problem results in limited scale-up, particularly because it prevents involvement of patients with heterogeneous diseases. The development of this research will therefore be oriented towards improving the outcomes of services related to new digital solutions. At the same time, it will identify possible solutions to build a model organized through integrated and multidisciplinary processes that allow scale-up to a much larger audience of patients.

Practical implications: Facilitating the process of integration of innovative mobile health solutions in current service provision.

Originality/value: Our approach might also be applied to enable the use of digital solutions such as telemedicine and teleconsultation. Considering the increase in the elderly population, and the need to manage sustainably health threats such as the Covid-19 pandemic, may bring benefits in terms of overall health outcomes, quality of life and improved sustainability of health service provision.

Intergenerational family solidarity

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Relations between generations in a family can be complicated. How connected do you feel to those older and younger than you? The dimensions of 'intergenerational solidarity 'below can help you consider how the bonds in your family work. Intergenerational solidarity refers to the degree of closeness and support between different generations. The notion of solidarity helps us to understand how people of different generations relate to, help and depend on one another in their daily lives. In the video, we look at the different dimensions of intergenerational family cohesion.

Keywords: Structural solidarity, Associational solidarity, Affectual solidarity, Consensual solidarity, Functional solidarity, Normative solidarity

Structural solidarity: This means how factors like geographical distance can constrain or enhance interaction between family members. It is easier to give and receive help, care and support if family members live near one another, but new technologies, such as Skype, can aid communication between family members who live far from one another.

Associational solidarity: This dimension refers to the frequency of social contact and shared activities between family members. Some adults visit their parents very frequently, others less often.

Affectual solidarity: Solidarity can manifest itself in feelings of emotional closeness, affirmation, and intimacy between family members, also known as affectual solidarity. Some ageing parents and their adult children declare that they are very close to each other; others feel more distant.

Consensual solidarity: Family members have different levels of actual or perceived agreement in opinions, values, and lifestyles. For instance, the family members might all vote for the same party or believe in a similar ideology. In other cases, parents and their children might have very different opinions on issues, for instance, same-sex marriage.

Functional solidarity: Exchanges of practical and financial assistance and support between family members are examples of functional solidarity. Examples of functional solidarity are gifts of money but also very practical things such as buying groceries, preparing meals, allowing family members to move in with you, or looking after their care needs. Older family members can be both beneficiaries and sources of functional solidarity. For instance, some look after their grandchildren; others receive visits from their children to help with household tasks.

Normative solidarity: Normative solidarity refers to the strength of obligation felt towards other family members. In some families, there is a strong belief in the need for and importance of family cohesion and assistance between family members; in others, family members consider that it is quite acceptable for them to feel and to be very independent of each other.

Acknowledgment: Present research was evaluated under the guide and with the support of COST CA19136: NET4Age-Friendly the main aim and objective of which is to establish an international and interdisciplinary network of researchers from all sectors to foster awareness, and to support the creation and implementation of smart, healthy indoor and outdoor environments for present and future generations. The results will contribute to solving problems and actions carried out within the COST CA 16226, Indoor living space improvement: Smart Habitat for the Elderly (SHELD-ON), this way creating a better society for everybody.

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Analiza funcționalităților dispozitivelor inteligente

Anatolie PRODAN[1], BS Student, Vasile TACIC[2], BS Student, Adriana CATRUC[3], lector universitar, *Analiza funcționalităților dispozitivelor inteligente,* ASEM, Chișinău,
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Abstract: Progresul tehnologiilor moderne este cu adevărat impresionant. Casa inteligentă nu este încă departe mâine, ci chiar lucru care este aproape astăzi. Majoritatea companiilor mari au realizat proiecte pentru construirea de case inteligente în ultimul deceniu. Cu toate acestea, pentru ca o casă inteligentă să devină realitate, trebuie mai întâi să reconstruim conștiința proprie. Una dintre cele mai importante caracteristici care permite să facem distincția "casei inteligente" este organizarea eficientă a spațiului de locuit. Prin implementarea celui mai eficient concept de interacțiune între om și casă, putem organiza și implementa în casă un mediu optim. În "casa inteligentă" omul cu ajutorul micilor impulsuri este capabil să monitorizeze tehnica din jur care va determina nevoile individuale ale omului

Cuvinte-cheie: Smart-Home, Casă inteligentă, Internet of Things, Robotizare, Sistem.

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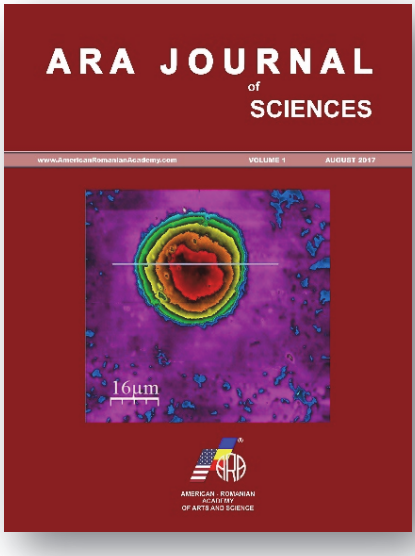

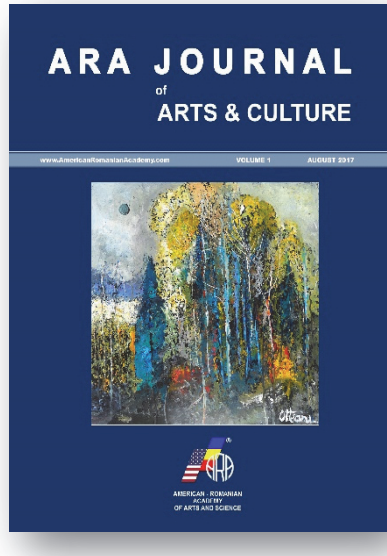

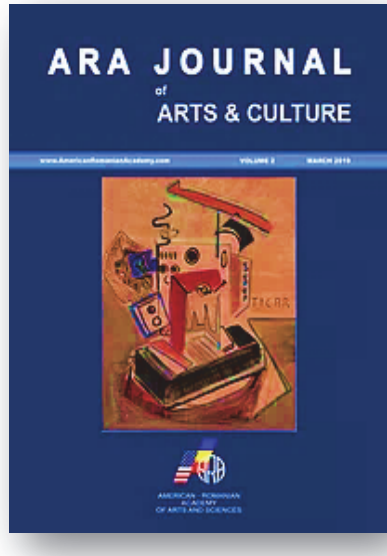

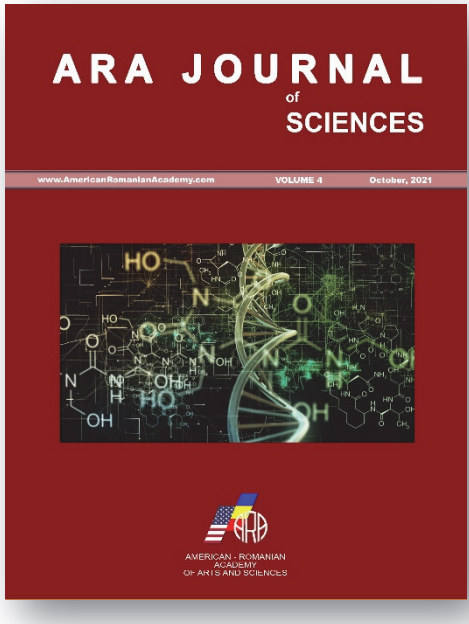
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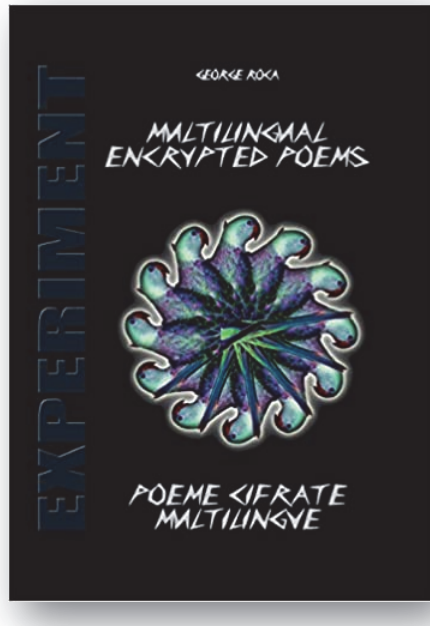
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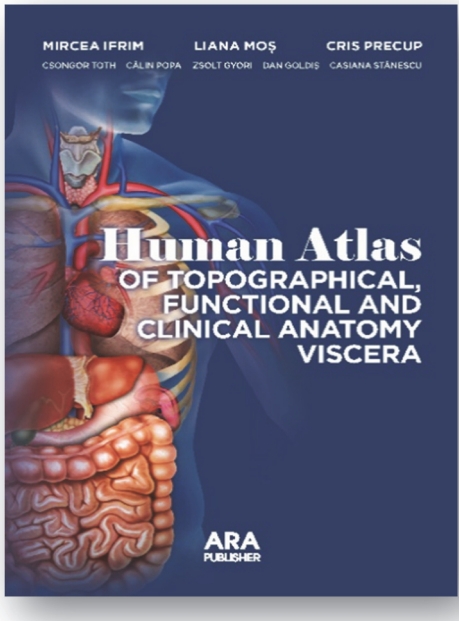
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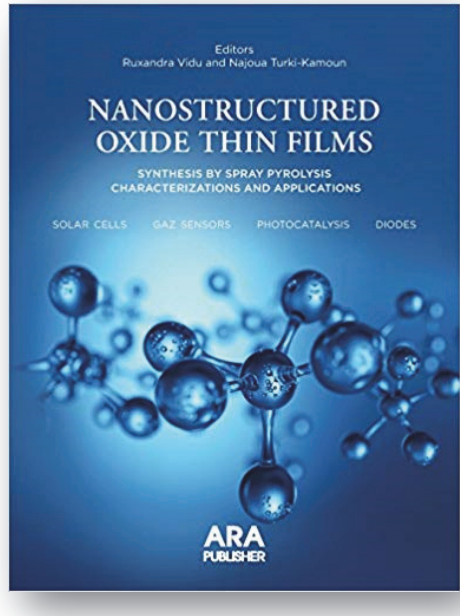
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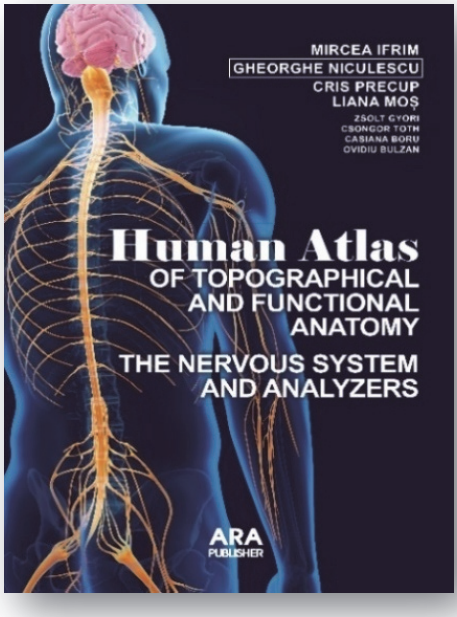
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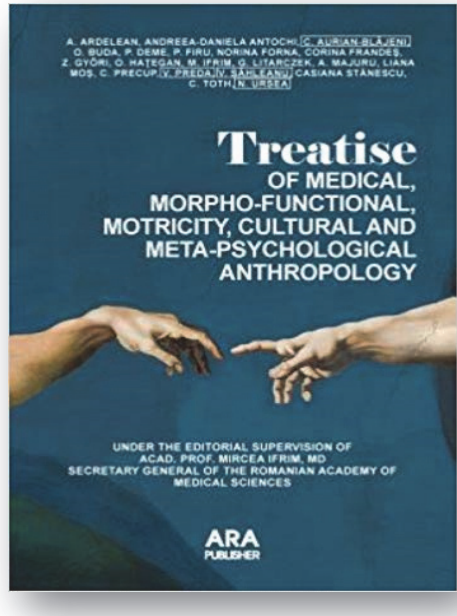
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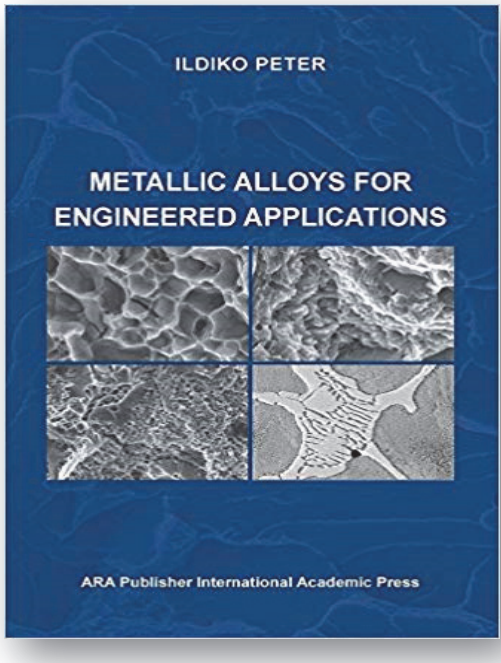

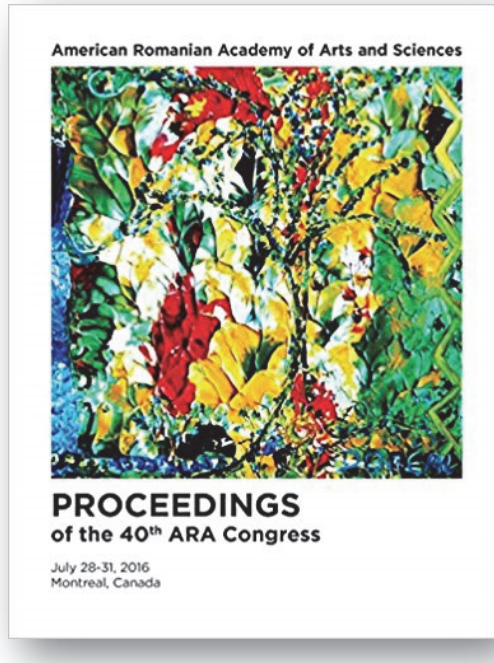

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