

**INTELLIGENCE AND SECURITY
IN THE 21ST CENTURY**

THE INTEGRATION OF EMERGING TECHNOLOGIES INTO INNOVATIVE SMART NATION PROJECTS AND SOLUTIONS

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Abstract:

In the current circumstances of accelerated technological and economic evolution, the success of nations depends on the level of education in their society, as well as its imminent consequences, such as the performance of human capital revealed by the efficiency of innovative solutions adopted to understand and address community issues with the aim of increasing social welfare. To achieve this goal, it is necessary to integrate and exploit emerging technologies (such as Artificial Intelligence, Virtual Reality etc.) in innovative Smart Nation projects adopted in the fields of education and research, as well as in areas that focus on solving and optimizing issues in other community services. Using literature review research methodology, this research argues that Romania, with its historical commitment to impactful projects such as Smart Nation (i.e. Spiru Haret's "education reforms" and Dimitrie Gusti's "Science of the Nation"), stands poised to leverage its competitive edge in implementing contemporary initiatives.

Today, for the successful adoption of Smart Nation projects and solutions, it is necessary for government and private entities to generate multidisciplinary collaboration platforms that use and exploit technological advancements to achieve two main objectives.

Thus, Smart Nation projects and solutions would ensure the functions of accumulating, generating, and disseminating knowledge and innovation (technological and social), with the aim of developing human capital and translating these strategic advantages (knowledge, innovation, human capital) into innovative products and services for understanding and solving societal issues, ultimately contributing to the increase of community welfare.

Keywords: *Smart Nation, Artificial Intelligence, human capital, innovation, network analysis, education.*

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Introduction

In the current circumstances of accelerated technological and economic evolution, the success of nations depends on the level of their education, as well as on the immediate consequences, such as the performance of human capital revealed by the degree of efficiency of innovative solutions adopted in order to understand and solve community problems with the aim to increase social welfare. In this article it is argued that in order to achieve this objective, it is necessary to integrate and exploit emerging technologies (such as Artificial Intelligence, Virtual Reality, Augmented Reality, Quantum Computing, etc.) in projects and innovative Smart Nation solutions adopted in the area of education and research, as well as in the fields aimed at solving and optimizing the problems of other community services.

Romania has a tradition of adopting projects with community impact as Smart Nation through the contributions of Spiru Haret "education reforms" and Dimitrie Gusti "Science of the Nation". Using literature review research methodology, this paper sets out to show that these historical contributions could be a competitive advantage in the implementation of current Smart Nation projects and solutions, whose implementation efficiency and generation of desirable effects at the community level would depend on the degree of exploitation of the capabilities available to emerging technologies.

Today, for the implementation of Smart Nation projects and solutions, it is necessary for governmental and private entities to generate multidisciplinary collaboration platforms (innovative ecosystems) that use and exploit the technological advance to achieve two objectives. First of all, for administrative purposes (as for the use of emerging technologies), in order to stimulate and integrate the innovative contributions of the participants willing to get involved in processes of understanding and solving community problems (from education and other fields). Secondly, for innovative purposes, for the exploitation of disruptive technologies by the social entities participating in the projects, by capitalizing on the capabilities of emerging technologies in order to streamline the processes of research, discovery, invention and production of services and innovative entrepreneurial products for solving community problems.

Thus, Smart Nation projects and solutions would ensure the functions of accumulation, generation and dissemination of knowledge and innovation (technological and social), in order to develop human capital and transpose these strategic advantages (knowledge, innovation, human capital) into innovative products and services of understanding and solving society's problems with the aim of increasing community well-being.

The usefulness of emerging technologies within educational processes and the development of innovative solutions

In the current context of international relations characterized by accelerated competitiveness, the success of nations depends above all on the level of development of the communities' learning and adaptation skills (Hellvig, 2023), essential elements of the accumulation of knowledge and the habit of advancing knowledge with effects in acquiring some strategic advantages in the competitive context of international relations.

To strengthen the capacities of learning and adaptation at the community level, after the Second World War, and especially during the last years, nations such as the United States of America¹, Sweden²,

¹ The National Science Foundation Project (Roosevelt, 1945), "After World War II, Vannevar Bush proposed the creation of a national research foundation to finance scientific research and develop national science policy. This proposal led to the creation of the National Science Foundation (NSF) in 1950. The inspiration for the creation of the NSF also included an answer given to President Roosevelt to four questions raised by him: 3) What should the government do now and in the future to support research activities through public and private organizations; 4) Can a concrete program be proposed for the discovery and development of scientific talent for young Americans so that we achieve the continuity of scientific research at a level comparable to that during the war?" text taken from (Sebe, 2010, 282)"; and the Smart Nation Project exploiting open sources to create the opportunity for citizens to participate in decision-making processes aimed at understanding and solving problems of community impact (Steele, 1996).

² Dedijer's project, to implement a national intelligence system based on the exploitation of open sources to obtain strategic advantages. He believed that innovation is more likely to occur in open environments, encouraging interaction between researchers (basic research) and companies (applied research) (Dedijer, 1994).

Great Britain³ or Singapore⁴ have adopted Smart Nation⁵ projects, through which they oriented their efforts for the accumulation, generation and diffusion of knowledge and innovation (technological and social), in order to develop human capital and transpose these strategic advantages (knowledge, innovation, human capital) into innovative solutions to solve society's problems with the aim of increasing community well-being.

In the 19th–20th centuries, through the “education reforms” project adopted by Spiru Haret and the “Science of the Nation” project conceived by Dimitrie Gusti, Romania made progress in the accumulation, generation and dissemination of strategic advantages, knowledge and innovation respectively, considered resources for human capital development and innovative solutions to solve society's problems in order to increase community well-being.

In the global context marked by a new technological revolution induced by cycles of innovation characterized by the emergence of disruptive/emerging technologies such as Blockchain, 5G, 6G, Big Data, Crowdsourcing, Data science, Internet of Things, Artificial Intelligence (IA), Virtual Reality, Augmented Reality, Quantum Computing, etc., in order to gain competitive advantages and increase social well-being, Romania needs to direct strategic efforts towards the adoption of Smart Nation type projects and associated technological solutions.

The adoption of Smart Nation projects and solutions means the exploitation of emerging technologies linked to open and official sources for the development of innovative products and services to improve the decision-making process aimed at understanding and solving community problems, including supporting the public function of training (education) and modelling community that lead to the

³ Through the Alan Turing Institute's Artificial Intelligence for Science and Government (ASG) research programme, the UK government is funding a number of projects using AI technology that exploit open and official sources with the aim of producing those technological solutions that help manage challenges with community impact.

⁴ Technologies based on AI and OSINT exploitation are being developed within the Smart Nation project launched by the authorities in 2014.

⁵ Seen as projects (political and with private interest) with community impact or as integrated or associated innovative technological products and services.

development of human capital (human resource education) with cultural identity status.

In fact, Smart Nation projects and solutions represent multidisciplinary platforms (social ecosystems) for stimulating citizens/social entities to participate in processes of accumulation, generation and dissemination of knowledge⁶ and technological and social innovation, through their contributions to acts⁷ of debate, deliberation, research, discovery and invention, with the aim of developing innovative products and services necessary to increase social well-being.

It is worthwhile highlighting the existing cyclicity in the relationship between Smart Nation projects and solutions and the development of human capital. On one hand, Smart Nation projects and solutions contribute to the education of human resources, and on the other hand, they stimulate human capital to participate in the development of high-performance innovative products and services, aiming at the transposition of these strategic advantages (knowledge, human capital, and innovation) in innovative products and services.

Therefore, the cycle specific to the Smart Nation paradigm integrates processes such as “emerging technologies (AI, OSINT, etc.) – accumulation, generation and diffusion – knowledge, innovation – education, shaping human capital” in order to understand and solve community problems (including in the area of education, in the sense of human capital development), through innovative products and services, with effects in supporting social well-being.

The main objective of the current research is to identify the main Smart Nation policies and solutions, both from Romania and from other countries, in order to argue the need to adopt Smart Nation policies and solutions against the backdrop of the new disruptive technological context and to present the main advantage that appears as an effect of these policies and solutions implementation, by exploiting emerging technologies, respectively improving the quality of life.

⁶ Implicitly of the knowledge that respects the criteria of conservation of identity cultural values.

⁷ Which also involves the consultation, distribution and deepening of information not reduced to entertainment, as well as the training/orientation in an ethical spirit of public opinion.

The hypothesis associated with the objective refers to the idea that Romania can acquire a competitive advantage in order to obtain the positive effects of the adoption of Smart Nation policies, by exploiting disruptive emerging technologies, respectively improving the quality of life, if the successive cycles of contributions in which the Smart Nation policies fundamentally participated, formulated in the past by Haret and Gusti.

In order to fulfil the objective of this work and test the hypothesis, the literature review⁸ research methodology is applied with the aim of exploiting the main advantages that refer to the integration of data from several research fields to be subjected to a critical analysis, a fact that allows the creation of an overall transdisciplinary perspective on Smart Nation policies and solutions. As a result, this approach allows the formulation of interdisciplinary and integrative research questions, objectives and hypotheses.

By choosing the literature review research methodology, it becomes possible to form a comprehensive understanding of the meaning and advantages of adopting Smart Nation policies and solutions by different states (e.g. USA, Great Britain, Singapore, Romania). Likewise, another strength of the choice of this methodology is the possibility of formulating an evolutionary perspective, considering that the cited authors (e.g. Steele, Dedijer, Deway, Bush, Gusti, Haret) and the Smart Nation analysed policies were adopted in different historical eras and in different conditions of socio-economic and technological development.

Presentation of the fundamental characteristics of the Smart Nation concept

The fundamental characteristics of the Smart Nation projects and the technological solutions associated with this mechanism of social influence result, both from the theoretical contribution of some authors

⁸ "A literature review can broadly be described as a more or less systematic way of collecting and synthesizing previous research" (Baumeister & Leary, 1997; Tranfield, Denyer, & Smart, 2003). "An effective and well-conducted review as a research method creates a firm foundation for advancing knowledge and facilitating theory development." (Webster & Watson, 2002)

to define the concept, and from the practical application of some holistic projects administered centrally at the government level.

The definitions of “Smart Nation” (Robert David Steele-Vivas), “Science of the Nation” (Dimitrie Gusti) and the associated concept “Social intelligence”⁹ (Stevan Dedijer, John Dewey) emphasize a common idea, that of the importance of accumulation, generation and continuous sharing of knowledge and innovation, necessary processes in the act of educating citizens (forming human capital) and community modelling under conditions of ensuring cultural identity security.

An important component of education (human capital development), as a public function exercised through open and official sources and the stimulation of innovation potential (translated into the development of innovative technological solutions), is the continuous exchange (diffusion) of information, not reduced to entertainment, carried out between contributors¹⁰, whose interaction forms networks of participants that facilitate the diffusion of knowledge.

Such an innovative ecosystem increases the chances of a nation’s adaptation by stimulating the potential for innovation, as well as the chances of accessing and using disruptive technologies to create strategic advantages.

- Stevan Dedijer (1982) and Dedijer & Svensson (1994) defines social intelligence as the general ability of a social system that anticipates, learns, manages and adapts to the environment and its rapid changes, with the aim of ensuring security and evolution.
- John Dewey approaches from an academic perspective the main function of the concept, namely the education of human resources, considering social intelligence as a mechanism for

⁹ It is a similar concept to that of Smart Nation, which shows the importance of training and empowering citizens to participate in social processes with the aim of increasing the welfare of the society, an aspect compatible with the fundamental democratic process of participation of “citizens in the life of the city”.

¹⁰ Governmental, private, non-governmental entities or citizens participating in the collection, production and use or consumption of intelligence, turned into a resource that confers competitive advantage through identity, values, potential for social innovation and the integration of intelligence into social processes that bring well-being (Sebe, 2010).

preparing citizens through learning processes in universities, as a continuous flow for ensuring the future generation of human capital (Sebe, 2010).

- Dimitrie Gusti considered that at the centre of the approach regarding the concept of the “science of the nation” is the social mechanism of social learning for the production and dissemination of information and knowledge throughout society, making the academic field responsible for the generation of knowledge through which the human resource is educated (Rus, 2018).
- To survive in the 21st century, every nation must become a “Smart Nation” and involve all its citizens – it is necessary for every citizen to collect, produce and consume information, to form a “Virtual Intelligence Community” (Steele, 1996)

Apart from the functions of education and community modelling, emphasized in the definition of the Smart Nation concept, another representative fundamental criteria is the multidisciplinary character, diversity, respectively polyvalence and pluralism, of the participating (contributing) entities that accumulate, generate and disseminate knowledge¹¹ at the level of society (governmental organizations, private institutions, non-governmental entities, citizens, etc.; with activity in the area of education or in the entrepreneurial environment, political or cultural elites, etc.).

- Dedijer (1982) characterizes social intelligence as a process governed by state or private organizations, to which citizens can also contribute. Among these participants, political elites are responsible for administering (initiating, sustaining and developing) social intelligence within society. Also, another important contribution is made by the multinational companies that initiate and develop specific social intelligence processes on the territory of the host states.
- Dewey (1930) emphasizes the importance of civic responsibility, supporting the need to educate the citizen in the direction of involvement in public policies.

¹¹ Consonant with the values of the cultural contribution space.

Regarding the methods and means of the processes of accumulation, generation and diffusion of knowledge and innovation with educational and community modelling effects, from the primary analysis of the description of the current Smart Nation type mechanisms, implemented in the full age of knowledge, which is characterized by the integration of disruptive technologies, such as AI, with official and open sources, such as the virtual environment not reduced to entertainment (e.g.: Great Britain¹², Singapore¹³, Romania¹⁴), the following changes are identified since the launch of the above-mentioned definitions:

- private¹⁵ and non-governmental entities have a greater contribution than in the past, in the processes of accumulation and generation of knowledge and innovation (by which the acquisition of the advance in knowledge in a more congested competitive context is sought);
- the means of generating knowledge and innovation are more diversified, producing faster, more information per unit of time, being anchored in the current technological advance;
- the means of disseminating knowledge and innovation are faster and allow the adoption of more strategies for spreading information, along with the development of new virtual means, especially through online social networks.

¹² Ex: the project that integrates AI – Raptory.

¹³ Ex: the project that integrates AI – CrowdTaskSG.

¹⁴ Ex: the project that integrates AI – ION.

¹⁵ Daniel David argues in the intervention at the Conference “(Re)awakening Romania: A country plan, now!” about “Romania’s human capital from the perspective of a country plan”, that not only the academic environment forms the human resource, but several entities, and the role of universities may soon become a complementary one in certifying the knowledge acquired by graduates. “Amidst the psycho-behavioral changes of hyper-technological people, globally distributed social, cultural and professional networks may acquire pronounced political valences in the future and we may witness an unprecedented surrender of authority of states to the wave of social libertarianism of cybersocietal origins. The growing influence of social networks on political mechanisms can prepare the ground for the affirmation of global economic and technological actors, major universities and research centers, international platforms for strategic analysis and lobbying or non-governmental non-profit organizations, as equal partners of nation-states.” Fictional geopolitical text taken from Niculae Iancu (2023).

It should be highlighted that Smart Nation projects and solutions, by stimulating and attracting citizens/social entities to participate in decision-making processes¹⁶ with community impact, contribute to the maintenance of fundamental democratic processes, of decision-making transparency, good governance and freedom of information for citizens. Thus, compatibility is generated between disruptive technologies as resources of the knowledge society, and the values of democracy.

In the context of the era of knowledge, the application of the Smart Nation paradigm, given that it engages innovative processes (materialized in products and services, including educational ones) that also involve the exercise of mass education and community modelling functions by exploiting emerging technologies and the power of the virtual environment not reduced to entertainment¹⁷, it can become a strategic advantage for managing the challenges of the competitive international environment. This aspect is achievable in the conditions where the exploitation of disruptive technologies results in the accumulation, generation and diffusion of knowledge and innovation, with the assurance of the security of cultural identity type values, necessary for the development of human capital with cultural identity status.

Fundamental steps of Smart Nation

From the primary analysis of the description of Smart Nation type projects and the technological solutions associated with this mechanism of social influence, at least the following 5 fundamental stages (processes) are identified:

- a) awareness of the importance of knowledge and education;

¹⁶ By engaging citizens in processes of accumulation, generation and dissemination of knowledge and innovation, resulting from acts of debate, deliberation, consultation, distribution and deepening of information not reduced to entertainment, as well as research, discovery and invention processes – with the aim of developing innovative products and services ways that would improve the decision-making process aimed to understand and solve community problems (especially in the educational area).

¹⁷ Actions in the virtual environment of producers and users or consumers of information and knowledge have a scalable effect. With the development of the means of information and virtual communication based on the Internet network, data is spread much more easily at the community level.

- b) ensuring the accumulation and generation of knowledge by creating an easy context (innovative ecosystem);
- c) continuous dissemination of information;
- d) representation of information in comprehensible forms (which facilitates the understanding of the message).

a. Awareness of the importance of knowledge and education. Spiru Haret's education reform¹⁸ is a Smart Nation representative project type of the step regarding raising awareness, being a social influence project that started by increasing the level of awareness of the importance of education among social connectors (agents of influence) in the areas of interest, respectively educational and political (Rus, 2018).

In order to increase the chances of success of adopting the reform, networks of social influence were formed (according to the social intelligence paradigm) consisting of contacts at the educational level (high school principals) and at the regional political level (prefects). They played the role of social connectors (brokers) subjects to influence, in order to promote in their circles of belonging (and at the same time of interest), the idea of the importance of education and to create the need to reform education (Haret, 1905).

b. Ensuring the accumulation and generation of knowledge by creating an easy context (innovative ecosystem). As it is shown from the above-mentioned aspects, emerging technologies coupled to open and official sources are tools that can facilitate the exercise of social instruction and innovation by developing social platforms that facilitate the participation of citizens/social entities in processes of accumulation, generation and diffusion of knowledge and innovation, in order to transpose them into innovative services and products to solve social problems. Thus, it is necessary for disruptive technologies to be used to create innovative ecosystems represented by multidisciplinary platforms coupled to open and official sources to create opportunities and the circumstances necessary to stimulate citizens/social entities to participate

¹⁸ This, although it took place at the confluence of the 19th and 20th centuries, left its mark over time on the development of Romanian society, producing added value through the accumulation, generation and diffusion of knowledge and innovation, as well as the development of human capital, from which Romania benefits even today.

in decision-making processes aimed at understanding and solving impactful community problems (including in the educational field).

In order to increase the chances of participation, it is necessary for Smart Nation projects to function as social platforms (ecosystems) for accumulating, integrating and managing the contributions of authorized participants resulting from the organization/administration (in physical/virtual format) of some social events/forums (such as: conferences, forums, courses, innovation hub events, hackathons, spin-off activities, think-thanks, robofest, etc.).

The accumulation of such contributions would inspire the association of participating entities in order to achieve the common goal of developing innovative solutions (entrepreneurial products and services) to solve community problems (with impact including on the educational field, but also on others) by exploiting emerging technologies following the course/the integration of processes such as debate, consultation, deepening and distribution of information not reduced to entertainment. Finally, these stages would stimulate research, discovery, invention and production of innovative entrepreneurial services and products to solve community problems (including in the educational area through social training, training/public opinion orientation in an ethical spirit¹⁹), thus concluding the Smart Nation conceptual cycle.

Thus, a societal dynamic is created around community problems and the innovative acts necessary to improve the decision-making process aimed at understanding and solving them, as well as, in particular, supporting the educational act at the community level. The societal dynamics manifested through the above-mentioned processes accelerates the potential for the accumulation, generation and diffusion of knowledge and innovation, and maximizes the chances of fulfilling the function of social training/learning (development of human capital), processes necessary for the development of innovative solutions to solve community problems.

¹⁹ Determining the appearance and consolidation in an ethical sense of the cultural trends of society's orientation. The ethical meaning is given by the final goal of the Smart Nation type social projects, namely the solution of community problems for the acquisition of well-being at the level of society, as well as the improvement of Romania's image as an international actor.

In the long term, those desirable and sustainable circumstances are created, typical for Smart Nation type social projects, through which an advance in knowledge is acquired, which facilitates the emergence of innovative ecosystem networks (social platforms). They develop and integrate causally-cohesively in the form of network hubs (conglomerates) in a series-like functioning structure that interconnects the participants (poles of accumulation, generation and diffusion of knowledge and innovation) and their innovative contributions (participation in debate and deliberation activities²⁰, with the aim of developing innovative solutions to community problems).

Such an ecosystem offers the opportunity for participants to be both users of emerging technologies and also vectors that exploit the capabilities of these disruptive technologies, contributing to the development of innovative products and services with community impact²¹.

The participants in the ecosystem contribute to the emergence of the advance in knowledge, both on the intangible component, by stimulating the act of discovery in an innovative sense, and on the tangible component, through invention, production of community services and products, as well as their dissemination (stages of the cycle of innovative succession necessary to confer collective utility on the discovery).

While for the intangible component, represented by fundamental (academic) research-type activities, the focus falls on the process component²², where the vector (carrier) of innovation is the researcher, in the case of the tangible component, represented by applied research-type activities (with increased resonance in the entrepreneurial

²⁰ Which also involves the consultation, distribution and deepening of information not reduced to entertainment in order to stimulate research, discovery, invention and the production of innovative products and services, as well as, in particular in the area of the equation, the training/orientation in an ethical spirit of the public opinion.

²¹ Nvidia CEO, Jensen Huang (2024) said that countries should ensure they own the production of their intelligence (referring to digital intelligence or generating knowledge) and the data produced, while protecting their culture from any negative impacts (talking about "sovereign AI" concept).

²² Representative is the explanation of Payton Usher who claimed that technological innovation is a slow, collective process that does not rely on the genius of great inventors; (Molella and Arthur, 2005).

environment²³), the focus falls on the product component, where the vector (carrier) of innovation is the entrepreneur²⁴.

Connecting the applied research environment with the entrepreneurial one leads to facilitating the access, accumulation and generation of academic (theoretical) entrepreneurial knowledge applied/translated into entrepreneurial products and services. In this sense, there is a need to create frameworks for frequent interaction between the entrepreneurial (business) environment and the academic-university (applied research) environment, which would result in supporting academic entrepreneurship.

Similar ecosystems (policies and circumstances) were developed in the US before and after World War II by people such as Morris Holland²⁵ (who inspired the MIT reform model to apply the research-production cycle, with results today in the transposition of entrepreneurial academic knowledge into (Evers, 2021) spin-off projects such as Boston Dynamics-Hyundai) and Vannevar Bush²⁶ (which inspired the generation and application of the National Science Foundation).

Last but not least, these innovative ecosystems would represent, on the one hand, resources for the generation of human capital (Sebe, 2010), and on the other, a continuous support of democracy, by activating

²³ Joseph Schumpeter's contribution to the theory of innovation applied to the market economy is representative.

²⁴ An example of the overlap of the vectors that are active, both in the area of research and in entrepreneurship, are the 6 people among the 8 authors who developed the scientific article "Attention is All You Need" (2017), also called "Transformers", who have formed a branched entrepreneurial network to found companies (such as Adept, Cohere, Pagoda, Character.AI and Inceptive) that integrate disruptive technologies; (Vaswani et. al. 2017).

²⁵ In 1928, Maurice Holland, Director of the Division of Engineering and Industrial Research at the US National Research Council, produced a document on what he called the "research cycle". He presented the development of modern industry as a series of sequential stages, from basic research to the commercialization of technological inventions. Holland provided arguments to several industrialists for the importance of building research laboratories to accelerate the development of industry (Godin, 2011).

²⁶ Vannevar Bush was responsible for coordinating the research efforts of the US government during the war. After the war, Bush proposed the creation of a national research foundation to fund scientific research and develop national science policy. This proposal led to the creation of the National Science Foundation (NSF) in 1950.

the participatory function, giving the opportunity to governmental actors, non-governmental and private to take responsibility for social training by participating in the act of social and technological innovation (including educational in nature).

c. Continuous dissemination of information. The continuous dissemination of information is a key phase of the Smart Nation project with at least two major implications in the processes of knowledge adoption, generation and diffusion.

An obvious implication of diffusion, defined as viral activity, is manifested in fulfilling the role that the stage of spreading knowledge and innovation has within social ecosystems, namely attracting, stimulating and raising awareness of the need for human capital to participate in the development of solution products and services of community problems.

In particular, within the ecosystems applied in the field of education, an essential role of the diffusion of knowledge and innovation within the Smart Nation type projects is to educate the human resource, through acts of social training and influencing in an ethical sense²⁷ of society (the behaviours of citizens), respectively through the viralization of some educational and community modelling acts, including with a view to determining and consolidating some cultural trends to guide social perception (Bunăiașu, Vlăduțescu, & Strungă, 2014).

An example of innovative public contribution, influencing and shaping the social and virtual environment is the work of Google researchers published in 2017, "Attention Is All You Need", also called "Transformers" (Vaswanin et. al., 2017).

OpenAI, the parent company of ChatGPT, likely benefited from this research by incorporating the "Transformer" architecture into their own language models, such as GPT-4, is one of the most advanced language models currently in use on a global scale. The growing influence of the "Transformers" linguistic model is evidenced by its applied nature, from RNA therapies to Web3 software development, as well as LLM and

²⁷ The ethical meaning is given by the final goal of Smart Nation type social projects, by solving community problems for the acquisition of well-being at the society level, as well as improving the image of Romania as an international actor.

NLP tools. The influence of the “Transformers” activity does not stop there, 6 of the 8 authors of the research created a network of influence that branched out to establish start-up companies (such as Adept, Cohere, Pagoda, Character.AI and Inceptive) that integrate disruptive technologies.

Considering that the diffusion of information is a social (mass) phenomenon, in order to increase the chances of influencing the adoption of desirable behaviours by the citizens, it is necessary to apply information communication strategies (with attractive content) adapted to the technological peculiarities of the current virtual environment, as the principal channel of information and cultural orientation of public opinion, as well as the particularities of the user profile.

Considering that both the entire virtual environment and online social networks operate on the structure of the Internet-type network, which can be analysed based on the principles of network science, this aspect can be exploited in order to achieve the goal of ethically influencing users by adopting an appropriate strategy for distributing (viralizing) information not reduced to entertainment (Vlăduțescu & Ciupercă, 2013). Thus, following the principles of network science, content with an educational effect can be distributed at the community level through agents of social influence, also known as connectors or brokers, as well as key opinion leaders or influencers who have social capital (Vlăduțescu & Ciupercă, 2014).

In other words, the power of viralization of information available from open sources/OSINT and the virtual environment can be exploited on a community scale by adopting information technology products and services with a role of learning and social modelling, whose functioning would involve the promotion of knowledge (more than the entertainment's) and innovation by challenging and stimulating the participation of citizens/social entities in acts of debate, deliberation and associated activities²⁸.

In this way, with the help of diffusion, social ecosystems with an educational role could be supported, in which citizens/social entities participate with contributions consonant with the specifics of the cultural space of belonging, which would support the formation of social capital

²⁸ Which includes the consultation, distribution and study of information not reduced to entertainment, as well as research, discovery, invention and training/orientation in an ethical spirit of public opinion.

with cultural identity status, necessary for the development innovative products and services to solve community problems in order to achieve social well-being.

This is one of the solutions to solve the perennial problem of society, defined by Spiru Haret as the need to “transform into organic qualities what is obtained as a temporary effect of education” (Sebe, 2010).

By replacing propaganda and entertainment with debate, deliberation and related activities, it aims not only to challenge the function of community education and the act of innovation, but also to secure freedom in a democratic framework.

In other words, by participating in the acts of debate, deliberation and associated activities, citizens would increase their chances of accumulating the cognitive resources necessary to treat informational sources in a critical-analytical key (so as to consider cultural identity landmarks), so necessary to the dynamic context and abundant current information. It is desirable that the cultural status of citizens contains protective cognitive resources²⁹ (analytical adaptive skills) such as: critical thinking, reflective thinking, autonomous thinking, design thinking, entrepreneurial thinking, learning techniques, a set of representative values, etc.

In this way, open source/OSINT and virtual environment with online social networks are considered and exploited at the community level, not only as a means of entertainment, but also as a supporting framework for the development of services and products to solve social problems, including for supporting the public function of social training.

The second implication of the diffusion of information, whose emphasis in definition falls on the exchange of information, more than on viralization, is manifested in the stages of accumulation and generation of knowledge and innovation, within social ecosystems, through the many connections between participants and contributions which diffusion facilitates/trains to emerge through/within processes of debate, deliberation and associated activities. Thus, the act of innovation transposed into the development of services and products to solve community problems is provoked.

²⁹ Bill Gates and the founder of Khan Academy discussing in 2023 about how artificial intelligence will transform education.

An example of a network of people that has contributed decisively in the last 25 years to the translation of innovation into technological solutions for solving community problems is the network of entrepreneurs so called “PayPal Mafia”, which contributed to the founding of PayPal. This network of entrepreneurs is still active in Silicon Valley, leading and investing together in other companies that use disruptive technology (some exploiting open and official sources), such as: Palantir, YouTube, Tesla, Neuralink, Yelp, LinkedIn, etc.

Another example is currently applied in Singapore, where the Punggol Digital District (PDD), which is expected to become the country’s main smart district, is being actively developed. PDD aims to be an innovative hub for work and life, encouraging collaboration and interaction between innovators and the community to bring ideas towards a result

Examples of social ecosystems are the initiatives of Great Britain³⁰ and Singapore³¹ to invite citizens/social entities to collaborate for the development of Smart Nation type projects, which integrate AI technology and OSINT information solutions, with the aim of identifying innovative solutions to problems with community impact.

d. Representation of information in comprehensible forms. Emerging technologies, integrated in Smart Nation projects and solutions, can be used both for the accumulation and generation of informational content (not reduced to entertainment) and for its community dissemination (viralization) through open sources/OSINT (implicitly the virtual

³⁰ Through a series of projects funded through the Alan Turing Institute’s “Artificial Intelligence for Science and Government” (ASG) research programme, the UK government is showing that taking the open and collaborative approach of inviting citizens and social entities to participate in producing innovative solutions for the management of community challenges (such as those of a medical, climatic nature, affecting public safety, etc.) is a strategy for capitalizing on the advantages offered by disruptive technologies, effective in solving social problems.

³¹ In 2014, the “Smart Nation Initiatives” Project was launched in Singapore in order to capitalize on the technologies introduced by the fourth industrial revolution, which involves the integration of artificial intelligence and related algorithmic processes to implement them at the national level with the aim of improving government policies and services such as those in health, education, transport, urban life, business and the entrepreneurial environment.

environment with component of social networks) and, if the case, through official sources channels.

With the aim of increasing the chances of the attractiveness and understanding of the informational content³² disseminated at the level of society through Smart Nation projects and solutions, as well as in order to stimulate and promote the participation³³ of citizens/social entities in decision-making processes aimed at understanding and solving problems with community impact, there is a need for semantic adaptation and representation of information in a form that is comprehensible and appropriate to the cultural profiles of citizens/users.

Smart Nation projects and solutions in Romania

In particular, in Romania, the series of succession of Smart Nation type social projects was triggered at the turn of the 19th–20th centuries through the remarkable domestic contributions “education reforms” (adopted by Spiru Haret) and “Science of the Nation” (supported by Dimitrie Gusti), which created the organic social circumstances of accumulation, generation and diffusion of knowledge and innovation, necessary for the development of human capital and innovative solutions for understanding and solving society’s problems for the increase of community well-being.

Highlights of the Smart Nation project “Education reforms” adopted by Spiru Haret. As he considered that the education is the key to achieving social well-being, Spiru Haret reformed the social structure of Romanian society by implementing a Smart Nation social mechanism of education and community modelling (development of human capital), implemented top-down and bottom-up, which ensured the accumulation,

³² Not reduced to entertainment, in order to influence society in an ethical sense through educational and community modeling acts, including by determining and consolidating cultural trends to guide social perception.

³³ Participation in the processes of accumulation, generation and dissemination of knowledge, respectively the acts of debate, deliberation, consultation, distribution and deepening of information not reduced to entertainment, as well as the processes of research, discovery and invention – with the aim of transposing them into services and products for the solution of problems with community impact (especially in the educational area).

generation and diffusion of knowledge and innovation in Romanian society, with effects even today (Haret, 1910/1969).

In order to implement the social modelling program, the former Minister of Education created extensive networks of social influence that included the most influential functions/professions of society at the central, regional and local levels, respectively those exercised by politicians, educators, researchers and priests, among whom the level of awareness of the importance of education has increased. They were co-opted and influenced to participate in the conception, implementation and promotion³⁴ of a mass instruction project whose main objective was to educate the human resource, respectively to acquire the necessary skills to solve society's problems to increase community well-being (Haret, 1910/1969).

At the basis of the strategic thinking of the Smart Nation project managed by Spiru Haret, with effects in the accumulation, generation and diffusion of knowledge and innovation, as well as the development of human capital, there was a new capital concept with two components, respectively the "intangible" and "tangible" one. It should be emphasized that the intangible dimension is represented in the cycle of innovation (discovery – invention), through discovery, which implies research activity with beneficial effects in closing a knowledge gap by compensating it. Successively, the tangible component is represented by the act of invention that gives collective utility to the discovery by developing innovative solutions to solve society's problems to increase community well-being (Sebe, 2010).

Another representative cycle for the Smart Nation project adopted by Haret was the division of research into: fundamental, applied, practical and commercial. The concept of practice (representative for the tangible dimension) was defined in accordance with the knowledge advance mechanism, but not before the orientation platform that gives it meaning was realized. For example, when the poor calculation skills of the candidates of the School of Bridges and Roads were discovered, the Society of Mathematical Sciences was established, the centre that offered the necessary circumstances to generate adapted innovative solutions.

³⁴ Also involving the stage of knowledge diffusion, having the role of agents of social influence.

In this way, by applying a mode of action consistent with the logic of the concept of succession cycles, the Smart Nation-type social mechanism of “education reforms” was developed to integrate theory – representative of the intangible, with practice – representative of the tangible (Sebe, 2010).

Highlights of the Smart Nation project “Science of the Nation” designed by Dimitrie Gusti. Complementary to the reforms adopted by Spiru Haret, Dimitrie Gusti designed the “Science of the Nation” program which meant the involvement of social influence networks consisting of influential functions/professions, like those represented by researchers, students, priests, educators and politicians, who were part of and active in several social strata. They were in charge of implementing the mass social learning mechanism, which involved the functions of accumulation, generation and diffusion of knowledge³⁵ throughout society, ultimately aiming at the education of human resources or the production and accumulation of human capital (Rus, 2018).

It should be noted that a current feature of the “Science of the Nation” program is the integration of social and technological innovation, a necessary stage for achieving social well-being in the vision of Dimitrie Gusti (Schuler, 2010 and 2016), an aspect also identified in modern Smart Nation paradigms.

The development of new Smart Nation projects and solutions in today’s Romania

Thanks to the series of successive contributions to the adoption of Smart Nation type projects, which constitute an organic social framework leading to development, Romania can benefit from this competitive advantage through the consonant adoption of new social mechanisms for the accumulation, generation and diffusion of knowledge and innovation for the social modelling and human resource education, with the aim of transposing them (knowledge, innovation, human capital) into innovative solutions for solving social problems that lead to an increase in social well-being.

³⁵ The academic environment was tasked with the process of generating knowledge with the help of which the human resource was trained in order to acquire the skills necessary to participate in solving community problems.

For the successful implementation of Smart Nation type social projects and associated technological solutions, it is necessary to organize innovative ecosystems that exploit the advantages of increased computing power and increased interconnection offered by disruptive technologies, represented by physical and virtual social platforms coupled to open and official sources.

Thus, opportunities are created for citizens/social entities to collaborate transdisciplinary and make innovative contributions to improve decision-making processes aimed at understanding and solving problems with community impact and achieving social well-being.

The innovative Smart Nation “ION” technological solution

A current project developed within the Romanian society and adopted with the involvement of the responsibility of the state, respectively the Government of Romania, is the innovative open source solution “ION”. This is a Smart Nation type technological solution, which integrates social and technological innovation and has the utility of facilitating communication between citizens and governors, with the aim of taking the messages, wishes and problems of citizens from the online environment to process and disseminate them to decision-makers in order to supporting the process of generating public policies in accordance with social reality.

Code for Romania’s Activity

Code for Romania is a community, community-driven type, which forms a very varied interdisciplinary group, in order to develop innovative technological solutions with the aim of solving community problems. Specifically, the association develops applications with social impact in areas such as: information and access to public data, civic involvement, education and the promotion of culture, as well as facilitating access to public services.

Code for Romania designs, builds and manages the social change ecosystem through technology in Romania. The association managed to design and consolidate a functional mechanism to bring together and

direct the huge IT development capacity from Romania and diaspora to deliver digital solutions for the problems faced by the society.

Smart Nation project for the development of human capital in the field of cyber security

On the context background of the increased cyber vulnerability, starting from 2017, in Romania, a Smart Nation project was initiated by the CyberInt National Centre under the Romanian Intelligence Service focused on the development of human capital in the field of cyber security and strengthening cyber security culture.

Thus, entities responsible and directly interested in the promotion of cyber security were mobilized, mainly from the academic environment, as well as from the private and state environment, resulting in university educational programs aimed at developing human capital in the field of cyber security.

Using emerging technologies to manage cybersecurity issues

The adoption of emerging technologies linked to open and official sources currently exposes the users/beneficiaries of the virtual environment to implicit risks due to the perpetuation of vulnerabilities such as:

- a) the virtual environment is based on the vulnerable operating structure (topology) of the Internet network, caused by the advanced degree of interconnection between network nodes;
- b) lack of regulation of the use of new technologies;
- c) the lack of tools to verify the veracity of the product (outcome) generated by emerging technologies such as artificial intelligence.

Considering the context of vulnerability described previously, as well as the intensification of the degree of dependence on the use of emerging technologies to increase professional performance, it is more and more threatening for their users and the virtual environment, a fact that accentuates the need for cyber security (the adoption of products and services of Cyber Security and Strengthening Cyber Culture/Hygiene). This context represents an opportunity for Romania in order to acquire the competitive advantage as an international actor by

accumulating knowledge and learning the advance in knowledge in the field of cyber security.

Hence the need to adopt Smart Nation-type projects and solutions, namely products and services that integrate emerging technologies for managing issues in the field of cyber security in order to achieve the following goals:

- a) the accumulation, generation and diffusion of knowledge and innovation in the field of cyber security aiming, together with the competent human capital, to translate it into the development of cyber security products and services;
- b) development of human capital with skills in the field of cyber security;
- c) developing cyber security culture (safe use of the virtual environment and emerging technologies).

Conclusions

In the near future, the level of quality of life can be improved considerably, both in the states with increased human development index and in the others, if the emerging technological capabilities are exploited (implicitly generative AI, blockchain, etc.), for educational purposes for the development of the human capital necessary for involvement in the generation of innovative products and services, adopted in order to understand and solve community problems.

In this sense, Romanian society needs new governmental and private initiatives, and, ideally, public-private partnerships, investment in the generation of Smart Nation type projects and solutions that ensure the functions of accumulation, generation and diffusion of knowledge and innovation (technological and social), in order to develop human capital and transpose these strategic advantages (knowledge, innovation, human capital) into innovative entrepreneurial products and services useful for solving society's problems.

In fact, to stimulate this process, it is necessary to generate educational and innovative ecosystems represented by (social) multidisciplinary collaboration platforms, linked to open and official sources (such as: conferences, forums, courses, innovation hub events, hackathons, activities such as spin-off, think-tank, robofest, etc.), through which opportunities and circumstances are provided to stimulate

citizens/social entities to participate in decision-making processes aimed at solving problems with community impact.

Against this backdrop, following the completion/integration of processes such as debate, consultation, deepening and distribution of information not reduced to entertainment, associations between the participating entities are stimulated and inspired in order to achieve the common goal of supporting and developing innovative Smart Nation solutions through exploiting the capabilities of emerging technologies.

Finally, the generation of these circumstances of accumulation of multidisciplinary contributions with joint participation, would stimulate research, discovery, invention and production of innovative entrepreneurial services and products to solve community problems, completing the Smart Nation concept cycle.

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