

INFORMATION TECHNOLOGY AND COMMUNICATIONS – THE PROGRESS TOWARD THE INFORMATION SOCIETY

Cristea DUMITRU¹

Abstract. *Information Society is a concept with a dynamic evolution. All of us have different degrees of perception of the Information Society potential alongside with a continuous process of education according to the manifestation of the information age at the individual and society level. The expression of the information age is represented by the certainty of the IT&C development in all its forms and applications, conducting to the radical change of our lives by constantly creating new products and services, new ways of making business, new markets and new investments opportunities, new social and cultural expressions, as well as new channels of communications and interactions between citizens and governments.*

1. Introduction

The Information Society is a collocation used by sociologists to describe the modern society which is affected among other things by extraordinary technological changes and the economical globalization. From our point of view, the Information Society is that kind of society wherein the information production and consumption are the most important types of activity, the information is recognized as main resource, information technology and communications (IT&C) are fundamental technologies, and the human living environment is made up of the information, the social and the ecological environments.

We could assert that the Information Society being dominated by the technical and scientific paradigm has not the ability to identify and define the changes surrounding us. The technology represents, beyond any doubt, the main factor of change. To be more accurate, small IT&C innovations are considered to be responsible for the global transformations aroused in the economy, politics and culture structures. Most of the future prophecies are qualified by the technological determinism and the evolutionary thinking as being related to the Information Society. Actually, the Information Society represents a new

¹ Prof. PhD, corresponding member of the Academy of Romanian Scientists, Section Military Sciences (e-mail: dumitru.cristea@computerland.ro), Lieutenant-General (r.), former chief of Romanian Directorate of Communications and Information / General Staff (J.6).

stage of the human society, a new and superior way of life, which implies an intensive use of information in every single field of human existence and activity, accompanied by a major social and economical impact.

Attracted by the rhetoric of the IT&C potential in molding the society of the future, the governments all over the world invest substantial amounts of money in order to ensure the basic level for the universal access of their citizens to the benefits of the Information Society. Technology assimilation and implementation are dependent in every society to the social, cultural, affective, cognitive and even psychological factors of the human communities. In our opinion, all these factors are presently less considered, and the priority is to ensure the infrastructure elements.

2. The Romanian Effort for the Implementation into the Information Society

Information Society integrates the goals of the durable development, based on social justice and equal chances, ecological protection, freedom, cultural diversity and innovative development, reorganization of the industry and business environment.

The measurement elements used to quantify the Information Society in Romania render a powerful ascending trend of diminution of the existing gaps between Romania and other European countries, and reveal a pronounced development of the IT&C field.

In order to develop the Information Society as a fundamental instrument of the Knowledge Society, in accordance with the Lisbon Strategy and within the broader context of the European legal framework, the Romanian government established a series of governance strategic goals in the IT&C field.

On the further side of these strategic goals, within the Romanian Ministry of Communications and Information Society a dedicated central directorate is established, the Intermediary Body for Information Society Promotion, this has as main mission the management of the projects funded by the Structural Funds, Axis 3: IT&C for private and public sectors, the Increase of the Economic Competitiveness.

IT&C reformulates the fundamentals of the economy, trade, education, investments, and practically every aspect of the social and human life. Romania acts to stimulate all the measures that are meant to create

the fundamentals for the expression Information Society, according to the EU policy. IT&C for private and public sectors comprises three key areas of intervention, each of them structured on operational programs, as follows:

- **Supporting the IT&C Use** intends to promote the broadband access and to strengthen the IT&C infrastructure, as well as the public access to it, especially in rural and small urban areas.

- **Developing and Increasing the Efficiency of Modern Electronic Public Services** have in view to support the economic competitiveness and to encourage the interactions between citizens and public institutions by fully improvement and use of the potential of the IT&C and its related applications.

- **Sustaining the e-Economy** intends to make the companies more efficient by reorganizing all the processes on information system basis and to bring in systems that use modern IT&C. This foundation will be an innovation enabler that will support the decision making process, the e-Commerce development, and the extended use of the on-line business training applications.

3. Features of the Information Society

In the last years, the fast development of IT&C had a growing impact on the society and the global economy, bringing in front fundamental changes of the manufacture and distribution models, of the trading conditions, labor force employment and day-to-day life. The global economy is presently part of a transition process from the industrial society to a new set of rules that lead to the appearance of the so called Information Society.

The transition to the Information Society is given by the very powerful dynamism of a new type of economy where the digital technologies make the access, processing, storing and transmitting information easier and more affordable.

This great amount of available information generates opportunities of their exploitation by creating new products and services, developing new activities and increasing the number of jobs. The new economy specific to the Information Society transforms the digital information into social and economical value, making new industries, modifying the existing ones and deeply affecting all the citizens' life.

The features of the Information Society could be expressed from different perspectives, from global to individual:

- From *political* point of view, Information Society is a democratic one;
- From *administrative* point of view, Information Society provides new development opportunities for business and public administration;
- from *social* point of view, Information Society gives to the population an easy access to education by developing the IT&C infrastructure;
- From *legal* point of view, Information Society changes the very nature of the work, making conditions for the specific activities of the information era to unfold;
- From *economical* point of view, Information Society determines the growth of the business potential and of the productivity;
- From *cultural* point of view, Information Society is a knowledge society, ensuring the sponsorship of the human values (tradition, religion, human relations etc.);
- From *individual* point of view, Information Society renders valuable the intelligence with small costs.

4. Dimensions of the Information Society

Making an objective assessment of the Information Society impact over the social life, we assert that Information Society has obvious expressions at the most levels of the social and human activity. We have identified a significant series of dimensions of the Information Society, as follows:

- *technological* – infrastructure, services, applications
- *economical* – the new digital economy
- *political and administrative* – e-Governance
- *social* – life standards
- *cultural* – culture-technology interaction
- *legal* – specific legislation

These dimensions do not exclude some issues mainly determined by a low level of individual (and to a certain extent, of the society) adaptation to the conditions of the new economy. A faster and better adaptation could be built on an increased individual trust in organization and society, in the meantime with getting the necessary abilities to access the information and to use it efficiently.

Despite the difficulty to analyze the unavoidable possible issues, it is consent over the transition of the modern society toward the Information Society. Part

of the futurologists forecasted a society based on telecommunications, virtual companies and remote working activities based on electronic communication, and easy and free access to information. Today we can affirm that the predictions were wrong in time, but exact in content, and some evolutions could prove them.

Thus, the experience shows that the new technologies lead to economic growth and making of new jobs (there are more than 6 millions direct jobs in the companies running their activity on the Internet and considerable positive indirect effects).

IT&C development, within the flexible work context, is a productivity driving factor and makes possible a long term powerful and non-inflationist economic development. This economic development should be harmonized with the cultural heritage preservation, combining the digital culture with the advantages of the telecommunications.

5. The Nature of the Inter-Human Relations in the Information Society

Changing the nature of the work and organizations is one of the transit conditions toward the Information Society. Work is no longer dependent of a certain field of activity and is also made of information in its nature. As a consequence, there is a need to perform activities such as gathering, processing, storing, modifying, creating and exchanging the information. As a conclusion, we could draw up the human information process completed of three distinct stages: identification of the information needs, information location, and use of information. This “status quo” is determined by the distribution of the knowledge and information inside the organizations collaborated with a steady activity of diverse sources information gathering.

The Information Society will have an infrastructure allowing every social entity to participate in the information social existence. This infrastructure will include at the same time transport networks and information services, public users, private users and remote employee users.

Introducing new IT&C might be a risk factor for the employed persons who could have a feeling of threat. Indeed, the IT&C brings resistance, since it can change the mind sets, the organizational culture, and can influence the real value of the skills.

In our opinion, the information importance will influence the social division in the meantime with the knowledge society. New social structures will appear composed of individuals not mentally able or without the necessary skills to use the information in their working process, eventually becoming the new unemployed persons. Information Society needs a large qualified working force, and as an immediate effect people should learn how to work with information. That will represent a major test for the educational institutions of the society, since every mature individual has to know at least three languages: an internationally largely used foreign language, the information language, and the artistic language.

Information Society gives to each individual the possibility to receive information from various fields and to engage debates. That individual could assume some democratic responsibilities in the so called *cybernetic democracy*.

New technologies open opportunities for new ideas and new personal opinions. IT&C allows people to use new channels of communications for worldwide, faster and easier social interactions. People will exchange information on fields of mutual interest that will lead to the enlargement and enrichment of the social life and quality of life, through the information advantages obtained via remote contacts. IT&C also enables people to adapt to different social aspects (family, religion, work, free time, civic responsibilities etc.) leading to the individual personality development.

Electronic gathering and exchange data will determine a radical constriction of the traditional services with a consequent release of the working force and an increase of the unemployment level, if appropriate absorption programs are not foreseen. Multimedia and computer networks bring an unprecedented flexibility in the classical education, with a simultaneous time and space independence of the learning activity. The availability of the information and the role of the communication in the global and local networks will lead to a new variety of facility related to the educational process:

- subjects could solve their homework using the available information;
- subjects could ask questions in order to better know the world (geography, history, civilization, culture etc.);
- subjects could discuss interactively each other;
- didactic material is linked to a vast information support electronically available;
- information is updated with minimum costs;

- subjects could organize their activity more efficiently, without any time constraints.

The multimedia networks prove to be a viable solution in order to solve the educational issue of the dispersed and geographically isolated population, because the transportation to school, university or training centre is no longer necessary. IT&C can remove all the existing barriers in the adults' education, allowing them to follow a process of education without interrupting their professional or private life.

6. IT&C – Support for the Information Society

Information Society is a business of most importance for the governments of the democratic states even it is still perceived with a surrealistic aura by the ordinary people. In European Union the development objectives to be fulfilled in order to access the Information Society were already defined. These objectives are designed to increase the living standard by using the advanced technologies, to grant the equal access of the people to the education and training promoted by the Information Society, to develop the legal framework needed for the implementation of the Information Society, and to ensure a sustainable development of the Information Society.

Making an analysis of the key factors with their convergence almost fully defining a society of information, it is easy to observe that the IT&C represents the functional element for the correct implementation of the Information Society and for the transition to the new technological era and to the new economy.

This new economy should be understood in the sense of economic activities transformation that take place meanwhile the digital technologies make easier and cheaper the access, process and storage of the information. In this context at least three way of describing the new economy could be defined, as follow:

- digital economy
- network economy
- information-based economy

The free flow of information is essential for the development of the Information Society. The rapid evolution of the IT&C created an unprecedented flow of information for the human society. As the information is even more available on Internet, it is still difficult to be accessed by the people who have insufficient infrastructure and training to make use of it.

IT&C could be a catalyst for the societal development, but it could be as well a driving factor of the digital exclusion, specific to the vulnerable groups.

Presently, IT&C represents the most important industrial sector of the transition from the society based on mass production to the Information Society featured by globalization, flexibility and mobility. The unique impact of the IT&C consists in the role played for the economy and society transformation as a whole. The technologies and the global networks of communications transform the economical activities and determine the increase of the productivity, new economical opportunities and, consequently, new jobs. This perspective is valid both for the developing and the developed countries, only if a permissive legislative framework exists in order to take advantage of the new opportunities. The development of the IT&C industry in the last years was an exponential one, maybe the most spectacular in the history of industrial changes.

For the implementation of the Information Society vision, we believe three major stages should be covered. These stages have the following main goals:

- Employment of the IT&C and Information Society components in every single development sector of the society;
- Obtaining a sustainable development of the Information Society;
- Active participation at the debates on Information Society and the development, and continuous assessment of IT&C impact over the development.

In order to employ IT&C in the entire society, basic information systems should be developed using the appropriate IT&C. It is also necessary to have functional e-services tailored in such a way that the use of up-to-date technology being accessible, trustful and transparent.

According to the estimations, the IT&C industry is developing with more than 5% faster than the other industrial sectors, getting a major contribution to the general economic growth. The huge amount of information changes the way the markets function, leads to the reorganization of the economic activities and make new opportunities, the use of the available information eventually creating the prosperity.

7. Rendering the Concept of Network Enabled Capability Valuable for the Civilian Society

Network Enabled Capability (NEC) offers decisive advantage through the timely provision and exploitation of information and data to enable effective decision-making and agile actions. This concept is developed and under implementation in the armed forces of the NATO member states, and presently there are efforts for its adaptation for the EU military component.

In our opinion, NEC represents the expression of the NATO military and political decision-makers' efforts for a holistic translation of the military phenomenon into the Information Society age. However, NEC concept is not isolated from the civilian society, having rezoning components to its needs. We appreciate the fact that the experience stored by the military experts in NEC field should be rendered valuable accordingly, in order to reveal the path toward the Information Society.

NEC will be implemented through the coherent and progressive development of equipment, software, processes, structures, and individual and collective training, underpinned by the development of a secure, robust and extensive network of networks. NEC has three overlapping and mutual dependent dimensions, all of which will require continued to achieve its full realization.

The NEC core is made of a network of networks to distribute information. A networked information environment will provide a capability to acquire, generate, distribute, manipulate and utilize information.

In a generic networked information environment information is gathered from a variety of sources, enters the network, is managed and after exploited leading to a decision to achieve a particular outcome. Whatever the desired outcome, the first step will be to acquire the appropriate information and then use the network to make it available to the planners and decision makers.

Decisions makers, at all levels, will need to identify what information is required and available to support their decisions and know how to obtain it. As now, they also have to know, when a decision needs to be made, and how long they can afford to wait for more information. In essence, decision makers will still need to know how much information is required to make the optimal decision, whilst avoiding the risk of procrastination. The key to NEC is effective information management. The availability and use of information has

always been essential, but we have not always been as effective as we should be at making it available.

As newer information systems are introduced, the function of information management will grow in importance and effective information management tools will become a key enabler. Decision support tools will help to reduce the cognitive workload of decision makers but, in the majority of situations, a person will still make the final decision. Decision support tools will help to assist in finding information, structure and present information in the most appropriate manner, and combine disparate types of information to draw inferences for presentation to decision maker. Networks are now demonstrating the ability to move information around quicker, and make it available to more people – often simultaneously. The potential advantage of this is recognized within NEC. To maximize the benefits of being able to share information, it is essential that common standards are developed and processes established to automate information sharing.

The people dimension of NEC focuses on the requirement to educate and train all personnel so that they can use their skills, knowledge and experience to exploit it and to contribute to NEC future development. People will need to learn how to share and find information from multiple sources and then use that information to plan and then make decisions. Whilst it is true that we have always needed this skill, in future NEC will provide network-based information management and decisions support tools to help with the process. Training will be required to build trust and confidence between people across organizations who may have to collaborate on a distributed and temporary basis. Certain skills will be generic to all users, like IT&C fundamental skills, and elements of information management and information exploitation. In our opinion, there will also be a need for specialists in some areas, for example Computer Network Defence, to help to reduce the vulnerabilities of NEC and ensure continued confidence in the security and accuracy of information. The education process will need to emphasize the cumulative benefit of NEC to all customers, rather than to each individual.

The ultimate benefit of NEC is the ability to generate better actions to realize better effects and thus lead to success. In the short term, as network capability improves, shared information will become more readily available. Routine tasks will be automated and new standard operating procedures and working practices will enable higher tempo decision-making processes. With the ability to reach to a broad range of information sources, we will be able to develop a

better shared understanding of the situation. This will enable improvements to the quality and tempo of decision-making, which in turn will lead to more coherent, concurrent and responsive actions, resulting in more timely and appropriate effects. The benefits chain shows how the fundamental NEC benefits are related. Each contributes to the next, resulting, ultimately in better effects in the operating space.

As well as benefits, NEC will pose significant challenges. The primary challenge is to fully incorporate the human dimension in the development of NEC. All our people will require appropriate education and training to utilize increasingly available information. They will need to use all available system tools to exploit information, and they will need time to adapt to a more open culture, requiring greater sharing and trust between colleagues and partners. The procedural and technical challenges should not be underestimated. Capability development will often be complex and will require the integration of new and legacy systems. This will require more flexible acquisition processes. These challenges will be accompanied by the need to avoid information overload and guarantee a robust network. The growing threat from cyber attacks, to which we will become more vulnerable as our dependence on the network increases, must also be contained through new measures. Financial constraints will necessitate careful prioritization and rigorous balance of investment decisions. Although significant, these challenges should be viewed against a backdrop of evolutionary long term NEC development.

8. Conclusions

The features of Information Society are pointed out by the following reasons:

- a)** Information Society evolves from the present society.
- b)** New technologies will be found in many aspects of the day to day life, without noticing nonetheless an information revolution. A normal evolution is given by introducing IT&C according to the existing needs and opportunities.
- c)** IT&C should be seen as a way of development and optimization of the human activity, by avoiding the technological determinism.
- d)** The development of Information Society should have a deep anthropocentric character, although the organizations have mainly a techno centric character.
- e)** Internet is one of the Information Society's expressions, being both a source of documentation and inspiration.

f) Main issues to address refer to:

- Working legislation;
- Copyrights;
- Improvement of population's level of knowledge;
- Development of the information infrastructure;
- Searching for new forms and rules of the educational process and of the involved institutions;
- Impact attenuation between geographical dispersion and the transportation of the working force;
- Providing the involvement conditions of the population within the process of Information Society's establishment and development.

The implementation of the Information Society requires a close cooperation among academic, governmental, military, and business environment. University research could be the key of success for the new technology implementation at individual, organizational, and society level.

