Could we speak of a fifth wave of IT&C?

ALEXANDRU ȚUGUI
Business Information System Department
"Alexandru Ioan Cuza" University of Iasi
22 Carol I Blvd., Ro-700505
ROMANIA
altug@uaic.ro

LAURA-DIANA GENETE
Business Information System Department
"Alexandru Ioan Cuza" University of Iasi
22 Carol I Blvd., Ro-700505
ROMANIA
glaura@uaic.ro

Abstract: - In this paper, we intend to point out some specific aspects of the information society, together with the four waves of the information technology. Since the progress of the human society is impossible to stop in a future globally information-based society, the following question came to us naturally: "What is after that?". Our answer is direct and concise and involves the intelligence of the future systems and the possibilities of successfully linking these technologies to the biological systems and not only.

Key-Words: - Knowledge, IT&C, Cyberspace, Internet, waves, society, bio-techno-system

1   Introduction

As we all know, the grounds of the future globally information society are made up by the recent information and communication technologies, as well as the ones that are waiting to be discovered in the following two or three decades. We are directly interested in whether people will be ready to handle these modern technologies. The answer is obviously affirmative, since man adjusts to the environment and to "well-being". As long as using these technologies generates a profit, regardless of its form and at a convenient price, humanity will very quickly adjust to technological novelties [13, 14].

2   On information technologies and communications

In this paragraph we shall discuss, as briefly as possible, about information technologies and communications (IT&C), about information society and technological waves. We shall end this paragraph with a future-oriented issue, which is actually the essence of the topic to be discussed.

2.1   Definition of IT&C

Specialists do not unanimously agree on the definition of information technologies; however, the most relevant of all consists of understanding the collections of technological fields, which develop simultaneously and interdependently. Among the most important fields, we mention: computer science, electronics and communications.

In other words, there are two basic technological fields on which rely the information and communication technologies, namely: computer science and communication [8]. It is obvious that there can be no computer science without electronics and other fields related to it, like photonics and others.

According to Boar [1], information technologies allow the preparation, collecting, transport, finding, memorizing, access, presentation and transformation of information of any kind (voice, graphics, text, video and image). These moves may occur among people, between people and equipment and/or among pieces of equipment. Therefore, figure 1 shows the representation pattern for information technologies and communications.

Fig. 1. Representation pattern of information technologies

A similar definition is given by the Commerce and Industry Department of Great Britain, which claims that information technologies allow "collecting, storing and transmission of information in the form of voice, image, text, as well as digital form, due to micro-electronics, by combining computer science and telecommunications"[10].

In other words, information technologies rely especially on two main components:

- *Information technologies*: Hardware and Software;
- *Communication technologies*: Networks, Optic transmissions, Wireless transmissions, ISDN, Communication standards etc.

2.2 Definition of information society

Throughout its history, human society has gone through various stages of development, as far as we currently know. We think that technological evolution relied on information and its communication. Thus, technological achievements were reached, which had a decisive influence on the reliance of human society on information. Here are some of these achievements: the ABACUS (3000 b. Ch.), the paper (50 b. Ch.); the printing machin e (1452); the newspaper (1700); the telegraph (1837); the photography (1839); the telephone (1876); the electricity (1882); the tabulator (1890); movies (1891); the radio – television (1920 – 1938); robots (1921); transistors (1947). We are convinced that all these achievements largely contributed to a better information use by and for human beings.

We believe that, when talking about information society, we should consider that that means information-based society.

As one can notice, we stopped with our enumeration of the main technological information-oriented achievements in 1947, since this is the year when the first electronic computing device (ENIAC) was built, which started the modern computerization race of human society. In other words, after 1947-1950, we may speak, theoretically, of an information-based society in the modern meaning of the word. 1970 is the beginning of the development of

information systems in organizations, which entitles us to claim that, practically speaking, the information society has started.

We may say that the globally information-based society is nothing more than the all times, normal human society, with traces of information modernism specific to information avalanche.

2.3   Waves of information technology

Today's and tomorrow's society is/will be characterized by interconnection, by the extended use of computers, by information flow digitization. All these will result into a new economy where information plays the lead part.

We can say that the grounds of tomorrow's society will be constituted by information and computer-mediated communications [3, 4, 5, 6].

In brief, Moschella [11] and O'Brien [2] have drawn up a globally information-based society transition chart and they reckons that humanity, in order to reach that point, must go through four waves, namely:

1. *Computerized Enterprises, corresponding to the period 1970-2010;*
2. *Networked KnowledgeWorkers, which started in 1980;*
3. *Global Internetworked Society, started around 1992-1993;*
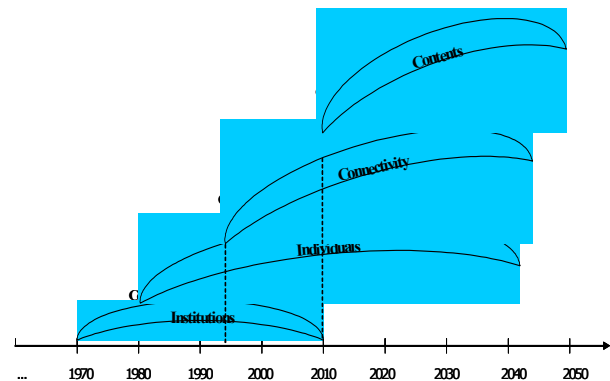4. *Global Information Society, which will begin after 2010.*

Fig. 2. The four waves of information technology

In the first *wave*, all the attention was drawn towards organizations as a key element in obtaining a profit. Therefore, a decrease in the time and information obtaining cost was desired, as well as a diminution of production costs of the electronic computer when computing. The purpose has been and still is the computerization of companies.

The second *wave* emphasizes especially the individual performance in a computerized

environment. In these circumstances, the increase in productivity is given by the knowledge individuals have and the degree of interconnection. The purpose of going through this stage is constituted by the reaching of the status of interlinked expert worker.

The third wave is aimed at achieving connectivity at a global level within the society where the workers of the knowledge and information-based society perform their activities [9, 12]. Therefore, the value-creating activities will bring about an increase in efficiency. The final goal of this wave is reaching the globally interlinked society (network society).

When entering *the fourth wave*, the computerization of companies is considered completed, which means that like pens, computers will be a regular tool that everyone will afford at small costs. This will be the stage when the concept of system-on-chip will be generalized and its package will be more expensive than the system itself.

As it can be noticed in figure 2, until 2010 we will be crossing a period of time when the first three waves superpose, what means we are in a transition period with its specific risks and advantages. Therefore, the traces of modernity will become even more obvious as we approach 2010, when the first wave of the simple information technology is completed and the fourth wave is more and more present, namely the "*Globally information society*" wave.

2.4   What is the problem?

We all know that human society is heading towards what we call the globally information-based society, where Super-Internet, systemes-on-a-cip, Cyberspace, knowledge, artificial intelligence, BAN - Body Area Network [7] prevail.

We saw above what are the technological bounderies. The question that naturally comes to mind is *What is there after the fourth wave of information technologies?*

3   Will there be a fifth wave of IT&C?

We have hardly entered the information society, and we already ask ourselves questions like: What is there after that? What will be the center of attention after information? Specialty studies take as a reference point for the new globally information-based society the following 40-50 years, but after these years, what new technologies will humans discover?

A first starting point could be the so-called calm technologies, a second starting point would be the invisible technologies, mind-power technologies and

why not bio-mechanic, bio-information, bio-magnetic etc. technologies [13]. However, what will happen afterwards? Here is a question to which the futurologists of tomorrow will have to find a plausible answer.

The natural analysis of the data-information-knowledge relation, together with the prospective technical achievements of tomorrow, leads to the idea of an intelligent society, a society where information acquires a meaning and is best used by and for human beings. In other words, it will be the knowledge- and communication-based society in the true meaning of the word [13, 14].
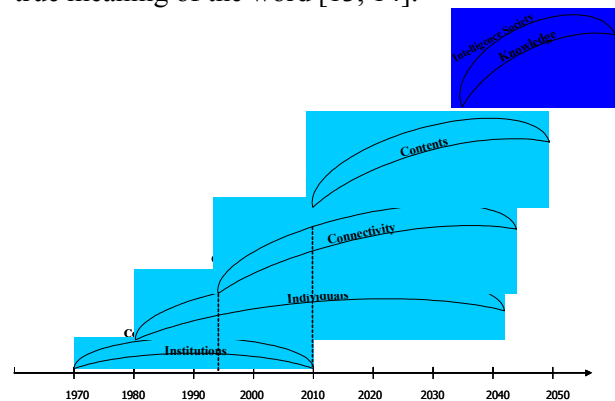

Fig. 3. The following wave after the globally information-based society

Thus, our answer to the question *What will be there after... ?* is very simple: we believe that the following wave might start around 2035 - 2040 and may be called the ***intelligence and knowledge stage***. This stage will have as its center of attention information exploitation in order to reach the desired level of intelligence for a certain entity. This will be the period when the concept of bio-techno-system is generalized, that is hybrid systems between biological systems and technical systems, by means of computer science [14].

4   Conclusion

Throughout this paper we described the main theoretical issues related to technology, human society and its technological future. In fact, we drafted a possible evolution. We think that we all should become more intelligent in order to manage current problems related to the environment and technology.

We are convinced that technology should become increasingly intelligent and calm, to which information technologies and communications will

have a significant contribution from this point of view.

We are aware that our opinion will lead to controversy among our fellow specialists in various areas, which would please us deeply. We believe that the *future* will be the one proving us right or wrong.

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