

A New Information Communication Paradigm for the 21st Century: Towards a Symbiotic Society of Human and Computers

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Abstract

The main aim and motivation of the present research in information communication are mainly dictate the efficiency. With respect to human computer interaction too, the above aspects are the main consideration. Thus the products are efficient, but with hard inflexible built-in functionalities. It is the sole responsibility of the user to adapt to the system through, often painful, training. We here propose a paradigm shift to improve the systems by adding some adaptive capacity to them. This would allow a symbiotic co-existence of both, where the man and the machine will grow up together to make each one suitable to the other.

21 世紀における情報通信パラダイムの創生:

人間と機械の共生社会をめざして

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概要

情報通信の高度化／近代化に伴う負の側面を克服し、老若男女が多様な社会活動を容易かつ安全に展開できる環境を実現することが急務となっている。そのためには、情報通信環境を構成する機械と、それを利用して活動する人々との間に存在する様々な障壁を最大限に取り払い、相互に対等に協力・協調・共生できる新たな情報通信環境の基盤を構築する必要がある。本研究では、人間と機械が共生する社会を創る基盤となる「21 世紀における情報通信パラダイム」を創生することを目的とする。

1. Introduction

The objectives of our research is to construct a symbiosis society consisting of human and machines like computer, computers connected through network, robot, etc, which will form the basis of the "Creation of a New Information Communication Paradigm for the 21st Century".

We first define "Information Communication" and describe the success and limitation of modern information communication. Then we point out the necessity for paradigm transformation towards the new century. In addition, we explain "Information communication paradigm for the 21st century" which will be the basis to build a warm and friendly information society which would be easily accessible by everyone, including the senior citizens of the society, through symbiosis.

Till now the user has to be get adapted to the machine through training or reading manuals. The system comes with its built in interface with varied complexity depending on its functionalities. The process of adaptation is sometimes long and painful for common user, and the responsibility of proper use is solely on the user. We propose a new paradigm, where both the machine and the user will adapt to each other through symbiotic process. A simple pictorial illustration is given in figure 1.

The research areas and their interrelationship to achieve the above objectives are discussed here.

2. Creation of a New Information Communication Paradigm for the 21st Century

2.1 Definition of information communication

Followings are a few examples of "Information Communication".

- 1) Exchange of electrical signals from transmitters to receivers.
- 2) Exchange of messages among computers.
- 3) Input and output interactions between human and computers using keyboard, mouse, display etc.
- 4) Exchange of information through internet.
- 5) Conversation using mobile telephone and PHS. etc.

The objective of information communication is to send information to a partner and deliver the intention to him.

2.2 Modernization of information communication

To achieve the objective of information communication, technology of information communication, by which a huge information can be quickly and correctly transmitted, has been evolving. It's basic technologies are network technologies such as internet, mobile communication, information highway, LAN and satellite communication. The objective of current information communication technology is to transfer huge quantity of information highly reliably at a very high speed. The background of

modernization of this technology is through establishment of production system which is principally based on designer's viewpoint, rationality and universality. As a result, we have succeeded to achieve method for mass production and consumption, and we are enjoying physical wealth and physical satisfaction. For future development too, hankering for speed and reliability remain as the key point, and further progress is expected. The research activities of information communication technologies make the spatial and temporal distances much closer. Based on this infrastructure, information communication can realize ubiquitous presence and be useful for everyone, especially for the aged people to be able to get services like remote medicine, remote education, SOHO and so forth. Moreover people can enjoy shopping in virtual mall constructed in the Internet, in reality being at their comfortable homes. It is very convenient for those whose movements are restricted.

2.3 Limitation of modern information communication

By the way of modernization of information communication, we are being confronted with many new problems, but specially they lack touch of humanity and warmth. Everything that is brought through information communication is not "bright" and there are many darker aspects too.

Although computers are widely available, the applications and access to the internet, the Global information resource, is not easy to the non-experts like senior citizens or housewives. Users have to

struggle with a user manual and understand it completely. In other words, the users have to fit themselves to the requirements set by the computer. There are more severe cultural and social problems created due to the presence of computers, computer games and Global information communication. One such example of negative aspect the murder case committed by a middle school student in Kobe, Japan. Like this teenager, people who can not distinguish between real world and virtual world are emerging. They tend to be engulfed in the virtual world offered by the Internet or computer and video games.

2.4 Towards human and machine symbiosis

The objective of this research is to create "a new information communication paradigm for the 21st century" as the basis to resolve the above problems, and to establish an infrastructure on which ordinary non-expert human beings and machines can live together in close association. The basic idea to achieve this goal consists of the following two points, (1)Paradigm transformation, and (2)Basic concept.

(1)Paradigm transformation

The success of modern information communication lack in warm human considerations e.g. forgiveness to mistakes, intelligence, superfluous services etc. Moreover the acquired wealth and satisfaction are limited to physical ones. To overcome these limitations and to salvage humanity, symbiosis of human and environment is a must for mental satisfaction and

mental comfort. Here, we include machines and computers as an important part of environment. This problem has to be resolved quickly. It is a paradigm transformation from current modern information communication to post modern information communication. That is, a shift from modern information communication based on "designer's viewpoint, rationality and universality" to "creation of information communication paradigm in 21st century" based on "user's viewpoint, sensitivity and diversity".

(a) From designer's viewpoint to user's viewpoint:

We should not be motivated to methods and products which are easy to design and produce, but look to things which are easy to use in real life by common people.

(b) From rationality to sensitivity:

We should not be motivated to manufacture snappy products based on rationality, i.e., efficiency, economics and functionality, but should be ready even to sacrifice efficiency to make something warmer and friendly.

(c) From universality to diversity:

We should not be motivated towards mass-production at down-to-earth price (for high profit), but do customized products (or products that have the capacity to get customized) for more suitability and usefulness.

(2) Basic concept

We are aiming to realize the paradigm transformation described above. Two basic concepts are proposed to accomplish the new

information communication paradigm in 21st century, i.e.,

(a) we compromise by giving importance to "new measures" over traditional paradigm of "modern information communication", and upgrade its quality.

(b) Human and machine collaborate and coexist together beyond the relation of master and slave. They adapt to each other, both have the functionality to get trained.

(3) Image of "information communication paradigm in 21st century"

The orientation of current "modern information communication" is hard in the sense that its materialistic aim is only in massive high speed transfer of information. On other hand, in "information communication paradigm in 21st century" we are aiming at a concept to establish a framework to add soft orientation and humanity. Of course traditional objectives are equally important and will remain at the bottom of our new objectives.

3. Research Topics

The objective of this research is proposal of the creation of a society where human and machine (computer, network, robots, etc..) live together, and to create "information communication paradigm for the 21st century" as the basis to realize this symbiotic society. The "information communication paradigm for the 21st century" is a new concept of a framework which includes hard oriented "modern information communication

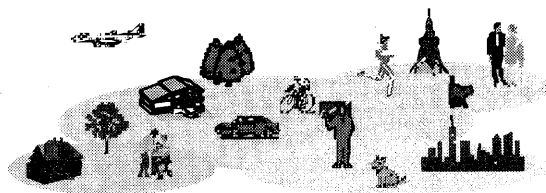
paradigm", where efficiency is the keyword and over that soft orientations and humanity are added.

In this research domain, we concentrate on this soft oriented topics, and define 4 primary research areas as follows:

- (1) User-oriented network: In this research area, we overcome the many kinds of qualitative and quantitative constraints of information which applications need, and we develop the technologies to realize the next generation information communication network which can provide stable services irrespective of the expertise of the user [1,2,4,6,7].
- (2) Ubiquitous information communication: In this research area, to realize new paradigm

for 21st century, we investigate new technologies to establish ubiquitous and comprehensive communication. Especially, we focus on the development of network environment and applications where people in mobile environment can receive and send needed information effectively.

- (3) Human-machine symbiosis computing: In this research area, we develop technologies to realize seamless cooperation and collaboration among human and system via the information communication network [3,5].
- (4) Construction of digital city as social information infrastructure: In this research



	新しい情報通信パラダイムに基づく 人間-機械共生社会	新しい情報通信パラダイム を支える技術階層
ソフトウェア 主導の領域	A04 社会情報基盤としてのデジタルシティ	情報通信 ソフトウェア応用技術
	A02 ユビキタス情報通信	A03 人間-機械共生 コンピューティング
	A01 利用者指向ネットワーク	
ハードウェア 主導の領域	情報ハイウェイ インターネット/ギガビットネットワーク	
		情報通信 ハードウェア基盤技術

Figure 1. Four primary research areas of Information communication paradigm for the 21st century.

area, we aim at the next generation applications such as social information system, industrial information system and life information system. They would run on wide-area information communication network, and envisage technologies to realize information space (digital city) where various kinds of activities of people in real world could be supported.

4. Summary

The main aim and motivation of the present research in information communication is to transfer more information in shorter time with less errors. These three objectives mainly dictate the efficiency. With respect to human computer interaction too, the above aspects are the main considerations. Thus the products are efficient, but with hard inflexible built-in functionalities. It is the sole responsibility of the user to adapt to the system through, often painful, training. We here propose a paradigm shift to improve the systems by adding some adaptive capacity to them. This would allow a symbiotic co-existence of both, where the man and the machine will grow up together to make each one suitable to the other. Different aspects to realize that is discussed here in details.

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