

# Information Technology and the Quality of Life: The Human Factor in the 6th World Telecommunication Forum

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## 情報技術と生活の質： 第6回世界電気通信フォーラムにみる ヒューマン・ファクター

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18世紀イギリスに始まる産業革命を端緒として、今日の産業社会が誕生した。産業社会は、やがてドイツやフランス、アメリカ、そして日本へとひろがり、そして20世紀末から21世紀に向かって全地球的規模での産業社会化が進行している。この産業社会の基盤システムのグローバルな拡大と並行して通信システムの技術革新が起こったのである。

1837年、イギリスの W. F. クックと C. ホイートストーンが電信機の特許を取った。同年、アメリカのモース（モールス）は、モールス符号を使った印字式電信機を発明。情報を電気の信号に変えて伝送する電気通信（テレコム）時代の始まりである。1866年には、大西洋横断海底電線が敷設された。1976年、ベルの電話の発明は電気通信の世界を一挙に拡大した。さらに、コンピュータとの結合によって、電気通信は高度情報化を推進する情報技術として再生するのである。

この間、1865年、パリで万国電信連合（International Telegraph Union: ITU）設立。国際機関としてのITUは1934年に国際電気通信連合（International Telecommunication Union: ITU）として再編成され、第二次大戦後の1947年に国連の専門機関となった。

1991年10月7日から15日までの9日間、スイスのジュネーブで国連の専門機関であるITU主催の電気通信の総合展示および討論会『テレコム91』が開催され、各国の先端情報技術開発の成果の展示およびグローバルなネットワーク社会に向けての情報技術の役割についての討論が行われた。テレコム91のテーマは「互いに結ばれた世界：万人のための生活の質の改善をめざして」である。開発途上国の通信基盤の整備や障害者のために情報技術を生かすことをめざしたテーマの設定であった。技術展示と並行して開催されたフォーラム91のシンポジウムでは、政策シンポジウム『グローバルなネットワーク社会に向って』、技術シンポジウム『統合、相互運用および相互接続：グローバルサービスへの道』、法制シンポジウム『変化しつつある環境における競争と協力』、経済シンポジウム『電気通信は開発と成長の触媒たり得るか？』、ラウンドテーブル・シンポジウム『電気通信技術－誰もが利用できるために』が開催され、各国の政策担当のVIP、産業界のトップ、学会の指導者が講演し討論が行われた。

ラウンドテーブル・シンポジウムでは、「万人のための生活の質」に関連して注目すべき討論が行われた。英国の盲人のための王立ナショナル・インスティテュートのジョン・ジルが、「障害のある人達のための良いデザインは大抵の場合誰にとっても良いデザインである」と結論づけていた。

コンピュータを利用した情報技術を利用するとき、多くの人々は複雑な命令体系や、込み入った操作方法を学ばねばならず、このようなシステムに対する苛立ちや不満は日常化している。情報技術のデザインを考えると、生産者（デザイナー）と消費者（ユーザー）の分裂は解決すべき極めて大きな問題となる。ラウンドテーブル・シンポジウムでは、多くの論者がこの点を指摘した。これは、産業社会に生きるすべての人々に対する問題提起である。

## **Information Technology and The Global Industrial Society**

Today, in the midst of global industrialization, not only industrial activities but also our daily lives strongly depend upon the information technologies such as telephone, facsimile, and data communications using computer. Some critics say information technologies played a very important role in the collapse of the communist regimes in eastern Europe. On the other hand, however, information technologies are undergoing a revolutionary stage in their own development as the telecommunication businesses grow globally day by day. Telecommunication technology is a fundamental infrastructure of the information technology.

Communication technologies have been developing along with the globally spreading industrial activities. The forerunner of the present high speed information technologies was the telegraph. In 1837 the first practical telegraph was patented in England by William Fothergill Cooke and Professor Charles Wheatstone. The stimulus necessary for its development was provided by the expansion of the railway network in Britain and the United States in the 1830's. The need for some means of communication faster, not merely than the horse but than the train itself, became clear.<sup>1</sup> The telegraph offered the possibility of transmitting information instantaneously over virtually any distance. Railway work was made safe and efficient and the dissemination of news to the press greatly accelerated.

An achievement in submarine telegraphy made global communication possible. In 1851 a cable was successfully laid across the Channel and then it was opened to the public. The first direct communication between London and Paris by electric telegraph was in 1852. In 1866 New York, the rest of the USA and Canada became connected in telegraphic communication with Europe. In 1872 Tonking, Hong Kong, Singapore and Madras were linked.<sup>2</sup> International telecommunications began to work. Imperial rulers in distant colonies, military commanders on remote battlefields, businessmen and commercial representatives far from their company headquarters were instantaneously linked with the central control and management.

It is the telephone that developed a very broad way towards the information age.

The invention of the telephone is generally credited to the Scottish-born inventor Alexander Graham Bell who emigrated to the U.S.A. in 1841. It was on March 10, 1876, that he first obtained good clear articulation from his experimental system.<sup>3</sup> Born into a family deeply interested in the issues of speech and deafness, Bell was trained by his father and grandfather in public speaking and in teaching the deaf to speak.<sup>4</sup> He thought and experimented along these lines, and he also studied anatomy and physiology, which provided him with the biological basis for his great invention. Bell's wife was deaf as was his mother. It is very interesting that the creator of the great information technology was born and lived in an environment sensitive to the quality of life of disabled persons.

Due to the rapid growth in the international telegraph systems, the International Telegraph Union was established in Paris on May 17, 1865, with the adoption, by twenty nations, of the first convention relating to telecommunications. On the same occasion the First Telegraph Regulations were adopted. The Union's name was changed to the International Telecommunication Union (ITU) in 1934. On October 15, 1947, the ITU became a specialized agency of the United Nations, reporting to the United Nations Economic and Social Council (ECOSOC). The Headquarters of the Union was transferred to Geneva in 1948.<sup>5</sup> The ITU is the international organization responsible for the regulation and planning of telecommunications worldwide, for the establishment of equipment and systems operating standards, for the coordination and dissemination of information required for the planning and operation of telecommunications services and for the promotion of, and contribution to, the development of telecommunications and related infrastructures.

### **TELECOM 91 - An Interconnected World : Improving the Quality of Life for All**

Since its inception in 1971, TELECOM (World Telecommunication Exhibition and Forum), which is held quadrennially under the auspices of the ITU, has constantly increased in size and importance. The 6th World Telecommunication Exhibition and Forum (TELECOM 91) were held in Geneva Switzerland on October 7-15. "An Interconnected World : Improving the Quality of Life for All" was chosen as the theme of TELECOM 91. In the highly industrialized nations, the basic need to replace analog telecommunication infrastructure with digital services like ISDN (Integrated Services Digital Network) or the more advanced B-ISDN (Broadband Integrated Services Digital Network) has been increasing. To accommodate the rapidly growing demand for high speed fax, computer data and video image transmission capability, leading telecommunication industries in the United States, Europe and Japan are rushing to install high capacity digital networks along with such complementary technologies as mobile communication systems and to develop such related application technologies as video conference system and multi-medium terminal.

TELECOM 91 offered a vital survey of these highly advanced technologies in the exhibition.

On the other hand, in symposia on policy, technical, regulatory and economic matters, FORUM 91 endeavored to present a complete panorama of all aspects of telecommunications. Ministers and Chief Executive Officers, scientists, engineers, economists, lawyers, from both the private and government sectors from all continents reviewed current and expected developments and engaged in a dialogue with an audience.<sup>6</sup> The Policy symposium "Towards A Global Network Society" analyzed developments in the structure of world communications. The relationship between economic policy and telecommunications planning in developing countries was reviewed in the Economic Symposium "Telecommunications as a Catalyst for Development and Growth?". The Technical Symposium "Integration, Inter-operation and Inter-connection : The Way to Global Services" focused on the latest innovations and technological trends affecting the development of telecommunications and on cooperative efforts being made for the development and integration of regional networks. During the Regulatory Symposium "Competition and Cooperation in The Changing Environment," lawyers and legal experts had an opportunity to focus on the emergence of new providers of telecommunication services and the changing relationships among them, and on the move towards deregulation and competition.

The noteworthy theme of improving the quality of life for all was discussed in the Roundtable symposium of FORUM 91. Telecommunication Roundtable "Telecommunications – Accessible to Everyone" addressed the relationship between telecommunications and the disabled and handicapped.

### **The Impact of the "Accessible to Everyone" Idea**

For a large portion of the world's estimated 600 million persons who are disabled, and for an equal number of elderly persons who have dexterity, vision or hearing impairments, appropriate telecommunication services and equipment could play a vital role in providing them with a means of accessing information for personal intellectual development. Presently there are no reliable global statistics on the exact number of persons who are telecommunicationally-impaired. That is, persons who have hearing, vision, or speech loss ; who are unable to operate telecommunication equipment and devices due to finger, hand or upper limb dexterity problems ; and persons who because of mobility problems are unable to access many telecommunication installations.<sup>7</sup> In Japan the Ministry of Health and Welfare estimates that the elderly population over the age of 65 will be more than 32 million (25.8% of the national population) in 2025.<sup>8</sup> A highly developed society is at the same time a highly aged society or more or less disabled society. The disabled and the aged have common problems and solutions. This is an essential point.

What does the word disability mean? Is disability different from handicap or impairment? Janet Silver criticized the fact that much confusion exists over the terms ; impairment, disability and handicap.<sup>9</sup> Within ICIDH<sup>10</sup>, an impairment is defined as "any loss of anatomical structure or function." An impairment may lead to a disability that is defined as "any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered to be normal for a human-being." This in turn may cause a handicap that is defined as "a disadvantage for a given individual resulting from an impairment or a disability that limits or prevents the fulfillment of a role that is normal (depending on age, sex and social and cultural factors) for that individual." Put simply, disease trauma or congenital defects may produce an impairment or loss of function, which may in turn cause a disability, that is the inability to perform certain tasks, which becomes a handicap when the individual wants to perform those tasks. Thus a person with an immobile finger has an impairment, and this impairment might well prevent him from playing the piano, but only becomes a handicap if he wishes to play the piano. We should understand the social and cultural meanings of disability and handicap and then underscore the word "wish." Silver said that disability is a penalty of aging in the developed countries but in the undeveloped countries more than half of all disability is caused by congenital defects, malnutrition or injury. A large portion of this is clearly preventable. Looking at each type of disability, locomotion or walking disability is probably the area where the development of telecommunications has provided the greatest advantages. New technology can be of great benefit to the disabled, but can also create new problems. Silver stressed the simple consideration of problems at the planning stage can prevent the creation of new types of handicap.

Pedro Zurita gave a consumer view as a blind person himself.<sup>11</sup> He presented a concrete picture of the situation of blind and visually-impaired people throughout the world and stressed their desire not to be left out of the advantages of new technologies. The importance of considering their needs in the design stage and definition of standards was emphasized. He insisted on the point that no doubt the decisive differentiating factor is between those who are given a reasonable degree of social opportunity and training and those who are denied access to any kind of service. There are no truly reliable statistics on world blindness, although different surveys carried out by the World Health Organization indicates that there must be more than 40 million people who are blind or severely visually impaired. Out of those, approximately eighty percent live in developing countries and most of them are blind for reasons that are preventable or curable. In industrialized countries the situation is different : over seventy percent of blindness cases are people who are beyond the age of sixty and their number is obviously increasing. Out of those who are of working age, in advanced countries the percentage of those who are actually employed varies between 10 and 30%, but in developing countries only a few really

work. Zurita said, "Employment should be a priority." Positive attitudes, nondiscriminatory legislation, adequate training strategies and the effective application of new technologies can enable blind people to work in wide range of activities. He explained that telecommunication development has caused pluses and minuses from the consumer point of view. The positive side is that Braille electronic displays, synthetic speech, electronic image magnification and optical or intelligent character recognition systems have been developed, which have very significantly improved the quality of life for people who are blind or visually impaired and have provided much easier access to the worlds of knowledge and information. The negative side is a clear trend to privilege more and more the use of graphic and iconic representations in displays, flat keyboards, touch screens and other strategies that tend to nullify the positive effects mentioned above. He observed that the main stumbling block is cost, and this factor is further aggravated by the lack of national and international standards. If effective international cooperation could be achieved, many projects related to this matter would become viable propositions.

As Silver and Zurita emphasized it is extremely important to take the needs of the disabled consumer into account at the planning or early design stage of new technologies.

### **What is Good Design?**

What is good design? John Gill gave a clear answer. He said there are simple adaptations that can make telecommunication systems accessible to disabled persons. Minor changes at the design stage of new equipment can increase the number of people who can use that equipment ; good design for disabled persons is frequently good for everyone. His discussion identified the areas that cause problems for disabled persons and suggested methods for alleviating these problems.<sup>12</sup> Whilst there are many ways of assisting disabled persons using sophisticated technology, there are also simple adaptations that can make telecommunication systems accessible in the short-term. Many of these adaptations are inexpensive, but they do require an understanding of the needs of disabled persons and careful consideration of the design aspects. However, many of these simple modifications or preferable changes at the design stage will benefit all users.

Firstly Gill discussed the systems for personal use. With the conventional telephone, many disabled users experience problems with dialing. A physically disabled person may have problems using push-button keys ; these problems can be alleviated by using keyboards that help someone with a hand tremor, or by changing the physical characteristics of the push button to lessen the probability of accidentally pressing a key. There are also problems with some modern systems in that they do not allow sufficient time for someone who dials very slowly. These

problems are also very important for aged persons. Blind persons have problems with the lack of standardization of dialing systems. For instance, with conventional rotary dials, the zero can be at either end of the dial. With push button telephones, there are two common layouts — CCITT and ISO layout<sup>13</sup> ; this means that calculators have different keypad layouts from telephones in many European countries. Therefore the addition of an embossed dot on the number '5' does not eliminate ambiguity. He added that before one can dial, one needs to know the number. A significant number of disabled persons have problems in using a telephone directory — this may occur from difficulties in reading the small print in the directories or from physical difficulty in handling a large book. Therefore these groups tend to make significant use of directory inquiry services where they are available. For elderly persons, the introduction of the memory telephone has been a boon, and the decreasing cost of speech recognition is likely to benefit many disabled persons who have problems in dialing numbers. Cordless telephones are a boon to wheelchair users since they can initiate and receive calls irrespective of their location in the house. However, many of these telephones require two hands to operate — one to hold the telephone and the other to dial the number ; this can occasionally be a problem for everybody not just physically handicapped persons. A mobile telephone can also be of considerable benefit to physically handicapped persons if they are away from their houses ; for instance, if their car has a breakdown.

Secondly, there are problems with systems for public use. To use a public terminal, one needs to find the terminal — this is not a trivial problem for someone who is blind. Gill said one proposal is for the blind person to carry a tag that is interrogated by a short range radio transceiver attached to the machine. This means that the behavior of the machine can be modified to suit the needs of the individual. Having found the terminal, the user then has to be able to use it. Here the lack of standardization of keypad layouts is a major problem. Another problem is the trend towards using flat keyboards ; visually disabled persons would greatly benefit if there were ridges between the number keys and some embossed indication on the number "5."

He stressed again designers should note that good design for disabled persons is often good design for everybody. For instance, many non-disabled persons have experienced difficulties in trying to find the correct coins and then insert them in the correct slots on a cold dark night in a foreign country. The current trend is towards making systems more user-friendly by going away from keyboards to using touchscreens ; this is useful for some groups of disabled persons but a significant problem to others. What is needed is to offer the user a choice of using the keyboard or a touchscreen, and to make the use of graphics optional so that the text can be output in synthetic speech. It is this option that makes new systems more accessible

to a greater number of people. His conclusion is that most disabled persons would like a choice of services and would like to do this choosing themselves. It is most important that designers of new equipment consult appropriate organizations to obtain advice on accessibility by disabled persons ; this must be done before the equipment is designed and not after the equipment has come into use.

We tend to forget that all of us could experience a disabling condition due to the problems that Gill observed. Here, for instance, we remember that most Japanese personal computers have no embossed indication on the keyboards. This can be a problem for everyone who practices a touch system. This demonstrates the importance of the consumer's role in the designing process of information technologies.

### **The Market System-A Friend of the Consumer?**

The leaders of Eastern Europe's newly emerging democracies believe that the improvement of their telecommunications infrastructure is a prerequisite for their rapid economic development. In these countries obsolete telecommunication systems must be upgraded to cope with the higher level that free-market systems demand. Sandor Gryukovics from Hungary summarized the consequent challenges facing his country.<sup>14</sup> The first challenge is to accelerate growth, i.e. to improve the present telephone penetration rate of about 10/100 inhabitants to 27-32/100 inhabitants by the end of 2000. The second great challenge is to introduce new technology, i.e. the current networks are overwhelmingly analog so the old equipment is ill-suited to modern demands, therefore it is imperative that almost all the new equipment must be digital and existing equipment must be replaced as rapidly as possible. Gyurkovics mentioned that the important role of a market economy is to protect the consumer interest.

According to Alvin Toffler's scheme, up to now the human race has undergone two great waves of change, each one largely obliterating earlier cultures or civilizations and replacing them with ways of life inconceivable to those who lived before. The First Wave of change – the agricultural revolution – took thousands of years to play itself out. The Second Wave – the rise of industrial civilization – took a mere three hundred years. Today the Third Wave will sweep across history and complete itself in a few decades.<sup>15</sup> It is very clear that global industrialization is now going on, although the full impact of the Third Wave is yet unknown. Toffler observed that industrialism broke the union of production and consumption, and split the producer from the consumer. Everybody became almost totally dependent upon food, goods, or services produced by somebody else. On the other hand, such cleavage remarkably improved "living standards."

For the market was an expansive, self-reinforcing, institution. Just as the earliest division of labor had encouraged commerce in the first place, now the very existence of a market or switchboard encouraged a further division of labor and led to sharply increased productivity. A self-amplifying process had been set in motion.

This explosive expansion of the market contributed to the fastest rise in living standards the world had ever experienced.<sup>16</sup>

However, a serious corruption has occurred. This corruption is inherent in the divorce of production from consumption. The very need for a market or switchboard to reconnect consumer and producer, to move goods from producer to consumer, necessarily places those who control the market in a position of inordinate power — regardless of the rhetoric they use to justify that power. Toffler criticizes the situation that in all industrial or Second Wave societies not only products are bought, sold, traded and exchanged, but labor, ideas, art, and souls as well. This is true. He considers information technology to be the historical force that will drive the Second Wave society toward the Third Wave society, but the divorce of production from consumption has brought about a more serious corruption in the accelerated development of information technology than even Toffler expected.

### **Information Technology and Producer-Consumer Relations**

“There are no bad technologies. There are only people who either use or misuse technologies,” say people who believe the progress of science and technology is absolutely good. They consider that to develop technology is one thing and to use it is another. They assume technology is neutral and do not care whether the cleavage between producer and consumer worsens or is alleviated. I believe that such a way of thinking is absolutely wrong. In fact, people who insist on the neutrality of technology are always willing to work under the patronage of the organization looking out for its own special interest.

Marshal McLuhan strongly criticized the neutrality of technology. He observed that the medium is the message.

In a culture like ours, long accustomed to splitting and dividing all things as a means of control, it is sometimes a bit of a shock to be reminded that, in operational and practical fact, the medium is the message. This is merely to say that the personal and social consequences of any medium — that is, of any extension of ourselves — result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.<sup>17</sup>

Designers send a message to users by the design of interactive systems between producer and consumer. The message is often an unfriendly and unpleasant one. This is because of the cleavage between producer and consumer. This is the essential point. I would like to think, however, that it is possible to send a much more positive message that conveys the human concern a designer has for the users through new producer-consumer relations.

Unhappily, frustration and anger are a part of daily life for most of the computerized information technology users. They struggle to learn command languages or menu selection or thick manuals that are supposed to help them do their job, even though it is an intellectually meaningless effort to learn such "black box" systems. Most designers of information technology hide themselves behind the sophisticated high-tech black box. A change is needed on the producer side, especially within the group of intellectual workers, but the bureaucratic structure is very strong in the "technostructure" of today's industrial society, as John Kenneth Galbraith has shown: "We come to an interesting if speculative result. Emancipation could be the salvation of the planning system. Its discipline will be worse but only thus will it attract people who are of a quality that will serve it well. However, this is, indeed, speculation. There are enough harder truths to occupy our attention."<sup>18</sup> I agree with Galbraith. Emancipation means liberation from the planning system, a bureaucratic corporate organization.

On the other hand, a change is also needed on the consumer's side. Discussion in FORUM 91 indicates that the consumer should stop being a passive user of high-tech products in order to develop a more friendly relation with the technology, especially computerized information technology that assists our human communication ability and improves the quality of life for all. This is especially true today when global industrialization has led to many handicapped consumers throughout the world.

### Notes and References

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- 6 The author attended the Policy Symposium, the Technical Symposium, and Telecommunication Roundtable of FORUM 91.
- 7 John Strome, Information Officer, Office of the special Representative of the Secretary-General

for the Promotion of the United Nations Decade of Disabled Persons, Speaker on the topic "How Many People?" in Roundtable Symposium Session 2 : Telecommunications for everyone - needs of people with disabilities.

- 8 Nihon Keizai Shimbun, September 26, 1992.
- 9 Janet Silver, Principal Optometrist, Moorfield Eye Hospital (United Kingdom), Speaker on the topic "How Many People?" in Roundtable Symposium Session 2 : Telecommunications for everyone - needs of people with disabilities.
- 10 ICIDH is the acronym for 'the International Classification of Impairments, Disability and Handicaps (the World Health Organization, 1980).'
- 11 Pedro Zurita, Secretary-General, World Blind Union, Speaker on the topic "Consumer Views" in Roundtable Symposium Session 2 : Telecommunications for everyone - needs of people with disabilities. He had a congenital eye disease and went completely blind at the age of 11. His primary and secondary education was begun in schools for the blind and completed in ordinary schools. He has a degree in Spanish philology and speaks fluently eight languages. He worked first as a teacher and later became involved in international work in the field of blindness, holding executive positions on various occasions.
- 12 John Gill, Technical Research and Development Manager, Royal National Institute for the Blind (United Kingdom), Speaker on the subject "The Simple Solutions" in Roundtable Symposium Session 3 : What can be done to provide communications for everyone.
- 13 CCITT is the acronym for the International Telegraph and Telephone Consultative Committee, an organ of the ITU. ISO is the acronym for the International Standardization Organization.
- 14 Sandor Gyurkovics, Secretary of State, Ministry of Transports, Communications and Water Management (Republic of Hungary), Speaker on the subject "Promoting and Funding Telecommunication Development : Given its Vital Role, Should Governments Take a More Active Role?" in Policy Symposium Session 4 : Telecommunications and Development.
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- 17 Marshal McLuhan, *Understanding Media - The Extensions of Man* (McGraw-Hill, New York, 1964), Mentor reprint edition, p.23.
- 18 John Kenneth Galbraith, *The New Industrial State*, Fourth Edition, A Mentor Book 1985, p.335.