Social Aspects of Telecommunication

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Guest editorial

BY RICHARD LING

About two years ago, on a nice sunny day, I took a day-trip with my wife and daughter to an art gallery located about two hours away by car from my home in Oslo. The gallery is located on quite beautiful grounds with an open grassy area and small lake in which children can play, a cafe and a museum shop.

I have to be honest, however, when I say I do not remember the art that was on display. The work is usually of quite good quality there and I am sure that I saw something that struck me as interesting at the time, though I don't remember what it was. The thing I remember – and the reason that I am prompted to write about it here in the introduction to a journal devoted to technology and society – was that one of my fellow gallery goers got a phone call on her mobile phone right in the middle of one of the display rooms.

The phone rang, the woman pulled a little telephone out of her purse, pulled down the "flip", sat down in a chair by a window and started in. *"Hello, oh, is this you? Why yes, I though that we could get together later next week. How is Kristin doing? You know I thought she looked better yesterday ..."* And so on. I was soon in another room, out of hearing range and trying to get back to looking at the art. But the telephone call sat in my mind.

That I remember the phone call is indicative of the way technology is changing our lives. It was the most surprizing thing that happened that day. In some respects it was not until then that I understood how quickly mobile telephony was on its way into my life. Now, as I sit here writing these words, a mobile telephone is lying next to my PC. In one sense, the revolution is complete.

The revolution is only complete, however, in that the technology has become commonplace. Our use and our social understanding of the technology is still in the process of definition. The rapid growth of new technology means that we, as persons in society, need to rethink how it is that we use the new technology and in which situations. It is this task to which this issue of Telekronikk is dedicated to mapping.
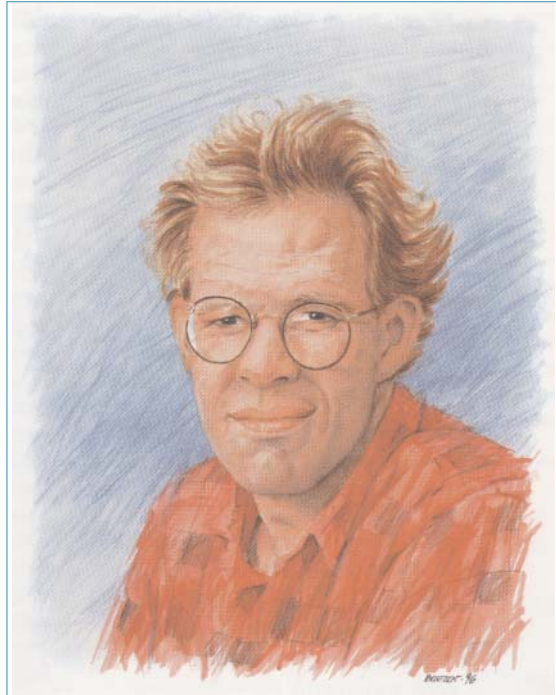
The changes occasioned by technology are taking place on many levels. The articles in this volume bring several of these into focus. Large corporations are having to rethink their strategies and ways of doing business, people are having to find justifications for having, or not having various technologies such as PCs, cellular telephones and internet access in their homes. People are having to rethink what it means to have a friend or go to work. It is possible, for example to have cyber-friendships (and for that matter cyber affairs) that exist only electronically. It is also possible to have only an electronic relationship to one's work place. As a society we have to consider the consequences of these developments for our personal security and for those persons who do not have access to the same information. Finally, it is worth considering if fundamental institutions such as the family, the state, education, work and religion will be changed, or perhaps even become obsolete, as a result of the new technologies.

These are questions that will be considered in this volume. The various authors have tried to look at that match between technological development and the way in which social institutions are reacting. However, like the cellular telephone in the gallery, it comes down to how individuals experience the changes. That is where we are having to accommodate, evaluate and interact with the technology. As my experience in the art gallery illustrates, one of the most obvious consequences is that development will go along unexpected paths. In the words of Kenneth Boulding "The safest way to prepare for the future is to prepare to be surprised, as you surely will be."

Social transitions and new communication technologies

BY RICHARD LING

Everything that was is no more.
All that will be is not yet.
– Alfred de Musset

Introduction

Mao is reported to have said that "the world is in chaos and the situation is wonderful." This could well be the motto of the social scientists investigating the changes brought on by new electronic information technology. This has challenged the way we carry out our lives. In the industrialized countries, and even in many third world nations, it is difficult to find people who are not affected by these developments. People are purchasing goods and services electronically, job descriptions are changing and old techniques are being replaced. Technological unemployment is a fact. Access to a broad spectrum of new information and entertainment sources is almost taken for granted. Household members are working remotely and holding contact with loved ones mobily, visually, via "the net" and via satellites. People are being tracked, billed, marketed to, entertained, inspired, corrupted and healed with the use of electronic data. In sum, we are facing new ways of interacting with others, with our work and with society as a whole.

Figure 1 Are we on the verge of a new Information Age? Are we facing the same type of social transition as those who experienced the introduction of printing or industrialization? We have only started to map the extent to which information technology will effect our lives. To answer these questions, however, we need to know its impact on settlement patterns, social institutions such as the church and the family, on our working lives, on forms of production and ownership, etc.

Commentators, who are perhaps prone to hyperbole, say that this represents a new era. They say it is as fundamental a shift as the invention of the printing press or the industrial revolution.

If this is so, then it must be a wonderful time to be a social scientist. After all, the printing, and more directly, the industrial revolutions were the progenitors of modern social science. These developments gave rise to the big names who, in turn, have spun off schools of thought (and practice) that even now dominate the disciplines. Saint Simon, Durkheim, Freud, Marx, Weber, Tönnies, Mannheim and their followers, Parsons, Merton, The Frankfurt School, Goffman, Garfinkel, Becker, Wright, Braverman, etc. are all in a dialogue with the social changes occasioned by the industrial revolution. As noted by Kumar:

> *The heroic age of sociology was also the heroic age of industrialism. It was almost impossible for the early sociologists not to feel some sense of exhilaration at the novel and sweeping changes taking place in their societies before their very eyes* (1978, 108).
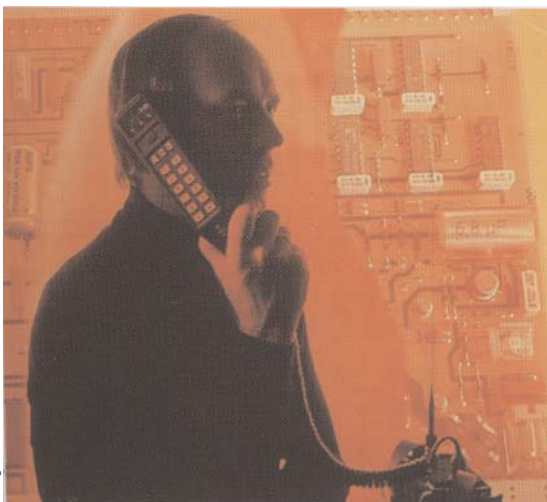
Now, it may be time for these earlier heroes to move over and make place for us. We can aspire to be the de Tocquevilles of our time, setting out to explore the functioning of bold new social experiments in not so far off cyber-space. If this is truly a social revolution then it must be this generation's turn to examine the functioning of social systems and the stresses accompanying the development of a new epoch. It is stress, after all, that renders the situation. If we focus our attention on how people deal with these social changes, it will be the perfect chance to really find out what it is that makes society tick.

New technology presents us with this type of situation in spades. We can call friends and family around the world with video telephones. We are seemingly forced to eavesdrop on other's cellular telephone conversations on buses, in restaurants and at meetings. We can work at home. Telephone sales people can reach us with ever more exotic offers at ever more inappropriate times and in ever more awkward places. We can gain access to the great libraries of the world, carry out medical examinations, check the subway schedule for New York, Paris or Tokyo, write a message to a lover or view great art works while we sit in the middle of the forest, on the top of a mountain, at our workplace or at our breakfast table. We can use the new communication possibilities to send flowers to sick Grandmothers, or to order heroin. All of this is existing technology. In the near future we will be able to send any type of high quality motion pictures from and to almost any place on the globe.

While the technological possibilities are seemingly limitless, social institutions and conventions are only beginning to develop. There are many unresolved issues. How does one greet others over video telephones? What does this mean for the future of corporations? Do people interact differently when they "meet" on the net and meet face-to-face? How do we conceive of cellular telephones? Do we really use the PCs we have bought for home use? Where does our personal privacy begin and end? How do people in different parts of the world and of different social status experience the access to information? Is gender an important key to understanding technology? At a broader level, if we are on the verge of a new era, will this technology lead to a new information based social organization, or is it just humbug? Theodore Roszak, for example, compares the role of faith in the information age with that of belief in relics of the True Cross in the age of salvation. He notes that both are seen as agents of deliverance (in Kumar 1995, 6–7).

Since we are still in the midst of the process it is difficult to take a measure of its total impact. To give us a perspective, this article will examine the issue by comparing the current situation with that experienced during the development of modernism. I will examine a period that lasted from the 15th to the middle of the 19th century during which printing and industrialism were established. This discussion takes its point of departure from the work of historian Elizabeth Eisenstein and her analysis of the social implications of printing (1993), Max Weber who examined the genesis of industrialization (1958) and in particular the sociologist Krishan Kumar who has examined the role of the industrial revolution in the development of sociology and contemporary thought (1978, 1995). After a short examination of today's technical situation, I will turn to the social changes associated with the print and industrial revolution. Finally, there will be an examination of the potential for a new social organization based on information technology.

The current technological situation

As described above we are living at a time when technology is developing very quickly. In this section I will describe some of these changes.

Ever since the development of radio and in particular television, one has had the ability to receive large amounts of **broadcast** information, that is all receivers in a given area receive the same signal simultaneously. With this system the user has to accept what is being offered at a given time. Aside from turning it on or off, the user has no ability to interact with the information flow. One aspect of the development we are experiencing is focused on the ability for each receiver to receive, or send a **unique** flow of information (text, pictures, film, sound, money, music, orders, love letters, hate mail, etc.) over which both the sending and the receiving party have various forms of control. That is, each individual can send information to either unique persons or broadcast it to all those who are connected to the system. In addition, the receiving party can stop, rewind, fast forward, request alternative information, etc. Negroponte describes the tailoring of information consumption as "Cottage television" and illustrates it as follows:

> *If I were contemplating a visit to the southwestern coast of Turkey, I might not find a documentary on Bodrum, but I could find sections from movies about wooden-ship building, nighttime fishing, underwater antiquities, baba ghanouj, and Oriental carpets from such sources as* National Geographic, *PBS, the BBC and hundreds of others. These pieces could be woven together to form a story that would suit my specific need. The result would not likely win an Oscar for best documentary, but that is not the point* (1995, 175).

In the past 15 years, the number of bits per second that one can transfer through such interactive channels has jumped from a couple hundred to many billion (see Figure 2). A decade ago, one was able to transfer simple text at quite slow rates over networks (300 – 1200 bits/second). Today, it is possible to transfer digital, interactive video material into the home, at quite high rates (164,000 – 6,000,000 bits/second). Video telephones, video-on demand, etc. are technical realities. The speed of information
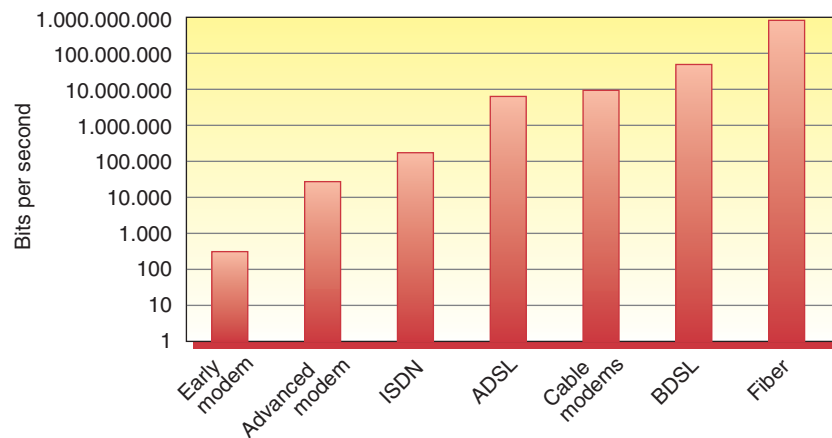

Figure 2 Developments in bandwidth and encoding (logarithmic scale). Early modems were able to transmit several hundred bits per second. This has now advanced to several thousand bits per second. ISDN (Integrated Subscriber Digital Network) systems can send over 100,000 bits per second and ADSL (Asynchronous Digital Subscriber Line) systems function in the range of two to 50 megabits per second. In the future Cable modems, BDSL (Broadband Digital Subscriber Line) systems and fiber optics will push this capacity into the gigabit and even terabit range.

transfer is, even now, in the process of increasing from millions to billions and even trillions of bits per second. At the same time the amount of band width needed to transfer, for example, full motion video material, has decreased due to the development of digital encoding.[1] Thus, ever more capacity is becoming available for content that takes up ever smaller amounts of capacity.

While the technological side develops with, quite literally, blinding speed, the social adoption of the conventions and institutions to integrate this development into our daily lives lags behind (see Ogburn 1965, 1970). At the macro-social level payment systems are in their infancy, copyright issues stand in the way for free access to material, our educational system is only beginning to integrate the use of technology, etc. On a micro-social level, the technologies have

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[1] *Video compression, in effect, scans a sequence of pictures and determines the information that remains the same from frame to frame. Rather than send the same information over and over again, it simply sends a message that the same material should be displayed from frame to frame until new material is introduced into the picture. The development of MPEG compression standards has resulted in an 80 fold decrease in the bandwidth required to send video material.*

only began to find their way into our lives. People often have the sense that we already have enough information. The TV, newspaper and paperback are good enough. People wonder why they should go out and buy the technologies that provide them with access to the flood of information that may come.

The situation with information technology can, perhaps, be compared to that of the car in 1900. One could purchase and drive about in a motor car. However, the social structure around the car was still in its infancy. On the broad institutional level, the roads were crude and undeveloped, in addition, there was no system of gas stations or mechanical help for the technology. Finally, the settlement patterns and the general needs of the society were oriented towards other forms of transportation, i.e. boats, trains, horse drawn carriages, etc. There was no real need to invest in a car. In short, the general technology was in place, but not the social structure (Dertouzos 1995, 24).

The situation has now changed. There have been incremental changes in the core technology (Lovins et al. 1993, 349–351). The engines in automobiles are somewhat more powerful, the passenger area is more comfortable, the cars are more reliable, etc.

The surrounding social context, however, has adapted to the technology such that automobile based transportation is driven by an internal logic, a culture of automo-

Figure 3 The degree to which the printing press was exalted is shown in this etching from the frontispiece of Prosper Marchand, Histoire de l'origine et des premiers progrès de l'imprimerie. *The spirit of printing is shown descending from the heavens under the aegis of Minerva and Mercury. It is given first to Germany, who then presents it to Holland, England, Italy, and France (reading from left to right) (Eisenstein (1993: v)).*
Following a similar perspective, Roszak has compared faith in the information age with that of belief in relics of the True Cross in the age of salvation.

bile transportation. With the development of better roads, and eventually freeways, different urban settlement patterns arose (Jakobs 1961, Gans 1967). In a self-sustaining cycle, these new settlement patterns in turn dictated the need for extensions of the motorized transportation system. Eventually, one could literally not get to work, shop, educate themselves, engage in free time activities, etc. without the use of the car.

This development has gone beyond the technological and spilled over into the

cultural. In addition to the immediate functionality of the car and the complex of institutions around it, there has also developed a supporting ideology. The culture of the automobile was not only accepted, but it became chic. The location of one's suburban home, the vintage and style of one's car, the shopping centers one visited and the exotic locations to which one drove on week-ends and vacation were elements of positive status.

To complete the comparison, the automobile has altered society. It is clear that

we have a much greater radius of movement than our grandparents. However, if one goes up to a somewhat higher level of abstraction, one can ask if the transformation is a fundamental shift away from that which has gone before. One can suggest that we have adapted the same social institutions to the existence of the automobile. There is no new form of ownership or production that has been occasioned by the automobile. One does not have a fundamentally different relationship to one's family or background. The church, work, education, government and the basic social institutions, are all quite similar to those that existed before the advent of the car. One does not see that radically different structure of society that separated the institutions of the middle age from their modern counterparts. Is this the situation with information technology? Let us pursue this question further by examining the transition from medieval to modern society.

The development of printing and industrialization

The assertion that we are in the midst of a new era is easy to make. The evidence seems to be all around us. A newspaper article features a new type of PC, the person sitting across from us in the bus gets a call on their mobile telephone, the news reports on the impact of a technology, writers and publicists suggest that we are on the point of entering a new era, etc. As with the case of the automobile, however, one can ask how deep is this revolution going. In this connection it is good to examine the contours of a previous, technically based, social upheaval.

In the section below I will consider the social impacts connected with the rise of printing and industrialization. I start by examining the effects of printing. This is a well documented example of a new communication technology that, in some ways parallels, and in some ways diverges from our current situation. With the development of printing one can begin to examine the groundwork being laid for the later development of industrialization. One must be quick to note, however, that this was only the groundwork. It seems that printing did not provide the spark that ignited the shift from feudal to industrial society. For a description of this one must turn, for example, to the work of Weber who suggested that access to technology in itself, does not explain the genesis of a new social order. Rather, he posited that it is the combina-

tion of technology and ideology, in whatever causal order, that provide the necessary and the sufficient conditions for the development of social change. Thus, if we are on the edge of a new era based on electronic communication, it is not enough to simply talk about wires and boxes. One must be on the look-out for ideologies that set the situation in relief, that galvanize the popular imagination and that channel development. To examine an historical case, I will look at Weber's analysis of the Protestant ethic and its effect on the rise of industrialization. In the last portion of this section I will examine some of the major social impacts of industrialization.

The print revolution

The discovery of movable type and the printing press by Gutenberg in about 1450 is seen by many as one of the key developments of the modern period. Many of the social effects of this invention went on to provide the necessary conditions for the development of industrialization in the beginning of the 1800s. The idea of an academic debate, fixed, indexed and cross referenced laws and regulations, the concept of nationalism based on the general recognition of a common language and a common set of national authors and the recognition of individualism were effected by printing. According to the historian Elizabeth Eisenstein (1993), there were six major effects of printing that will be examined below. These were changes in the dissemination and standardization of information, the organization of books, the data collection process, the preservation of information and its amplification and finally, in the use of censorship. I will examine these points and draw out parallel contemporary developments in the section below.

Dissemination of information

The first, and perhaps most notable effect of printing suggested by Eisenstein is the increased ability to disseminate information. She describes two major effects of increased access to printed material. On the one hand, printing gave rise to a new wave of literacy (Anderson, 1993, 44). This resulted in, among other things the establishment of the Reformation and the rise of the vernacular church. The other effect was that those who were already literate gained access to a vast new body of material. This access has been described as intoxicating. Like the intensity of contemporary computer "hack-

Figure 4 While movable type had been known for several hundred years, its use was not combined with the printing press and perfected before the middle of the 15th century in Mainz, Germany by Johann Gutenberg, Johann Fust and Peter Schöffer. The development of the printing led to a rapid growth in access to books for the priesthood, scholars and common people.

ers," one can imagine the ferment of ideas experienced in the decades after the invention of the printing press. Where earlier colleagues were forced to travel in order to gain access to manuscripts, scholars could visit the printers' shop and the book store to sample the newly accessible, and ever less expensive books. Eisenstein reports, for example that Montaigne "could see more books by spending a few months in his tower study than earlier scholars had seen after a lifetime of travel ..." (1993, 44).

While there was fermentation of ideas, the results were not always in the direction of an ever more rational outline of accurate and factual knowledge. In fact, the scholarship immediately after the introduction of printing has been described as wide ranging and unfocused. The rise of the printing press, in many instances, meant that existing belief structures were adopted as whole cloth and dispersed to both scholars and lay people. Scholars were busy untangling the assertions made by various disciplines, such as maths and physics, from those of quasi-disciplines such as alchemy, astrology

and other occult "sciences." The scholarly libraries were quick to grow. None the less, the painful and entrenched process of sorting out the real from the imagined scholarship required the development of more rigorous academic discussions.

There are obvious parallels to today's situation here. The computer literate population has gained access to a bewildering variety of information via various electronic communication networks. Like the ability to publish scientific findings or vernacular manuals, today's Internet is the home of an unfathomable number of sources. One can exchange tips on statistical analysis with people in India or Berlin, find the best place to enjoy a Belgian beer in Manhattan, chase down facts on the latest developments in interactive communication, commiserate, world wide, with fellow left handers, catch up on the latest conspiracy theories or read serious sociological journals. This access has given a forum to a wide variety of people and perspectives. The result is a babble of information, some factual, some fanciful and some outright false. Like the reader in the early modern era,

Norwegian Telecommunications Museum

we are now in the process of sorting out the useful and the useless information. We are experiencing much of the same wide-ranging and unfocused debate, or cheap speech, that one experienced during the first part of the print revolution (Rosen 1995).

Standardization of information

After the development of printing, access to a relatively fixed and uniform body of knowledge led to the standardization of ideas and schools of thought such as schools of architecture and art. Eisenstein also suggests that standardization can be seen in development of stock procedures in various "How to" books. Skills such as the composition of sermons, housekeeping, cooking, musical instruction, accounting, etc. were the subject of these efforts. Using this type of instruction one could learn the techniques that previously were based on verbal traditions.

In addition, Eisenstein suggests that printing helped to standardize a sense of identity and defined the differences between various groups. This was done via the establishment of broadly recognized place names and boundaries and individuals, key aspects of national identity.[2] She asserts that printing helped develop a lexicon of stereotypical regional and status differences in clothing styles through the publication of clothing patterns and books describing various social groups.

> *Repeated encounters [in print] with identical images of couples representing three social groups – noble, burgher, peasant – wearing distinctive costumes and set against distinctive regional landscapes probably encouraged a sharpened sense of social divisions as well as regional ones* (Eisenstein 1993, 59).

If we can jump in time to the present, electronic communication seems to be having the opposite effect. The ease with which one can communicate over international boundaries has perhaps resulted

in a sense of globalism. In spite of the fact that much of what is discussed on the Internet is in English and has to do with what one might call a glossed over version of Californian culture, there is a cosmopolitan flavor to the discussion. At another level people have began to play with their gender, status, age and educational identities in today's electronic communication networks. For example, the anonymous nature of the so-called multi-user domains (MUDs) allows users to present themselves as either men or women, as old or young, as sexy or boring. Both Turkel and Stone report on gender swapping, the development of fantasy characters and what one might call interactive pornography and "cyber-affairs" in these Internet-based chat groups (Turkel 1995, Stone 1994).[3] Thus, the notion of a fixed individual identity, described as being a consequence of printing may be in the process of changing. It may be that we are moving into a world where the individual can employ the possibilities made available in electronic communication to develop a flexible notion of individuality.

Reorganization of texts

Eisenstein suggests, as have others, that the development of printing may have reorganized ways of thinking (Innis 1972, Meyrowitz 1994, McLuhan 1964, Ong 1982).

> [After the development of printing,] *copying, memorizing and transmitting absorbed fewer energies. Useful reference books were no longer blotted or blurred with the passage of time. Cadence and rhyme, images and symbols ceased to fulfil their traditional function of preserving the collective memory. Once technical information could be conveyed directly by unambiguous numbers, diagrams and maps the esthetic experience became increasingly autonomous* (Eisenstein 1993, 88).

As evidence of this she points to the idea that access to reference books placed an increasing importance on the understanding of alphabetical order. While already

existing, the notion of alphabetical order was not common knowledge. For example, a thirteenth century writer noted:

> *'Amo' comes before 'bibo' because 'a' is the first letter of the former and 'b' is the first letter of the latter and 'a' comes before 'b' ... by the grace of God working in me, I have devised this order* (cited in Eisenstein 1993, 65).

This citation strikes us as quaint, not only because of the pedantic tone regarding the order of the letters, but also because of the authority cited.[4] Previous to the development of the printing press there was little need to organize books in a library in any standardized order. The collections were small enough that the librarian knew each volume on sight. If the collection was large enough, an idiosyncratic ordering system might be employed, such as the use of rhyme to locate titles in the eighth-century library at York (Eisenstein 1993, 65).

Along with alphabetizing, the concept of pagination, indexing and cataloging is said to have experienced a development with the introduction of printing. Part of this was simply for the convenience of the reader as they referred to the same work over and over. However, part of the motivation was the attempt by book publishers to out compete each other with finesses and features. An effect of this pressure to catalogue, is that books began to be defined in terms of more narrow disciplines. As this definition process proceeded, authors began to limit themselves to the categories that had been established. Thus, Eisenstein suggests that the reorganization, indexing and cataloging of texts helped to precipitate the systemization and channeling of scholarship in the various disciplines.

Printing also enabled scholars and jurists to collect and to unify various documents and for the first time in centuries study important documents as a whole. A case

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[2] *For example, the wide distribution of the king's likeness gave subjects a different understanding of the royal person. An ironic example of this is provided by Louis XVI. When he tried to flee he was apprehended by a Frenchman who recognized the king from his printed portrait on paper money (Eisenstein 1993, 59).*

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[3] *According to Turkel about 5 – 10 % of the users of the Japanese computer area known as Habitat have switched their "virtual" gender. She reports it is more common for men to pose as women (1996, 196).*

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[4] *One might expect a similar statement by one of today's cyber punks regarding the organization of the Internet, i.e. home pages on the net are organized in a tree structure and can also be accessed using hyperlinks. The difference, of course, is that "by the grace of God working in me" would be struck from the acknowledgments leaving the brash "I have devised this order."*

in point is a key legal work from the classical period called the *Corpus Juris*, the original manuscript of which had been separated into two portions. The original of one portion was in Pisa where legal scholars had to travel if they wished to view, not study, the document. "The legal scholars were barred (quite literally in the case of Budé, who saw the manuscript only through a grate) by the guardians of the precious codex who allowed visitors only fleeting glimpses of the relic" (Eisenstein 1993, 71). Given this situation, one can understand how the publication of the complete document in 1553 changed the way legal scholars approached their work.

In addition to providing a common set of materials for academic study, printing also provided more standardized regulation and legal proclamations, thus increasing the power of the state. Previous to printing, proclamations were hand copied and displayed or read in public places. After the development of printing a new order was introduced to public administration. Official documents could be indexed, cross-indexed, alphabetized or set in chronological order in bound volumes. This, in effect, fixed laws and regulations and gave all a common point of reference. Weber, as will be noted below, asserts that one of the main conditions for the development of bureaucracy, national administration and industrialization is the existence of an accessible set of fixed rules.

Like our counterparts in the 15th and 16th centuries, one can today experience the striving to make sense of the vast amounts of electronic information. Just as alphabetizing, pagination, indexing and cataloging existed before the rise of printing, some of these metaphors and conventions are being carried over into the development of new media. There are, for example, pages, addresses and menus on the Internet. However, one can assert that with electronic communication, information retrieval is becoming more personalized and idiosyncratic, not more rationalized as was the case in the era of print. Rather than a common system of categorization, we are moving towards a system where each individual develops their own indexing system, their own taxonomy of knowledge. There is the rise of Internet searching services such as Yahoo, Alta Vista, Lycos to aid in this process. The administrators of these systems even contribute their own idiosyncratic suggestions via the "What's cool" function of certain web sites. In

addition, the whole idea of agents, that is small transmittable user defined programs sent out to collect certain types of information or services, are perhaps taking idiosyncratic information retrieval to its logical extent.

Data collection

Printing affected the way that data collection took place in several ways. First, it allowed the correction of manuscripts through feedback. Previous to Gutenberg, the compilation of catalogues and books tended to become more and more corrupted as they passed from copyist to copyist. The advantage with printing was that, in spite of the fact that such mistakes could be made, a wide readership could find the same mistake in identical books and report this to the printer.[5] The development of published errata illustrates how printing was more self-correcting than scribal culture. Many independent readers could find and report problematic material, the publisher could make corrections and publish them to a wide audience. Eisenstein notes that in "the very process of accelerating the corruption ... [printing] offered a way of overcoming it for the first time" (Eisenstein 1993, 74).

Second, in scientific discussions the object of debate became fixed after the development of printing. This meant that a document was exposed to broad exposure within relevant academic communities, and therefore subject to commentary and the exposure of errors. Rather than an individual trying to interpret a single manuscript, a whole community of readers could refer to a common document and communicate with each other, the publisher and the author when questions arose. This demystified texts and moved them from being sacred relics to being the object of debate, to be amended, developed and extended in subsequent editions.

Third, Eisenstein describes how the development of a community of readers, who were also potential contributors, led to an expansion of knowledge. The idea of a closed corpus of knowledge passed from generation to generation in sacred or semi-sacred texts was, in this way, replaced with the idea of an ever expanding body of knowledge. Easy access to

identical printed material meant that a broad public was inspired by the work of others, either in the direction of attempting to rebut it or to extend it. New information in the fields of astronomy, biology, botany and zoology led to interchanges leading to new investigations, more data, better classification and more complete reference works (Eisenstein 1983, 258–259). The fact that reports were subject to the scrutiny of a wide audience meant that falsities and misleading material were soon found out and debated. This process has been retained in the referee system still in use with scholarly journals, a system that assumes the existence of discipline boundaries. Another scholarly convention that arose at this time was the citation system and the acknowledgment of one's sources. Thus, the development of a stable body of scientific literature that is examined, amended and developed by a community of interested parties owes much to the development of printing.

To consider our present situation, information technology provides stunning advances when one considers the ability to collect and examine information on complex issues. The sociological questionnaire, the development of econometrics, genetic analysis, weather forecasting, advances in physics, engineering and even text analyses in the humanities have all flourished via the application of information technology. This is perhaps their greatest contribution. In the words of Kenneth Boulding: "The computer ... has given us continuously compounded interest at banks, easier airplane reservations, and a large quantity of unread Ph.D. theses" (Boulding 1971, 13). Interaction engendered by telecommunications has also increased the ability to debate issues and to seek clarifications.

Preservation of information

Printing had a preservative effect at both a concrete and cultural level. Manuscripts, like books are physical objects that are subject to destruction. The difference is that the multiple nature of books means that there is a larger chance that the content will be retained in spite of the disappearance of a single copy of the document.

At a broader level, printing also helps to preserve local culture and language. The fixity of published writing helped to define differences between languages. At the same time it helped to eliminate local variations contained in dialects, thus en-

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[5] *The classic example of this is the so-called "wicked bible" of 1631 which stated that: "Thou shalt commit adultery."*

gendering a sense of nationalism and identity with broader political entities such as the state (Anderson, 1983, 47). Printing also allowed one to preserve other types of traditionally verbal information. Recipes, biographies, epics, sagas, etc., could be published, free from the corruption associated with scribal culture or individuals' memory. With this arose the issue of information ownership and individual vs. collective authorship. The idea of authorship is difficult, and perhaps irrelevant when discussing manuscripts, epics, fairy tales, folk songs and sagas since they are, by nature, social constructions. With printing there was a sudden need for newly created material, and thus the identity of the author becomes obvious and gains importance. The author's identity, for example, has real economic consequences when discussing contemporary novels and screenplays.

> *Until it became possible to distinguish between composing a poem and reciting one, writing a book and copying one; until books could be classified by something other than incepts; the modern game of books and authors could not be played* (Eisenstein 1993, 85).

The commercial interests of publishers pushed development away from the idea of collective authorship towards that of the individual, and identifiable author. The production of "experts" and the marketing of best selling authors found its form in the development of unique titles (see also Anderson 1983, 43). This movement toward individualization, as we shall see, is also one of the key developments of the industrial period.

It has been argued that electronic communication reduces the ability to preserve material. Historians, for example, bemoan the development of telephone since it has led to fewer letters, an important source for historical research (Meyrowitz 1995). Another problem is that frequent changes in equipment and information formatting lead to problems with the preservation. One who has a manuscript in MAG card format, or in 80 column IBM computer punch card format will have problems finding equipment to read the material given the rapid shifts in standards. Even within the same general format, i.e. DOS, advances in software without backward compatibility often mean that old material is inaccessible. Finally, the easy ability to erase large data files with a few simple key

strokes, hard disk crashes and computer viruses are all threats to the preservation of information. Thus, while the ease of producing massive amounts of material are enhanced with information technology, it is not guaranteed that there is a similar ability to preserve the material.

At another level, one can observe that electronic communication seems to be loosening the "fixity" provided by printing. An effect of today's information technology is that it is becoming more difficult to protect copyrights. Text, film, music and any combination of these can easily be sampled and copied from the work of others almost with impunity (Bing 1994, Mitchell 1995). The rights of authors, film directors, musicians and a whole host of creative people are being overrun by the development of new technology. This threatens the notion of individual authorship since the viewer or reader can not be sure of the source of material. McLuhan spoke of electronic communication's role in the development of a global village. This is perhaps true in the sense that the material one reads, hears or watches is becoming collectively produced, just as in the older pre-scribal cultures. These developments also mean that the development of science becomes more interactive, and perhaps less reflective.

Amplification of information

Printing allows the amplification of certain vernacular voices. The fact that Goethe, Ibsen, Shakespeare, H.C. Andersen, or Burns or are so often referred to in their respective countries is due to their publication. The writings of such authors, in effect, helped to define and became a part of the cultural or national identity. An aspect of being American is the knowledge of Twain, part of being Norwegian is knowledge of Bjørnson, etc. The impact of Shakespeare on the English language was displayed by the journalist Bernard Levin when he "wrote":

> *If you can not understand my argument and declare "It's Greek to me", you are quoting Shakespeare; if you claim to be more sinned against than sinning, you are quoting Shakespeare; if you act more in sorrow than in anger, if your wish is the father to thought, if your lost property has vanished into thin air, you are quoting Shakespeare; if you have ever refused to budge an inch or suffered from green eyed jealousy, if you have*

> *played fast and loose, if you have been tongue-tied, a tower of strength, hoodwinked or in a pickle, if you have knitted your brows, made a virtue of necessity, insisted on fair play, slept not one wink, stood on ceremony, danced attendance (on your lord and master), laughed yourself into stitches, had short shrift, cold comfort or too much of a good thing, if you have seen better days or lived in a fools paradise – why, be that as it may, the more fool to you, for it is a foregone conclusion that you are (as good luck would have it) quoting Shakespeare* ... (in McCrum et al. 1986, 99–100).

The ability of the printing press to provide a population with an identifiable body of literature and a common set of references is due to amplification. This "vernacular" identity is a key aspect of nationalism which is, as we will see below, an identifying theme in the rise of industrial society.

Electronic communication has led to a broad based amplification of one's ability to present material. One is almost prompted to suggest that we are not experiencing the amplification of discernible voices, rather we are simply experiencing a higher noise level. The barriers to access are so minimal and the welter of voices yearning to be heard is so large that it is difficult to locate the cyber-based Shakespeares and the Ibsens. It is quite likely that these will come, but a mechanism and a motivation for their identification and their promotion seems to be lacking.

Censorship

Finally, almost from its origin, printing provoked the exercise of censorship. Wright notes examples of press censorship as early as 1480, only 30 years after Gutenberg's invention (1971, 180). From the Council of Trent (1545 – 1560) came the *Index librorum prohibitorum* listing books and material that were incompatible with Catholic doctrine. In addition, that forum emphasized the need to authorize new editions of the Bible and restrict lay reading (Eisenstein 1991, 160). Draper describes the anxiety over the development of the press among the ecclesiastical authorities leading to the Lateran decree of 1615 prohibiting the discussion of the Copernican theory under the penalty of excommunication (Wright 1971, 180).

The same debate, it seems, is being waged in relation to the development of electronic communication. A widely publicized but methodologically shaky analysis of material on the Internet reported on 900,000 pornographic "images, descriptions, short stories and animations downloaded 8.5 million times" (Rimm 1995).[6] At the same time a newly passed law in the US has made it illegal to electronically transmit "lewd, lascivious, filthy, or indecent" material. On this score, then, both the development of printing and electronic communication have seen a parallel development.

To summarize Eisenstein, she describes the ways in which printing provided the groundwork for the later development of industrialization. In particular, printing aided the growth of modern science in that it allowed the broad discussion of experimental results and gave the community of scholars access to the work and thought of others. Printing aided in the replacement of small, often kinship based social units with establishment of allegiance to broader entities such as the state. This was done by providing the basis for storing information in an easily accessible, and generally fixed form, a key idea in the development of bureaucracy. In addition, it helped to fix national identity in the form of a generally recognized language and through the establishment and promotion of "national" voices, such as broadly recognized poets and writers. Finally, it aided in the recognition of individualism vis-à-vis the authorship of ideas.

The *élan vital* of industrialization

Many of the institutions and conventions described by Eisenstein provided the necessary conditions for a clear break from the Medieval period and laid the groundwork for industrialization. One saw the rise of science, the fall of religious domination and the reorganization of public administration. However, after examining Eisenstein, one is left with the sense that only the necessary and not the sufficient conditions for industrialization have

been discussed. In this section I will discuss the ignition of industrialization, and the social order it engendered. One can suggest that our current situation parallels this in that perhaps information technology has provided the necessary but not the sufficient conditions for social change.

Several have suggested that the key to the development of industrialization is the accumulation of capital. A Marxian approach suggests that this accumulation resulted from the introduction of new technology, particularly Cartwright's power loom from 1785, spinning technology in the British textile industry and Whitney's cotton gin. This materialist approach suggests that the ideology supporting capitalism arose out of this material basis. By contrast, Weber suggests that the development of industrialization has both a material and an ideological moment. He noted several conditions necessary for the rise of industrialization. These included, among other things, the development of appropriate technology and accounting, free wage-labor, separation of the business from the household, an established and rationalized legal system and administration based on formal rules (Weber 1958, 22 – 25).

> *The particular modern Western form of capitalism has been, at first sight, strongly influenced by the development of technical possibilities. Its rationality is today essentially dependent on the calculability of the most important technical factors* (Weber 1958, 24).

These conditions, however, are not enough. According to Weber the individual was not free to engage in the types of activities required of capitalism before certain inner psychological barriers were removed.

> *... though the development of economic rationalism is partly dependent on rational technique and law, it is at the same determined by the ability and disposition of man to adopt certain types of practical rational conduct.* When these types have been obstructed by spiritual obstacles, the development of rational economic conduct has also met serious inner resistance. *The magical and religious forces, and ethical ideas of duty based on them, have in the past always been among the most important formative influences on conduct* (Weber 1958, 27) (emphasis added).

While the preconditions for capitalism and industrial development were observed in many other cultures, it was not before the development of Protestantism, and in particular Calvinism, that the proper ideological posture was achieved. For Weber then there is an intricate dance between the availability of the correct preconditions and what he calls the "spirit" of a new era. If one is not co-existent with the other, then industrialization would not have taken place.

Weber's analysis suggests that Calvin's theology of predestination and worldly asceticism provided the spark that ignited the industrial developments of the 19th century. As with Marx, the basic mechanism in this process is the accumulation of wealth.[7] For the Calvinists, the emphasis needs to be clearly placed on the idea of accumulation, not consumption.

> *Wealth in itself is a temptation. But here asceticism was the power 'which ever seeks the good but ever creates the evil;' what was evil in its sense was possession and its temptations. For, in conformity with the Old Testament and in analogy to the ethical valuation of good works, asceticism looked upon the pursuit of wealth as an end in itself as highly reprehensible; but the attainment of it as a fruit of labor in a calling was a sign of God's blessing. And even more important: the religious valuation of restless, continuous, systematic work in a worldly calling, as the highest means to asceticism, and at the same time the surest and most evident proof of rebirth and genuine faith, must have been the most powerful conceivable lever for the expansion of that attitude toward life which we have here called the spirit of capitalism.*

> *When the limitation of consumption is combined with this release of acquisitive activity, the inevitable practical result is obvious: accumulation of capital through ascetic*

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6 *Rosen (1995, 75) examines the many problems with Rimm's research. The validity of the research is one issue, however, its broad acceptance and the fact that it has supported the development of policy illustrate the currency of censorship in electronic telecommunication.*

7 *At one level Marx shares this perspective. He suggests the development of capitalism is the result of the commodification of consumption and the extraction of surplus value. The point of divergence is the role of ideology and the point at which ideology becomes an important element in the development of a new social formation.*

compulsion to save (Weber 1958, 172).

The effect of the "spirit of capitalism" is that an economic ethic had been established. In effect, Calvinists asserted that the blessing of God was made obvious through amassed wealth. As long as the use of the wealth could be construed as being within the general sense of propriety the incumbents activity was seen as a sign of divine recognition. It also supplied the underpinnings of an ideology whereby the rich could feel they deserved their position and that the distribution of wealth, just as the division of labor, was part of a greater design (Weber 1958, 177). For Weber then, wealth, and the endless search to realize further wealth is that ideological force that sparks the development of industrialism.

> *The idea of man's duty to his possessions, to which he subordinates himself as an obedient steward, or even as an acquisitive machine, bear with chilling weight on his life. The greater the possessions the heavier, if ascetic attitude toward life stands the test, the feeling of responsibility for them, for holding them undiminished for the glory of God and increasing them by restless effort* (Weber 1958, 170).

One can almost picture an early industrialist as dutifully seeking out ever more ingenious ways to pursue profits, all the while not looking over his shoulder for fear of God smiting him for relaxation.[8]

Thus, a key aspect describing the genesis of the industrial era is the accumulation of capital. While it was not the intention of the Calvinists, or the Protestants, to develop industrialization, Weber described it as a consequence of their ideology. When one searches for parallels to today's situation it is difficult to point to either a new ideology, or the consequences of an existing one that have the same broad effect on the organization of society as that of the Calvinists. It may be that it is in the process of developing

among, for example the cyber-punk culture, or some other ideological byway. However, its eventual manifestations and generalization are not yet obvious. This discussion will be taken up in the final section of the paper after an examination of industrialization's legacy.

The legacy of the industrial revolution

Many have pointed to the industrial revolution as one of the most dramatic turning points in human development. The period from the late 1700s until the middle of the 1800s saw a series of fundamental changes in the organization of production. The era is characterized by the replacement of hand work by machines, the replacement of human power by inanimate sources of energy, the rise of commercial marketing and entrepreneurship and the concentration of workers into large scale enterprises. These developments of course had their social consequences. The era saw the rise of achieved as opposed to ascribed status, complex social structures, specialization and heterogeneous culture. The family, religion, work life, the state, entertainment, justice, the waging of war, the arts, relations between the sexes, the role and the function of childhood and almost any other institution one can name were either established or transformed by industrialism.

As noted above, the industrial revolution is one of the central sources of inspiration for sociology. Contemporary social thinkers were inspired to capture the flavor and the impact of the transition. While one can not expect that the social formations arising from a potential information revolution will be the same, a review of these can give one a sense of the breadth of social changes that are attributed to the industrial revolution. They provide the standard against which one can examine claims as to the rise of an information society. Kumar points out several trends that are generally associated with industrialism.[9] The elements described by Kumar include: 1) the rise of urban life and the decline of community, 2) the demographic transition, 3) the division of labor, 4) centralization (nationalization), equality and democracy and 5) secularization, rationalization and bureaucratization (1987, 66 – 111).

The rise of urban life and the decline of community

One of the most concrete legacies of industrialization is the changes in physical living patterns. Industrialism saw the

rise of the modern city and the marginalization of traditional face-to-face communities.

While cities existed before industrialization, they were not the locus of production; that took place in the country side. Cities were market places and the religious or administrative centers that were, by today's standards, quite small. It is estimated, for example, that at its height Rome had only about 350,000 residents. With the rise of industrialism, production moved into a more urban context. This is the shift from Tönnies pastoral and community oriented *Gemeinschaft* to the more formalized, urban *Gesellschaft*. The co-location of factories, distribution centers and housing for workers, plus all the additional infrastructure needed to supply this system, turned the city into a new type of phenomena. Rather than being a more or less unneeded appendage to the primary agricultural production in the country, the city became the locus of the newly important secondary industrial production and even tertiary service industries. As with the automobile described above, the city's development went beyond simple functional aspects over into an ideology that supported a unique urban culture. The charm and the vibrancy of the theater, libraries, cafe society, art galleries, etc. are the manifestations of this culture (Jacobs 1961).

While urbanism is seen as a consequence of industrialization, the literature also accuses industrialization of causing the marginalization of primary communities. Authors have described this shift using a variety of different terms. As mentioned Tönnies called it the movement from

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[8] *Thoreau mocked this attitude when he wrote: "How many a poor immortal soul have I met well nigh crushed and smothering under its load, creeping down the road of life, pushing before it a barn seventy five feet by forty, its Augean stables never cleansed" (Thoreau 1975, 169).*

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[9] *While outlining the impact of industrialization, it is correct to point out that Kumar goes on to examine how sociology has perhaps taken as too literal the role of the industrial revolution. In its drive to comprehend and describe the changes wrought by industrialization, the discipline is guilty of overlooking the variations within the industrialization process, the timing and the tempo of the process and the likely outcome of industrial society. He notes that "as with the different modes of industrialization, so with their future working out: there was a diversity to the picture that ought to have warned anyone against inferring a strict logic from it" (1978, 161).*

Gemeinschaft to *Gesellchaft*. Durkheim used the terms mechanical and organic solidarity to describe roughly the same process while Marx talked about the shift from feudal to capitalistic society and Spencer described the evolution from homogeneity to heterogeneity. These thinkers were intent on describing a transition that was far more than the simple physical movement from the country to the city. Rather, they were considering an all encompassing shift in one's relation to society, the economy, the state and tradition. It was a movement from the consentual to the contractual, from control over one's work process to alienation from it, and from community to association.

Regardless of the names applied to the concept, this seems to be one of the most basic, and emotionally loaded aspects of the industrial transition. The movement from the relatively closed but highly personal local village to the de-personalized city has become one of the most powerful symbolic metaphors for describing industrialization. It is the modern re-enactment of the fall from grace. When presented as a melodrama, industrial society tears the child away from the mother's bosom and casts him or her into a Dickensian world to be abused by heartless industrialists. The continued popularity and endless variations on this theme indicate that the transition from the pre-industrial to the industrial remains clear in the popular imagination.[10]

The demographic transition

A second effect often associated with the industrial revolution is a change in the structure of reproduction. This so-called demographic transition is the shift from a society with high birth rates, high infant mortality rates and low population to the opposite situation.

The demographic transition asserts that in pre-industrial societies there is a high birth rate along with high infant and child mortality rates. Even though a woman

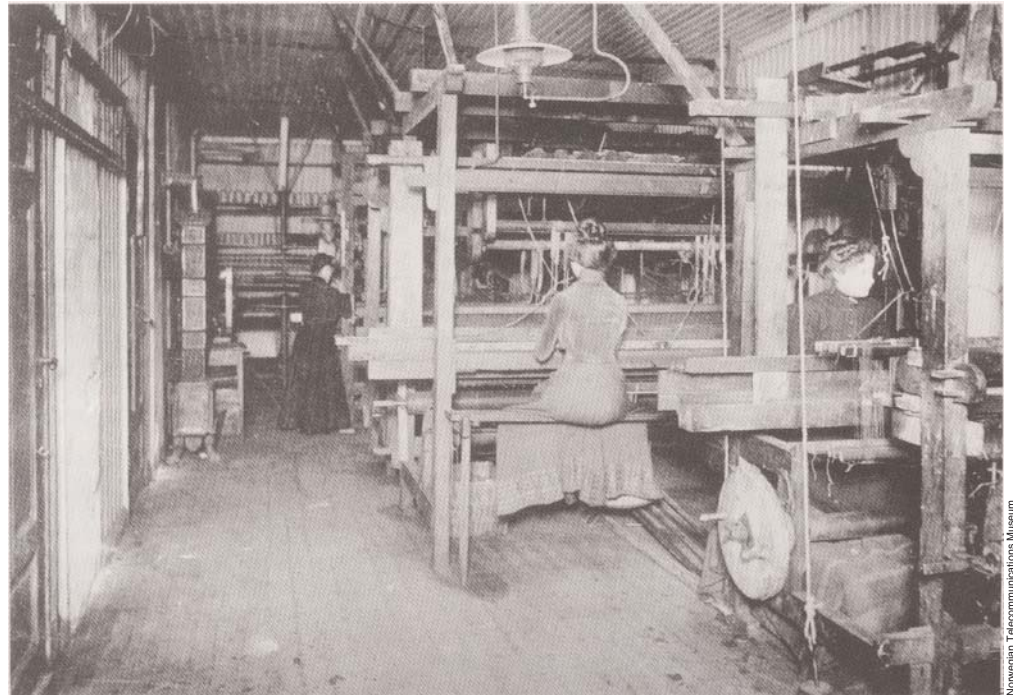*Figure 5 A photograph from the Gunnerius Pettersen Veveriet in 1902. The photo shows women working at looms producing cloth. It was this industry that provided the first example of industrialization in northwestern England. The development of the flying shuttle in 1733 by John Kay, Carwright's power loom from 1785, spinning technology in the British textile industry and Whitney's cotton gin along with development of the steam engine all contributed to the rise of the industry.*

may give birth to many children, only a few survive in order to reproduce themselves. This is supported by a morality emphasizing the realization of masculine and feminine ideals via the sireing, bearing and rearing of children (Rahman 1992). High fertility in this type of society has consequences for the welfare of the parents as they become elderly and unable to provide for themselves. Not surprisingly, before the demographic transition the mores governing children's relationship to their parents prescribe the idea of veneration and ancestor worship.

With the onset of industrialization and improved health conditions result in larger families. A larger number of the children survive birth and adolescence to the age of procreation. Thus, there is a population explosion. Eventually, constraints such as the costs of urban living and the difficulties of providing for larger families make them more difficult to maintain. With access to more secure contraception, the development of social welfare, the education of women, their entry into the work force and delays in childbearing until later in life there is a reduction in fertility rates. This results in a stable or even a declining population.

A lower fertility rate is supported by shifts in the culture. Rather than being a

sign of one's masculinity or femininity, producing an excessive number of children becomes a sign of questionable morality. It is acceptable and even positive to prioritize one's personal development and personal activities over the choice to have children. In some cases the choice to have children can be seen as a resignation to mid-life rather than an expression of one's potency. In this way, the conclusion of the demographic transition is a large urban industrialized population with low birth rates, high life expectancy and small families.

The division of labor

A central concept in many descriptions of industrialization is the division of labor. While certain types of specialization exist in pre-industrial societies, a more complete division of labor is a key characteristic of the industrial revolution. Industrialization broke down the time honored holistic production processes and replaced them with atomized assembly. Adam Smith's discussion of pin making in *The wealth of nations*, Eli Whitney's production of rifles out of interchangeable parts and Henry Ford's assembly line are perhaps the most famous illustrations of the division of labor. According to Smith the production of pins could be increased by several

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[10]*Indeed this theme is employed when considering film's interpretation of the transition from industrial to post-industrial society. Films such as* Blade Runner, Mad Max *and* Waterworld *are, in essence, an updating of* Oliver Twist, High Noon *and* Stagecoach, *that is the clash between the natural man and the corrupted and overly materialistic city dwellers.*

thousand fold if the various sub-processes were divided and carried out by separate individuals. Whitney and Ford took the concept, further refined it and applied it commercialized production.

Charles Babbage – the inventor of the difference and analytical engines, the ancestors of today's computers – was also interested in the potential that one could realize from the application of the division of labor. Babbage calculated not only the potential for increased output, but the potential for reduction in wage costs since not all procedures required the same skill. In his examination of Smith's pin making, Babbage estimated the wages for the various skills ranging from six shillings per day for those who carry out "Tinning and whitening" to less than one shilling for a helper. The division of labor in this example went so far as to specify the gender and age required for the various skills (cited in Braverman 1974, 80 – 81).

For Durkheim the division of labor is at the center of his conception of how industrialized society is organized and for Marx the division of labor was not simply a means to increase production, it was the very alienation of the worker from their product.

The division of labor was carried to perhaps its logical conclusion in the idea of scientific management developed by Frederick Taylor in the 1880s and 1890s. In this approach Taylor advocated, and perhaps preached, a form of management characterized by the highly defined division of labor, the separation of conception and execution and the splitting of tasks into their simplest possible form (Braverman 1974, 85 – 138, Kumar 1995). The legacy of scientific management is with us in the development of information technology as we will see below.

Centralization (nationalization), equality and democracy

We have seen that printing helped peoples to identify with broader political entities such as the state. The fourth point to be considered here is that industrialization is co-temporal with the development of democratic nationalism. The idea that all persons sharing a common culture and language also became subjects in a common state took hold as industrialization was carried out.

At the same time, the rise of the nation-state was integral in the development of

new industrial enterprises since it provided a structure for more centralized planning and regulation. In addition, it is asserted that an ideology emphasizing individual equality and participation in governance provided the basis for a common identity. This ideology helped to lubricate the transition from a system of *patria potestas*. It states that rather than the family or local community, it was the nation to which one belonged and it is through the nation and through the exercise of democracy that one develops a sense of identity.

Secularization, rationalization and bureaucratization

The last point outlined by Kumar is the rise of a more secular, rational and bureaucratic society. In spite of the popularity of the church for certain functions such as baptism, marriage and funerals, more routine participation experienced a dramatic drop with the advent of industrialization. In addition, it appears that with industrialization one also sees the growth of profane institutions, practices and beliefs. Industrialization with its various secularized ideologies – such as faith in science, democracy, the market or natural law – seemed to fill in the need for meaning and hope where the church functioned before.

Kumar points to the parallel development of rationalization and "disenchantment" as another feature of industrialization. A particular form of rationalization is bureaucracy.[11] This rationalized form of administration is a core aspect of industrialization. The development of formalized rules and procedures is, in the words of Kumar, "the highest expression of the rationalizing tendency in industrial society. Industrial society, in whatever form, capitalist or socialist, needs bureaucracy as much as it needs workers and machines" (1978, 106). It is also

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[11] *It is important to underscore that bureaucracies are employed both in the public and the private sector. In recent years the word has been identified as synonymous with governmental inefficiency. While some of this reputation is deserved, the routinized handling of information and cases results in efficiencies and control. These advantages, along with the drawbacks, are enjoyed by both public and corporate administration and are integral to their operation.*

worth noting that bureaucracy is, perhaps, that realm where information technology has its greatest potential to contribute to the spirit of industrialization. This point will be further examined below.

In summary, industrialization saw a series of fundamental changes in the organization of production and the organization of society. Work routines were changed and broken into atomized processes, rationalization changed the individuals relationship to the state, the need to follow one's occupation changed settlement patterns and the relationship to one's family, among other things economic rationalization changed the need for high fertility rates, etc. Thus, institutions as divergent as the family, the church, the economy, the state, the arts, notions of gender, notions of childhood, the elderly and a whole host of other social constructions were effected by industrialism. The next section will return to the present and examine the current situation in light of this analysis.

New age or the same old stuff?

Now we return to the original question. Is it time for the early heroes of the social sciences to move over and make place for a new generation, or is this an extension of that which has been?

Advocates of the new age

On the one hand many authors have described the assertion that we are being thrust from an industrial into the new post-industrial or information age (Boulding 1978, 49 – 51, Giddens 1990, Kumar 1995, 9, Rasmussen 1995, 168 – 196). Daniel Bell is the author credited with formalizing the concept of a post-industrial society (1973). It was he who developed the idea of an information society where the barrier between information technology and telecommunications is eliminated. Bell, and those who have followed, described a service based society populated by knowledge workers and completely new social formulations. That which is important in such a society is information. The pressure on transportation, for example, is reduced since it is easier to transport information than people. In the catchy phrase of Negroponte (1995), it is easier to move bits than atoms. Based on this, the role of the home, work, the state, religion and all other institutions are faced with a new social reality.

The information society, according to its proponents, brings about change at the most fundamental level of society. It initiates a new mode of production. It changes the very source of wealth-creation and the governing factors in production. Labor and capital, the central variables of the industrial society, are replaced by information and knowledge as the central variables (Kumar 1995, 13).

As noted, the key indicators of an information society for Bell are the development of a service economy and the concept of knowledge workers. For others who are more willing to speculate, the social institutions and the possibilities seem endless. Some suggest that the information era will see the rise of a new life-style and others go as far as to suggest that the information age will eliminate the need for war, expand resources, eliminate illiteracy, solve the energy crisis, achieve disarmament, topple dictators, save the environment, give us an endless life span, eliminate the need for factories, crystallize participatory democracy and "citizen management systems" and result in "a rich symbiosis of god and man, without the compulsion of power or law, but by the voluntary cooperation of citizens" (Masuda in Kumar 1995, 15). Wow!

Given this wish list of possibilities, and viewing the explosion in bandwidth described in Figure 1, it is easy to see that the information society has a powerful appeal. As Kumar notes:

It suggests that even though we may be losing control over our immediate social environment, we gain ample compensation for this in the global citizenship that is within the reach of everyone with access to a personal computer. We can overstep the boundaries of our class, our race, our nation. Moreover we can do this as individuals, in our own person and in our own private space. We do not have to join the parties and movements. The information society puts the power of knowledge at our fingertips, at the touch of a computer keyboard. It allows us to communicate with thousands of people across the globe. States are powerless in the face of the new technology. At a stroke their regimes of censorship and surveillance are undermined – or at least by-passed as impotent (hence,

according to this view, the collapse of eastern European state socialism in the era of the information society). The eighteenth-century dream of cosmopolis can be realized – without the need of a world state. Information technology substitutes for the cumbersome bureaucratic structures of world organizations. It allows for direct global democracy (Kumar 1995, 160).

Evidence of a transition

The available evidence, however, does not support even a modest assertion that we are experiencing the dawn of a new age. We have not began to see social changes that compare to those experienced during the transition from the middle ages into the modern period. But what is the evidence?

When considering this question one can approach the issue from three different perspectives. First, one can examine the rise of a new era using the indicators from the previous transition. This is, of course, the least defensible since one can not assume that these indicators will obtain in this new situation. The second approach is to employ the indicators described by the information society theorists to determine the degree to which their prognoses are becoming fulfilled. Finally, one can apply to more abstract theories of social transition. Each of these will be considered here.

To take the first of these, there is little evidence to support the rise of a new era based on the indicators from the transition into modernity. As outlined above the comparisons between printing and electronic communication result in a somewhat confused and contradictory picture. In some ways two technologies seem similar as with the imposition of censorship. In other cases, they are quite different as with the fixity of print. When we turn to industrialization, none of the major manifestations are apparent in the current situation. For example, despite abundant discussion surrounding telecommuting and the dispersion of the cities one is hard pressed to identify any broad scale impact of data technology on the form and character of the city. To take another example, it is similarly difficult to find evidence of a change in the structure of the family that rivals that of the demographic transition.

If one turns to the division of labor, centralization, rationalization and bureaucratization, all of these tendencies were well

under way before the development of electronic telecommunication. They are continuing along the same trajectory as they have been for the last 150 years. It seems, in fact, that new technology is pushing many of these tendencies to greater heights rather than replacing them with something new. In this respect, electronic telecommunication may simply be an extension of industrialization, a new chapter in what Beniger has called a control revolution (Beniger 1986). This line of thought suggests that the processing speed introduced in the industrialization underscored the need for better control over the production. It is this need that has been a major motivation behind the development of information technology. After all, if one can produce thousands of pins (or rifles or cars) per day, there is an increased pressure to keep track of ordering the raw materials, paying the workers, cataloguing the orders from customers, reviewing contracts with sub-contractors, ensuring payment and following up on shipments. The manifestations of control, i.e., train schedules, invoicing systems, the bureaucratic routines, etc., have been with us since early in the modernization process. The application of computer technology and telecommunication has aided and extended the process, but according to Beniger the process itself was generally in place long before the development of information technology (see also Rasmussen 1995, 55 – 56).

Thus, when considered using the indicators from the printing and industrial revolutions, the information era does not measure up. There is no new form of ownership or production, one does not have a fundamentally different relationship to one's family or background nor is there the dramatically different structure of society that separated the institutions of the middle age from their modern counterparts.

The second perspective is that of the post industrial theorists who interpret the growth of a service based economy with white collar knowledge workers at its core as evidence of a new post-industrial era. This evidence can, however, just as easily support the idea of the continuing hegemony of the existing system.

While there is a growth in the number of workers who interact with advanced data technology they can not be described as controlling information in any real sense. Even within those job categories that deal directly with information, many of

the incumbents include secretaries, data entry clerks and other low-paid positions whose jobs involve simple manipulations of information, not its creation. These persons have only limited prospects for becoming "knowledge workers" in any real sense of the term. On the contrary, the effective control of work routines, decision making and skill based activity is becoming more and more centralized in many industries. To cite one example, check-out personnel at grocery stores previously used a relatively simple, non-networked, cash register and relied on a large and quite specific knowledge of item pricing. Now they interact with sophisticated networked computer systems that have the ability to scan information directly from an item, sum this into a bill for the customer and to control a supply and ordering system for the store via a centralized data information system. While the check out personnel may now, in one sense, be considered knowledge workers, the competence to carry out their job has in fact been reduced, not expanded by the introduction of information technology. These developments have seen the rise of technicians who control and process the information at the expense of lower and even middle management positions (Giuliano, 1982).[12]

The concept of a service worker is also somewhat misleading. While a certain portion of those in this type of job are characterized as white collar and have a large degree of freedom in their working habits, many are in traditionally low pay, dirty and dangerous and dead-end occupations. Jobs such as night cleaner and auto mechanic are related to jobs such as researcher and market analyst only in the sense that both are seen as part of the service economy (as opposed to the primary or secondary sectors). It is clear that the major growth in the service sector comes from those jobs that are less, not more desirable. Thus, the predictions by some that the transition to an information society will rival those described in the previous section of this paper do not seem to hold water.

Finally, those suggesting the rise of a new era may suggest that we are too early in its development to even understand the indicators. Failing to find evi-

dence of a social transition in concrete indications of social change, one might turn to a general examination of social strife as a harbinger of change. Somewhat like the giant radio telescopes pointing to the heavens in hope of receiving a coded message from a far away civilization, this approach suggests that one can find evidence of the nascent era by scanning society for signs of ideological friction between differing perspectives. While there are skirmishes on many fronts, it is difficult to point to any real evidence of broad social change.[13] There is nothing comparing to the Reformation or the papal reaction to Luther's *sola scriptura* ("by scripture alone"). Nor is there evidence of a gathering Counter Reformation with its trial and intellectual banishment of Galileo, Spanish Inquisition as carried out by Tomás de Torquemada, St. Bartholomew's Day massacre where as many as 30,000 French Huguenots were murdered in a matter of days or Thirty year's war in which up to one third of the German peoples died. In sum, it is difficult to discern a coherent and serious ideology that, for example, places the TV, telephone, computer or modem at the center of humanities' search for salvation or as an explanation of our being as Luther did with the vernacular translation of the Bible. In addition, it is difficult to see any serious and rendering cleavages between ideologies over such issues.

Where does this leave us?

While electronic information technology has the potential to effect our lives, it has perhaps a greater ability to support, not replace, the needs of existing institutions. There are, for example, commercially based motivations for the development of information technology. Computerization allows a more complete organization of consumption. This is seen in the marketing of products and the organization of consumer databases that provide an overview of our consumption of everything from gasoline and pizza to air plane tickets and bank loans. Just as the 1800s saw the rationalization of work, we are experiencing the rationalization of consumption. In a form of "social Taylorism," there is the privatization of information, the management of consumption,

ever more rationalized market forecasting, market segmentation, political polling, etc.

Where does this leave us? While it is interesting to entertain the notion that something new and novel has been introduced, it is something else to assert that we are entering into a thorough restructuring of society on the level of the industrial revolution. Can we await the rise of a new generation of social theorists in the same mold as Marx, Weber and Durkheim? Like Kumar (1995, 31), I think it is correct to assert that there is no new era that compares to the rise of industrialization right around the corner. It may well be that the promotion of this idea has as much, if not more to do with the interests of those who stand behind the development of technology as it does with any real social transition. While information technology has speeded up various processes such as the rationalization of management, the nature of work and various types of leisure consumption, it has not yet produced a shift in the organization of industrial societies. The production process has not been fundamentally changed, nor are there, for example, viable instances of participatory democracy on the horizon (Lyon 1991). "The imperatives of profit, power and control seem as predominant now as they ever have been in the history of capitalist industrialism" (Kumar 1995, 154).

If we turn to the question of a leavening ideology similar to Weber's Protestant ethic, one can also question the rise of a new era. It is true that many processes have been affected by the development of information technology. Giddens notes the institutionalization of doubt and holds out the possibility of a new form for religious belief which will provide us with an ideological anchor (1990, 176 – 178). There is, however, no overarching realignment of society in sight nor does there seem to be an ideology capable of transforming the technical base into a broad social realignment. While the notions of cyber-punk, information societies, cyborgs, etc. are kicked around in the popular press and in chat groups on "the net," these are nothing when compared with the changes of the reformation and the industrial revolution. While the former are convenient handles for social writers and critics, one's ideological bent had real physical consequences during the Inquisition.

Based on this, spinning off full blown versions of social futures seems prema-

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[12] *In perhaps their most ironic development, computers have even deskilled computer programming professionals (Ling 1988).*

[13] *Examples include the attempts by China to control the Internet and the outlawing of satellite antennas in many Muslim countries.*

ture. One must remember that more than 400 years and much social strife elapsed from 1450 when Gutenberg discovered the printing press until the middle of the nineteenth century when many of the major social changes of the industrial revolution were in place. It is short sighted then, to extrapolate a new society by looking back 20 years to the development of ARPANET in the 1970s or even 50 years looking back to the development of the computer in the 1940s. To do this negates the relevance of culture in this so-called social revolution. A more humble, observant stance, with a willingness to be surprised, might be more appropriate.

Are the pieces of a new era in place? It is clear that we are experiencing a change, but it is difficult to answer this in the affirmative. Does the development of electronic telecommunications represent a fundamental shift away from that which has gone before? When seen from the perspective of the printing/industrial revolution, it does not seem so. It is clear that modernity and industrialism will not continue indefinitely into the future just as it is clear that electronic telecommunication has had and will continue to have its impact on society. However, based on the current evidence it is difficult to say that we have entered into a new age.

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Teleworking – the vision
An historical view of theories and trends

BY TOM ERIK JULSRUD

1 Introduction

Development within telecommunications technology has expanded the possibility of communication and co-operation independent of location. In parallel with the increasing number of workers in Western lands involved in information based services, the development of tele- and data communications networks has made it simpler to co-operate in spite of physical and geographical divisions. Today, we can see the outlines of a completely new information based workplace, where tasks are agreed, coordinated and distributed via global telecommunications networks. A large part of the business within research, industry and trade is already now heavily dependent on extensive partnership and coordination via telematic networks. In the future, access to the global information- based job mar-

Home-working

Self employed

Mobile/Flexible Work

Shared Facilities Centres

Satellite/Branch Offices

Distance Working Enterprises

○ Organization/enterprise
⊗ Teleworker
— Tele communication link
↔ Temporary/Telecomm. Link

Based on: Holti R. & Stern E. (1986)

Figure 1 Different types of teleworking

ket will certainly be of decisive influence for the development and maintenance of a business life on a high technological level, and in addition, as a means of securing employment within information based jobs in our own part of the world.

It is for these reasons that 'Teleworking' – work where different participants in a work process are to be found in diverse geographical locations, but communicate via telecommunications – has found a new importance in more recent discussions on our future working life. The implementation plan from Clinton and Gore, for building an "Electronic Super-Highway", and also the Bangemann report from the EU commission, have picked out teleworking as an especially important application area for the new data-based information networks (Club de Bruxelles 1994). The same is true of the Danish implementation plan "Info – society 2000" and the corresponding Norwegian contribution "A national Information Network" (Forskningsministeriet 1994, Norges Forskningsråd 1994).

However, teleworking is not a new idea. These new plans for reorganising the location of work, by using tele- and data technology, are based on a rich and diverse tradition of "Teleworking studies" (Bakke 1995, Huws 1991, Julsrud 1994, Qvortrup 1992). This article will present a few of the main theories and visions which have been put forward in this area, chiefly in the course of the last 15 – 20 years. The intention is to show how teleworking studies, as an individual area of research, have matured along with the theoretical studies, empirical analyses, and diverse practical investigations. At the same time we can reap the benefits of many previous experiences in the new contributions in this area, by providing an historical perspective for teleworking studies. Finally, I will summarise some of the main opinions, which are useful to those who wish to develop new visions of a future workstyle based on telecommunications.

1.1 What is teleworking?

Over the last 20 years, a long series of work arrangements have been categorised as "Teleworking" (DiMartino, Wirth 1991). This is true for the first individual forms, where the teleworker worked at home, using different types of communications technology.[1] It would be better to call this "Electronic homeworking", and similarly for the other collective forms,

where the teleworkers are located in a decentralised work centre with well developed communications technology facilities. This can either be a so-called "Neighbourhood centre", where the self-employed, or employees from different companies, can meet to work near their homes, or it could also be a so-called "Satellite centre", where decentralised divisions of a larger company maintain the necessary contact using communications technology. A third category of teleworking is flexible forms (also called "Mobile work"). The identifying characteristic here is that the work is not located in any particular place, but combines locations by using communications technology.

Teleworking as a concept also embraces more ways of working than is commonly thought. Figure 1 illustrates some of the ways in which teleworking can be connected to an organisation. Meanwhile, it is not easy to make a precise definition of "Teleworking" with any degree of satisfaction. According to Holti and Stern (1986) the nearest one comes to a common definition of the previously mentioned forms, is that they are burdened with certain social or economic goals, connected to the introduction of information and communications technology within the workplace.[2]

It becomes obvious that there is a serious problem in trying to convert a group of "good intentions" to an operational definition, and up to now there has been no substantial agreement on a definition of "Teleworking" (Huws 1988, Huws 1991). However, it is possible to point to a few basic concepts that occur in most. Beer and Blanc (1988) provided a run-down of more than 50 different definitions of teleworking, and found that most consist of these three concepts; organising, localising and technology (after: DiMartino & Wirth 1991). This implies that most concepts of teleworking primarily stress that it consists in some form or other of (re-)organising work. Secondly, that it consists of locating to a place that is not the traditional workplace. And thirdly, that it involves some form or other of technology, usually information technology, in combination with different types of media. As a general delimiter of the teleworking area, it is therefore possible to say that "it consists in income-earning work which is carried out at a distance from the contracting work supplier, with the help of one or more communications technologies."
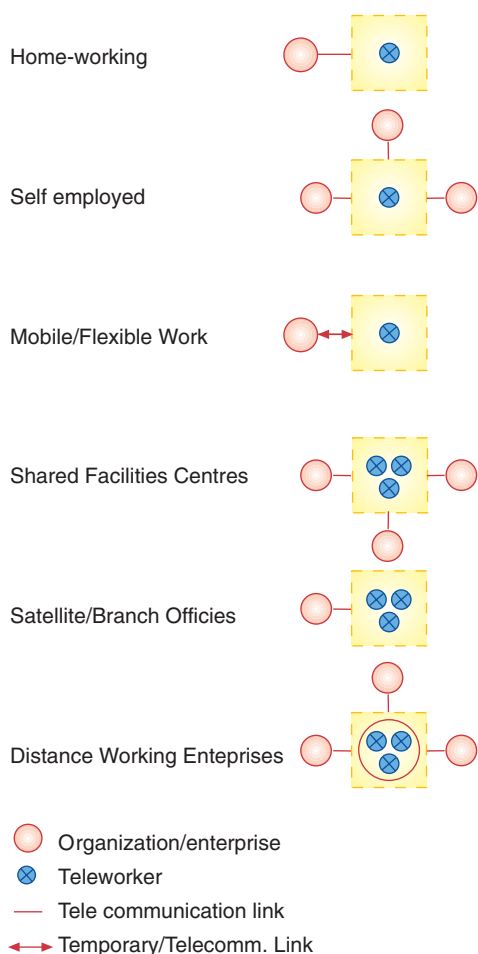
2 Previous visions of distance working

We can already find the earliest ideas about distance working using media technology, in the previous century. In Jules Verne's book, of 1889, *A day for an American journalist in 2889,* we find a prophetical description of how news can be distributed using screens, throughout the world, simultaneously, and how a journalist, working in America, is connected by "screen media" with his editor in Paris (Frängsmyr 1981: 213). As we know, Verne was renowned as one of his time's foremost heralds of new technology, and his ideas on distance working must be seen in the context of the contemporary media-technology revolution. Telegraphy and telephony were new creations, which had already contributed to the co-ordination of activities over long distances, including the operation of the railways and stock exchanges. The new media-technology was at that time important for the future growth of large businesses in the USA and Germany (H.W. Andersen 1988: 52), and in 1901 Marconi had just sent the first radio signals across the Atlantic. It was therefore quite natural that Verne's idea of distance working was connected to the vision of these media as co-ordinators for efficient working practices.

Meanwhile, at the beginning of the 1950s we find a more direct fore-runner of the modern understanding of distance working, in the book *The human use of human beings: Cybernetics and society,* written by the American mathematician Norbert Wiener (1989). In among, he describes an architect, living in Europe, who oversees house construction on the other side of the Atlantic. The tool was an "Ultrafax" (sic), which communicated information alone. Wiener wrote the following:

"... the bodily transmission of the architect and his documents may be replaced very effectively by the message-transmission of communications which do not entail the moving of a particle of matter from one end of the line to the other" (Wiener 1989: 98).

The point of Wiener's description is to illustrate how large a part of human activities can be described as transmission of "pure information", and therefore can be understood in the light of cybernetics, as a general scientific theory. He postulated that transport of information and material transfer are related, and that in the same way an individual consists of more than

matter ("spirit" and "soul" as well), so mankind will cause these boundaries to burst. For Wiener mankind and human relationships are first and foremost *information,* and, according to his theory, information can be carried equally well over telephone cables and highways (Qvortrup 1988: 167). This apparently raises the question of where the limits are for what can be transformed to exchange of information. Wiener thought that he could espy the beginnings of these possibilities, and that we had our feet on the first rung of the ladder to the "Communications revolution".

But Wiener was not the only one speculating about working using the new information based tools. Five years earlier, Vanevar Bush, President Roosevelt's scientific adviser, had put forward his much discussed technological visions. Bush postulated, amongst other things, a future information tool for use in scientific work, a so-called "Memex". He believed that this would be able to organise and sort large quantities of information, and so be of great assistance within research, historical writing, librarianship and archiving (after: Dunlop et. al 1991: 17).

We must remember that this was an era when many had strong faith that the new technologies would change and improve future working life. Not least at this time, the first ideas emerge of a type of data machine, while concurrently pointing towards the information era (Kumar 1995: 7). It is also plain that Norbert Wiener followed up Jules Verne's typically modern thought processes on communications technology as an arrangement for increasing work productivity. Both these "ancestors of teleworking" have a clearly technological starting point, and teleworking became, therefore, primarily connected to a vision where new communications technology contributed to a more competent and efficient working life.

3 Telecommuting theories: A reaction to the oil crisis

Throughout the 50s and 60s, many firms had experimented with moving work from offices to individual employees' homes. As early as 1957 a computer company in Boston offered its services via consultants based at home, and in 1962 we find a secretarial company "F-international", with an organisational model which indubitably was (and continues to

be) based on associates working at home (Shirley 1988: 23). It is not until the early 70s that we find the first fully thought out theories concerning a possible advantage to society as a result of teleworking. The so-called "Telecommuting-theories" arose at the University of Southern California within a milieu of economists, engineers and social scientists. The focus of investigation was to what extent tele- and data technology could replace traditional transport mechanisms within the workplace (Nilles et al. 1976, Nilles 1994). In the course of the 70s this developed into a leading topic of research amongst teleworking studies.

The direct occasion for telecommuting theories lay in quite a different part of the world than the American East Coast. In 1973 the conflict in the Middle East unleashed an oil boycott which troubled a whole series of Western industrialised nations, including the USA. This raised the energy crisis as a serious problem in the political agenda, and many politicians were worried about how dependent the West was on Arab oil. So, it was with this background that researchers like Jack Nilles and Frank Schiff launched the concept of teleworking, or telecommuting, as a means of saving oil and petrol (Huws 1991). Together with a group of researchers they carried out the first real studies in this area, where the prime goal was to show that it was to the economic advantage of society to have work carried out at home using data machines connected to the telephone network.

The gains were not inconsiderable: they calculated that for each percent of the workforce who worked at home rather than commute, it was possible to save 5.4 million barrels of oil per day (Huws 1991: 22, Forester 1988: 214). This implied that if it were possible to reduce the amount of commuting to and from cities by a seventh, it would not be necessary to import oil into the country! (Nilles 1985: 208, Forester 1987: 163.) In addition, there would obviously be the advantages to be gained from such a reduction in transport and traffic as regards the suburbs in large cities, reduced expenses in office space, etc. Nilles' understanding of telecommuting made a good impression, and even now there are high expectations for this form of teleworking within many research environments (see e.g.: Gordon 1988, Hamilton 1987). Nilles himself has moderated his earlier quantitative predictions in more recent work, but has continued to believe in a steady expansion of the

telecommuting concept. (See: Nilles 1985, Nilles 1988, Nilles, 1994.)[3]

The background for the future growth of telecommuting theories was obviously a lot more than an acute pressure on oil resources. The fast development within *information technology* and *teletechnology* was a fundamental criterion. Telecommuting was well down the road of being a theory of how a personal computer could be used to social benefit. About the middle of the 1960s commercial interest in computing began to really come to life, and in 1965 IBM began production of its 360-series, which was something of a watershed in commercial use of data technology (Andersen 1986: 89). In 1971 Intel began production of the first micro-processors, and with third and fourth generation machines, most people could begin to understand the developing pattern and its consequences. Understanding that the capabilities were increasing but the price levels were falling was one thing; equally as important was the merging of data technology (informatics) and teletechnology. This was first clearly described by Simon Nora and Alain Mink in their report on telecommunications development in France, where they created the phrase *Telematics* to cover this merging (Nora, Mink 1978).

The increasing academic interest in *Future Studies,* both in the USA and Europe towards the end of the 1960s, must also be seen as a central reason for the concept of teleworking seriously coming onto the agenda in the early 70s. A new set of theories and methods gave this field a legitimacy which it had earlier lacked, and the effects of new technology became a hot topic (Strandbakken 1991). This meant that within individual circles came an early hint about the future extent of telecommuting, which swung between the optimistic and downright utopian. At the Institute for Future Studies at the University of Southern California, it was predicted, for example, that 20 % of the workforce would telework within 1990, and 40 % within the year 2000 (Korte 1988: 160). AT &T predicted in 1971 that the *whole* workforce in the USA would be able to work at home by 1990 (Steinle 1988: 7). The early telecommuting theories also presented distance working within an economic framework, as well as within a quantitative direction, with Future Studies, based on technological assessments and extrapolation.

4 The liberal social critique; the visions come to life

There were also other traditions than telecommuting theories to be found, which went along with the distance working concept, at the beginning of the 70s. Parallel with telecommuting theories, we find a more human-oriented thought process. Its roots lay in the 1960s' liberal and populist thought streams, where other values than socio-economic were predominant (Huws 1991). Here, the new technology was seen as having potential to transform industrial society to a society with more emphasis on environmentally friendly and decentralised solutions. This was expressed in phrases such as "The Post-Industrial Society", "Small is Beautiful", etc. Throughout the 1960s similar thoughts crystallised in many contributions which sketched the effects of the new electronic media. Marshall McLuhan can be viewed as a spokesman for this view, and as early as 1964 he described how the media would transform society under titles like "This Electronic Age" and "The Information Age". A keynote in his published works is how the media in the near future will be able to influence the creation of a new global community. McLuhan has a vision of a future where electronic media will play a similarly dominating role as mechanical technologies have done up to the present day, and importantly, an electronic infrastructure will make the car more and more outmoded (McLuhan 1968: 193). So as we can see, McLuhan postulates theories which later are plucked out and worked up within Future Studies.

The most important keystone within the liberal critics was the weight which was placed on regionalisation and self-management. Even though distance working was not realised to any large degree, there were many at that time who aired their ideas on how worklife could take a new turn, with the assistance of the new technology. Peter Goldmark, for example, introduced in 1972 the phrase "New Rural Society", where he postulated that work could soon be carried out in comfortable surroundings, where necessary business could be carried on over telecommunication connections (Williams 1987: 242). A few years previously James Martin and Adrian R.D. Norman averred that: *"We may see a return to cottage industry, with the spin-*

ning wheel replaced by the computer terminal ..." (after Forester 1989: 214).

Many also saw the potential for how information technology could be an important medium, not only for a more comfortable existence, but also for democratisation and liberation.[4] "The Liberal Social Critique", as Ursula Huws (1991) called this, became in this way a forerunner of a more radical social critique, which at the beginning of the 70s also developed more politically oriented visions of media technology's possibilities for shaking up working practices. André Gortz (1983), in his description of how information technology can make work more flexible and so give more leisure and raised quality of life, can be reckoned as a part of this movement. This type of more political – but no less visionary – interpretation of media technology's impact on future working practices, also runs parallel with more efficiency and pragmatically oriented telecommuting tradition. Even though it is not possible here directly to be concerned with theories about distance working, a broader interest in how work can be decentralised by using media technologies, was awoken. Gradually, it became increasingly difficult to split these "traditions" from each other.

5 Theories about the information society; Daniel Bell and Alvin Toffler

Throughout the 70s, importantly, there was much re-thinking within many different spheres as to the impact of information technology within society (Huws 1991: 23). Many had realised the factual importance of small silicon chips with reference to economy, culture, work, leisure and much more. People were beginning to take "The Information Technology Revolution" seriously. These ideas had their roots in the previously mentioned liberal social critique, but they were also influenced by more quantitatively oriented future studies. Throughout the 80s a more or less cohesive tradition developed, directed towards describing our common information technology future, where teleworking would soon be an important component. I will call this "Information Society Theories" (or "IS-theories" for short).

The merit for this must first lie with Alvin Toffler. His book *The Third Wave*, which appeared in 1980, gradually

became the leading reference on teleworking in the information society (Toffler 1980). Toffler was almost the only person with vision writing at that time, but it was he who managed in that prestigious work, to unite the previously parallel teleworking theories, into one theory (Huws 1991). This theory was controversial and commercial enough to spark off a serious teleworking debate.

It will be useful to spend a little more time considering the theoretical tradition concerning *the information society*, of which Toffler is naturally considered a part (Lyon 1988, Kumar 1995). The theoretical basis for these theories is chiefly to be found in Daniel Bell's book *The Coming of Post-Industrial Society* (Bell 1976). There is no real and complete convergence between theories of the post-industrial society and the information society, and Bell himself is not overjoyed with the combination.[5] Even so, it is from here that IS-concepts gain their central theoretical foundation (Lyon 1988, Miles & Gershuney 1986, Schement & Lievrouw 1987, Kumar 1995).

The main thesis in Bell's concept of "the post-industrial" is that society is beginning a new phase of development, with totally different characteristics from the earlier industrial and pre-industrial societies. To be more precise, Bell "warns" that it is a new society characterised by a different "principle" from the production oriented industrial society. The post-industrial represents an overstepping and prolonging of the agricultural society, as well as the industrial society. The two central dimensions of the new society are growth of a service economy, and the increasing importance of theoretical knowledge. While work in the industrial society had primarily consisted in human processing of raw goods, the post-industrial society consists in interchange of *knowledge* and *information* between people. In other words, we are concerned with an "intellectual technology", instead of a "mechanical". This new technology demands a new form of infrastructure,[6] in addition to what we have now, based on telecommunications and information technology:

> *"The major problem for the post-industrial society will be the development of an appropriate 'infrastructure' for the developing communication networks (...) of digital information technologies that will tie the post industrial society together."* (Bell 1976: xv.)

Bell's theory is principally one of economic changes, of an overreaching of industrialism's economic logic, where information is more important than actual capital. Bell points to the fact that the greater part of GNP already comes from the production, management and distribution of information, and that in this way we already have an information economy.[7] Theoretical information is in process of being both a goal and a means for the post-industrial economy. This new "Information Economy" will create an information network with somewhat different social relationships within the workplace than in the industrial society, it is alleged.

Bell points to many possible new relationships in the workplace as a result of a new data technology network, but it is not teleworking which is his concern. Even so, it is clear that the central theoretical outline which the concept of teleworking consists in, has been established. This is valid first for the *historical framework* which is used, where we see the outlines of a new social form, with other qualities than industrialism. This is also valid for the second stress on *information and theoretical knowledge* which is the most important part of economic working life. And thirdly, the implications of telecommunications and information technology within an *infrastructural network* in working relationships. This also goes for the framework round most subsequent theories on the information society, which developed in the 70s and 80s. Within the concept of the *information society* we find here reflected many of Bell's central points, such as: 1) information as a (raw) commodity in a new economy, 2) widespread use of information technology, 3) a large number of information workers, and 4) a special stress on knowledge working (Schement, Lievrouw 1987: 3). IS-theories also point up that information processing can be split out as its own sector in the economy, which will be in control in most areas of society (Miles, Gershuny 1986: 20).

5.1 The home-centred society

Meanwhile, it was also Alvin Toffler (1980) who fleshed out the details of teleworking in the coming information society, or "The third wave" as he called it. The Teleworker carries out his work at home in his convenient "Electronic workroom" ("The Electronic Cottage"), surrounded by family and close friends. In this concept of the new telecommunications technology, travelling to a work-

place will be practically unnecessary, and teleworking will enable a mass movement where the home will once again be the most important geographic centre in society. Working from home is part of a more home-centred society, where the telenetwork brings work to the people, instead of them travelling to the workplace. He wrote:

> *"The electronic cottage raises once more on a mass scale the possibility of husbands and wives, and perhaps even children, working together as a unit. (...) Soon we may see the rise of movements demanding that all work that can be done at home be done at home"* (Toffler 1980: 219).

What is noteworthy with Toffler's postulation is that he manages to synthesise the earlier traditions concerning teleworking, the liberal social critique and the so-called telecommuting tradition, within a broadly suitable historical framework (Huws 1991: 21). Teleworking is also put forward as a method for replacing current transport practices in society, similar to telecommuting theories.[8] In Toffler's vision homeworking can be a bulwark against many of the other threats today's industrial society suffers from. This concerns not only the disintegration of the nuclear family, but also pollution from transport, the technocrat's monopoly power, lack of equal opportunity in the workplace, just to mention a few. The new information technology networks are to be regarded as solving problems, not only for society as a whole, but on an individual level.

The causes of these changes are described by Toffler as parts of a larger social re-organisation, which he believes we live in the middle of today. The third wave is distinguished from earlier "waves" in a way that reminds us of Bell's description of how the post-industrial is different from the industrial and pre-industrial.[9] In many ways it would be correct to say that Toffler popularises the main themes in Bell's "Future Warning" (Kumar 1995). Toffler, meanwhile, concerns himself much more with a detailed description of the future society and working practices, than Bell would find defensible. On the one hand he describes how teleworking will be able to establish a "home-based society", with the opportunity for new forms of local social interaction, and on the other hand he postulates that media technology will enable new forms for a global network-based society. Here Toffler borrows as much

from McLuhan as from Bell.[10] Seen in this light, the third wave is a concept of teleworking which synthesises many of the ideas from the beginning of the 80s, into a popular vision. This vision can to some extent be criticised for being a little uncritical of the problems which are connected to an eventual work re-structuring from offices to the house and home. For Toffler, teleworking is the answer to everything from economic depression, air pollution, divorce, and local environments. (See: Julsrud 1993.)

5.2 Critique of the information society's teleworking theories

Throughout the 80s the optimistic future ideas of teleworking met opposition from different quarters. Toffler's book raised the interest considerably in teleworking, but also exposed it to a much more hostile offensive. The idea of teleworking, which up till then had mainly consisted in lofty ideas of the future, increasingly became exposed to criticism from different camps. William Renfro early in the 80s expressed extreme scepticism to the "home office" in a key-note article in "Future":

> *"If sociologists are concerned today about the sense of isolation, aloneness, and anomie in our society, they should be sending up warning flares about the sociological disaster the home office should bring."* (Renfro 1981.)

Gradually, increasing numbers of critics could point to qualitative studies which – at that time – confirmed the supposition of isolated and unhappy teleworkers. Margrethe Olson, in the first half of the 80s, issued a number of key investigations of teleworkers, teleworking organisations and decision makers (Olson 1983, Olson, Primps 1984, Olson 1985). Olson's investigations became the corner-stone of a more thorough analysis of these types of work situations, with empirical analyses based on surveys, and in-depth interviews of the teleworkers that actually existed (if on a relatively modest scale). Gradually, she came to document positive as well as somewhat negative job situations connected to teleworking.

It was further postulated that the social aspects of work could suffer with teleworking, and that it was possible for serious role conflicts to arise by mixing work and home affairs (Salmon, Salmon 1984, Dürrenberg 1985). But also the purely

practical problems of moving the office home were postulated as problematic. Many were able to report problems in concentration on work while they were surrounded by children and housework (Renfro 1985). Some individuals felt that it was more of a handicap than a blessing for the family when Father or Mother (– or both!) stopped travelling to work. Tom Forester, a social researcher who himself tried to telework along with some of his colleagues, described in a realistic style how he himself developed a more critical viewpoint:

> *"... I monitored the progress of five other homeworkers in the Brighton area – three whom like myself, had previously commuted to London by train. Of the five, two divorced, one became seriously depressed and one returned to working in London. For only one of the five did homeworking appear to be a success – and even in that case there were serious question marks over aspects of the domestic situation which could lead to problems later"* (Forester 1989: 218).

Experience speaks for itself in many of the objections which come from many of the qualitatively oriented studies. Much of the criticism had a *political* angle, where they raised doubt on who really benefited from relocating the workforce, and whom this would really consist of. Many feminists felt that it was a method free from obligations for employers to profit from unskilled labour at home, in other words, single women who had to be at home because of their children (Lie 1985, Lie 1986). Doubts were expressed as to whether highly qualified men would risk a work placement which might produce carrier uncertainty. From trade unions, some of the same disquiet was expressed over how employees might possibly be left out of all tariffs and work agreements.[11] Business was frightened by studies which covered underpaid women who worked at home on routine programming jobs. Critical studies of the information economy also pointed more generally to the fact that this type of home based media use could represent an intrusion into the private sphere by commercial interests, who wished to control and manipulate the use of information services (Wilson 1988: 129).[12]

Little by little, quantitative follow-up studies were able to document the fact that teleworking was far from providing the broad solutions that the heated debate had given the impression of, as seen in

the optimistic calculations from the 70s. Estimates from the end of the 80s indicated that the number of teleworkers in Europe was between a couple of thousand and more than 100,000 (Steinle 1988). Estimates for the USA at the same period are at about 10,000 teleworkers (Gordon 1988, Korte 1988). The contrast with the previously inflated estimates caused many to begin to lose their patience. Some authors hinted than perhaps there were more researchers than teleworkers![13]

6 Network theories; teleworking as office automation

In more recent years the larger estimates and predictions concerning teleworking have died away, to the advantage of investigations on lower levels. At the same time new theoretical standpoints have been adopted, and teleworking studies have been resurrected in a more academic guise. Teleworking has especially had a renewed theoretical interest in organisation theory contexts. This evidently hides the fact that they are not so much "new" theories, but rather a change of focus away from homework, and more towards "automation of the office".[14]

Office automation has long been a separate branch within the information society tradition, where it has usually operated within evolutionary stages, like those used by Daniel Bell and others.[15] Already in 1971 one of the first projects is found with scenarios of how information technology would be able to turn its back on traditional office work. Firms like Rank Xerox and IBM did what they could in the 70s to market their own products through slogans like "the automated office", "the paperless office", etc. (Forester 1987: 205). Most of this type of scenario were obviously unrealistic and optimistic, and contributed to raising the expectations higher than might have been reasonable.

The idea of teleworking as a consequence of widespread office automation has meanwhile also been developed in more serious organisation theory perspectives. Already within the radical postulations of Jack Nilles and his colleagues (1976) the organisational framework was being laid down. Here is described a development where the organisation undergoes four phases, from a normal centralised organisation up to a full "diffusion". Figure 2 shows Nilles'
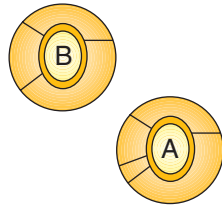
model of the four organizational phases of teleworking. In relation to Nilles' postulation, the last phase is distinguished by individual workers or service organisations who offer their services through a well constructed network of telecommunications services (Huws et. al 1990: 23). The geographically centralised organisation has here by and large ceased to exist, to the advantage of an interactive communication network.[16]

This is a twist which has won a place in newer studies. The idea that communications technology contributes to a decentralising of organisations, is found again within a long series of studies of office automation. (See: Huws et. al 1990: 11–21.) Especially Hiltz' (1984) description of future office work as different types of "on-line communities", has been important. Instead of today's centralised organisation structure, work will be instilled with knowledge workers who through electronically mediated processes, will establish new electronic relationships. She also writes:
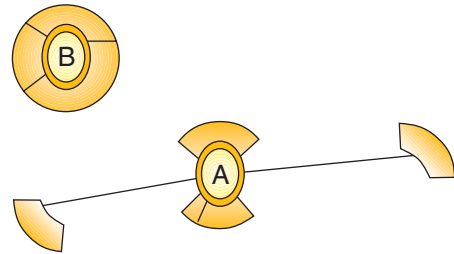
> "In thinking about the office of the future, one must instead think of it as a communication space, created by the merger of computers and telecommunications" (Hiltz 1984: 30).

Newer organisation theory studies of teleworking have approached this form of teleworking based on a broader foundation than just technology. In for example economic organisation theory, people have been taken up with general changes within organisations and markets (Bakke 1993, Vareide 1992). Two trends have been especially noticeable. The first regards a development where service performing functions are divided from industrial processes and service companies. To an increasing degree companies opt to buy certain types of services rather than perform them themselves. This is especially so for *sub-contracting* and opens the way for the establishment of smaller entities to a greater degree than before. Secondly, a trend has been pointed out where even production itself is carried out in a different manner than previously. Instead of a classical "hierarchical" arrangement, it has been possible to observe a form of organisation consisting of smaller work entities, with a "flatter" and decentralised structure. This is better called by Piore and Sabel's (1984) expression *flexible specialisation*. A development of this type will often be able to produce lesser, and often "Teleworking characterised" entities, where
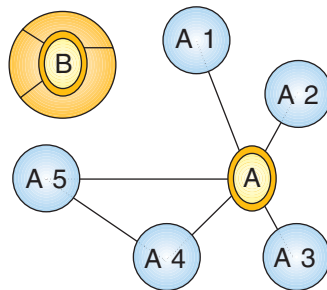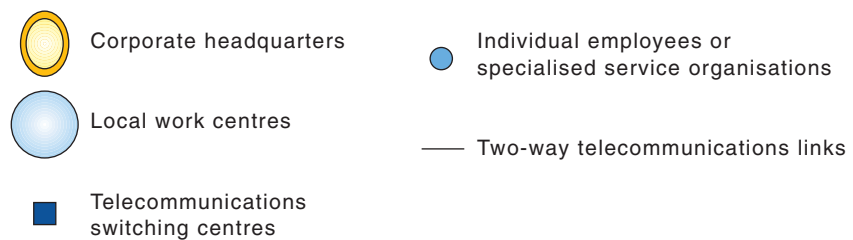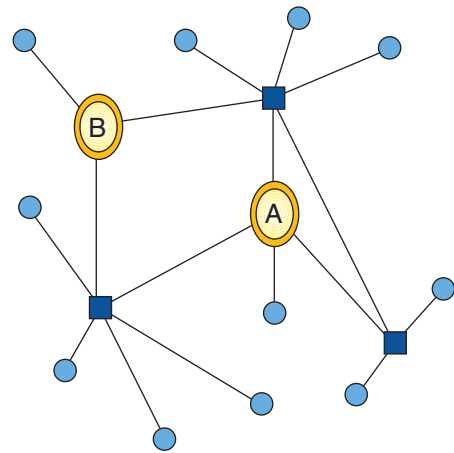

a) Centralisation

b) Fragmentation

c) Dispersion

d) Diffusion

Corporate headquarters

Local work centres

Telecommunications switching centres

Individual employees or specialised service organisations

Two-way telecommunications links

Source: Nilles from phaser of telework (Nilles et al. 1976)

Figure 2 Jack Nilles' model for office automation

telecommunications plays a central role (see: Kanter 1991, Piore, Sabel 1984, Sabel 1992).

These observations support also central ideas within theories on "Office automation" and that organisations in the future will be fragmented into smaller and more independent entities. Instead of the large centralised organisations it will be possible to see a development towards a *net-*

work of contracts and agreements. Huws, Korte and Robinson (1990) are spokesmen for a similar idea in the book *Telework: Towards the elusive office,* where they write:

> "... we think that organizations will increasingly cease to be defined in terms of people they have on the payroll and the types of activity being carried out under their direct control, but

in terms of the activities they control indirectly, through a network of contracts with smaller suppliers, with central control over such functions as product image, distribution or sales" (Huws. et. al 1990: 220).

The main idea behind this postulation is also that teleworkers will become the important hubs in the future organisational networks. This provides the central viewpoint in the study of teleworking as discussed by Lars Qvortrup (1992, 1993). Through a series of essays, Qvortrup has taken the direction that this type of phenomena should be best studied in a systematic framework, in the special form that this has been developed within Niklas Luhmann's perception of "self-referring systems". Teleworking here has become a building block in a larger perception of the organisation as a "communications space" without any particular spatial or temporal permanence (Qvortrup 1992: 72).

7 Discussion and summing up

I have in this essay surveyed how teleworking has been dealt with through varying theoretical standpoints. These are by no means antagonistic or isolated theoretical directions, but rather mark the central points of emphasis within the research field in the last 20 years. Collectively, these standpoints document a gradually increasing interest in teleworking, where a long series of different academic specialities have gradually been drawn in. Today, studies of teleworking stand out as a meeting point for engineers, psychologists, trained social workers, company consultants, the self-employed, and a large group of interested individuals and organisations. Within a speciality with large depth and interest it is natural that a long series of different postulations and theories will have been used.

This review has picked out some of the characteristic trends in these postulations, which will be quickly picked out here: Firstly, it is clear that teleworking studies up to today to a large extent have been *descriptions of the future,* and in most cases as positive prophecies. This characteristic is attached to teleworking studies, even if newer studies have proved to work in a more empirical and analytical direction. These newer and more comprehensive academic analyses have in many areas drawn inspiration from more

literary and fantastic descriptions. However, it is interesting to note that while Jules Verne and Norbert Wiener can be regarded as a part of a development within a typical efficiency oriented, modern industrial society, Toffler and the others connect this with a completely new (post-industrial) type of society.

Secondly, a central thesis in teleworking theories is that they have always been closely connected to the development of modern communications technology, and especially to the possibilities connected with the coming together of *tele-* and *information technology*. It is this type of interactive media which, in fact from the time of Wiener's ideas, has underlaid the concept of Teleworking.[17] This must be seen in connection with the notion of information and the idea of an information based knowledge worker, as well as the visions of the new data technology. This picture of a teleworker sitting in front of a data terminal, in his own front room, is still closely connected to the general perception of the concept.

Thirdly, it is important to note that teleworking has been *motivated in different ways*. It is not the use of new technology alone which has been the driving force behind the visions, but also the need or a wish to improve the circumstances for individuals, organisations or society. Central motives for teleworking have

been increased efficiency, economic savings, reduction of environmentally destructive transport, better quality of life, and better family life. Seen in this way it is with good grounds that the visions of teleworking have been described as "a vision in change" (Bakke 1995). It is, however, important to notice the differences between the telework theories. One important difference is their view on the driving forces behind the development of telework. While more recent theories see teleworking as a response to societal and organizational needs, the earlier theories tended to view teleworking solely as a consequence of new communication technology. As mentioned, the information society theories also heavily stressed the importance of technology behind the emerging teleworking activities. Another important difference can be found if we look at the theories for understanding the main goals for doing telework. There seem to be an important distinction between, on the one hand, theories that focus on the possibilities for higher quality of life for the individual, and on the other hand, theories that focus on the possibilities for higher societal or organizational efficiency. This overview has shown that this duality to a large degree can be traced back to telecommuting theories and the liberal critique.[18] Figure 3 illustrates the theoretical positions on these questions.
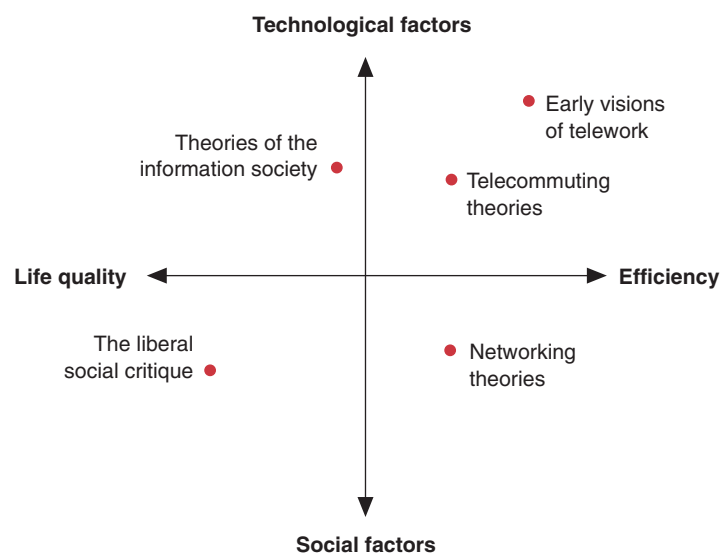

Figure 3 Theories of teleworking categorized by their understanding of "driving forces" (vertical axis) and "motives" (horizontal axis)

7.1 Towards a renewed vision of teleworking

In line with the gradually greater awareness which has been bestowed on teleworking studies, this specialism has also changed in character from being a collection of technological utopian futures, to an area which is open for systematic studies and research. Teleworking is no longer a vision, it has become a reality (and it has a history!). In summing up I shall point out some of the general experiences which are the result of 50 years' discussions and theories on teleworking's development, and some ten years' empirical researching. These are insights which hopefully will be of value for new generations with their visions and theories.

Firstly, it is possible to conclude that teleworking has developed much *more slowly* than anticipated previously. The first predictions – especially those that were produced within information society theories – were full of a large degree of future optimism. At the same time many of these descriptions were imprinted with a very naïve use of scenario techniques, which to a small degree divorced explorative and normative purposes. It was often unclear whether descriptions were meant as wishful or rational futures. Today, it is clear that teleworking in its different variants is extending its embrace, even if it follows an evolutionary, rather than a revolutionary development (Bakke 1995b, Huws et al. 1990, Korte et al. 1995).

Secondly, it is clear that teleworking today is represented in a long series of *different work types*. Up to today there has been, to a large degree, a tendency to connect this with full-time home working. There has also been a general insight that there are far more who are interested in teleworking in combination with traditional work, or for short periods. Many of the disadvantages with teleworking, such as isolation and increased problems for the family, can be considerably reduced when teleworking is combined with normal working practices. In addition can be found a long series of different methods for organising it within teleworking centres or neighbourhood centres. Teleworking appears today as a conglomerate of new work styles, where the only single characteristic is that it uses tele- and data technology to organise work in a more location independent way.

Thirdly, it is important to point out that development of teleworking is dependent on *more than just communications technology*. Teleworking studies have to a large degree been driven forward by the desire to describe possibilities which the new tele- and data technology can offer, with the rider that it has often been overlooked that Teleworking perhaps first and foremost is concerned with new methods for organising work (Bakke 1993). An important finding within many field trials with teleworking has been that opposition from the administration and management often created the most important bottleneck. Teleworking represents a serious challenge to managers, who have to get used to new ways to coordinate, administrate and control their work force.

Finally, it should also be pointed out that teleworking must be viewed in the light of many broad structural changes in national and global economic systems. One clear strength with many more recent theories in the subject has been that they have managed to see Teleworking in the light of a general development trend within organisations and markets. When many of the earlier visions of teleworking today appear as unrealistic it is often because they took no account of the development at the individual, organisation and society level (Calhoun 1986).

Teleworking is in its essence connected to the future, in so far as it describes a work style which today is experienced as something new and different. The day that teleworking is the rule rather than the exception, the concept will have played out its role. Seen thus, teleworking studies will necessarily find themselves in suspension between literary visions, political target setting, and sociological researches. This has often shown itself to be a fruitful interchange. In the future we should therefore encourage more activity within both academic and non-academic contributions to future working life.

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Notes

1 There are many attempts to classify teleworking methods. See Kraut (1989), Korte (1988), Holti, Stern (1986) for similar classifications.

2 These goals can be more closely described as: 1) to reduce fixed company costs, 2) a better control of uncertainty within the market, 3) to bring in missing skills, 4) to redistribute unemployment, 5) to strengthen the local environment and family, 6) to make the jobs market more available for marginalised groups (women, young people, handicapped), and 7) to encourage a wider acceptance of Information Technology (Holti, Stern 1986: 33-34).

3 Nilles has somewhat later (1988) developed three scenarios concerning the development of telecommuting in the USA. His estimates predict that by the year 2005 it would be possible to have from 7.7 million employees up to half the workforce as teleworkers.

4 The rallying call for the computer magazine "Peoples Computer Company" from 1972, reflects something of the spirit of the times: "Computers are mostly used against people instead of for people. Used to control people instead of to FREE them. Time to change all that – We need a People's Computer Company!" (Wooley 1992).

5 In the preface to the 1976 edition of "The Post-Industrial Society", Bell

criticises these theories as being one-dimensional and full of academic cross-currents: "... I rejected the temptation to label these emergent features as the "service society" or the "information society" or the "knowledge society", even though all these elements are present, since such terms are only partial, or they seek to catch a fashionable wind and twist it for modish purposes" (Bell 1976: ix).

6 Bell connects the future growth of infrastructure to different phases in society: "The first infrastructure in society is transportation – roads, canals, rail, air – for the movement of people and goods. The second infrastructure has been the energy utilities – oil, pipeline, gas, electricity – for the transmission of power. The third infrastructure has been telecommunications, principally the voice telephone, radio, and television (Bell 1976: xv).

7 Bell here builds on the material and insights of the American Fritz Machlup, who at the beginning of the 1960s analysed and described the importance of knowledge-based services for the American economy.

8 Toffler refers in many places to the work of Nilles et al. (See e.g.: Toffler 1980: 216.)

9 For a more detailed discussion on Toffler's theory of "The Third Wave" see Julsrud (1993).

10 McLuhan's influence is especially noticeable when Toffler describes the developments towards a media based globalising, in terms such as a new "planetary concsciousness" etc. (Toffler 1980: 324).

11 Many reports from different trade associations expressed highly critical viewpoints on teleworking in the course of the 80s. Judith Gregory (1985) for example, reccommends, in an American report, to outlaw data-based work at home, because it was expected that that would represent a worsening of the working conditions for the more poorly positioned employees (see: Qvortrup 1992).

12 Wilson considers so-called "home networking", an expression which focuses on a domestic connection to different interactive digital networks (Wilson 1988: 16). This obviously comprises more than teleworking practices. He is not directly concerned with teleworking, but more so with control and surveil-

lance possibilities in the wake of a general commercialisation of information and communication forms in society.

13 Perhaps it should be mentioned here that estimating the number of teleworkers is beset with difficulties. In investigations the number swings from under 2 % to over 20 %, heavily dependent on what type of criteria are used (Korte 1988, Kraut 1989). Those relatively low estimates probably contributed to the fact that the interest in teleworking dived throughout the second half of the 80s.

14 Parallel with this direction, we find in certain economic theories a stronger focus on the impact of information technology on the home and household economy ("Home informatics"). Jonathan Gershuny and Ian Miles point out the development where innovation in information technology implies that an increasingly wider range of services can be provided in the so-called "intelligent home" (see e.g.: Gershuney 1978, Miles, Gershuney 1987). Even if these theories discuss the central premises for development of teleworking, they have a much broader field of operation for their analyses. I therefore choose to keep them out of the more definitively "Teleworking theories". Whether they can be encompassed in the same criticism as earlier teleworking theories, is another matter (see Forester 1988).

15 Vincent E. Guiliano (1985) thinks for example of a development through the following three stages: the pre-industrial, the industrial, and the information age's office.

16 Nilles' theoretical framework is still alive within studies of distance working. Qvortrup here wishes to couple the expressions "Telecommuting", "Teleworking" and "Networking", to Nilles' last three phases (Qvortrup 1992: 84).

17 In practice, it appears, however, that information technology plays a minor role for many teleworkers. More recent studies show that the telephone, in combination with an answering machine and a fax machine are the most important media for teleworkers in Norway (see: Bakke 1995b).

18 This duality corresponds to the division which Leif Drambo (1985) has drawn within his postulation of the information society.

Internet relationships: the bright and dark sides of cyber-friendship

BY SUSAN B. BARNES

Ten years ago, William Gibson (1984) coined the term cyberspace to describe the future use of computer networking – a hyperdimensional realm that we enter through technology. Today, cyberspace is a term that is used synonymously with other phrases such as cyberia, virtual space, virtual reality, the electronic frontier, and the Internet. According to Howard Rheingold (1993), cyberspace is the conceptual space where human relationships are manifested by people using computer-mediated communications. In his book, *The virtual community*, Rheingold extols the benefits of making friends through electronic networking. Currently, the topic of developing online relationships is very popular. As a result, a number of "how to" books have emerged in the marketplace to help people socialize in cyberspace. Topics include *Playing MUDs on the Internet* and *Love online: a practical guide to digital dating*. Authors of these books tend to glorify life on the Internet.

In contrast to their glowing reports about today's cyberspace, Gibson had a different reaction to life online. In reality, Gibson lives a low-tech life style. Until recently, he had never logged onto a computer network to witness first-hand the cyberspace realms that he described in his books. After exploring the Internet, Gibson had the following reaction: "The present is more frightening than any imaginable future I might dream up" (cited in Lewis, 1995, p. D3). Today, we are living in a new cyber-culture.

Cyber-culture "means an information society which stresses human capacity to manage and process information. It also implies a society dominated by computers, multimedia, and technology" (Ablamowicz, 1993, p. 11). For researchers, such as Ablamowicz (1993), Postman (1990), and Slouka (1995), cyber-culture is so fascinated by technology and automatization that it forgets the dehumanization brought with them. In contrast, researchers including Sproull & Kiesler (1991a), Turkle (1995), and Zuboff (1988) argue that electronic communication can be humane. For example, Zuboff's (1988) ethnographic study on computer-mediated communications in organizational settings revealed that this method of "interpersonal communication provided researchers with the most important channels of access to information and stimulation for new ideas" (p. 363).

By blurring the boundaries between face-to-face and computer-mediated communication, developing relationships in cyberspace can have both positive and negative effects on people. This article will describe some of the bright and dark sides of using computer networks to develop friendships. Moreover, it will argue that people meeting in cyberspace behave as if these encounters are real not virtual.

Research method

An ethnographic research method was used in this study to observe online relationships. Hundreds of electronic messages from discussion lists, online communities, and personal correspondence were recorded and reviewed. However, unlike classical ethnographies that observe people in physical places, this study is concerned with a newly emerging online culture that breaks down the boundaries between imaginary and real space. This study utilizes ethnographic techniques that are similar to those used by Henry Jenkins (1992), Sherry Turkle (1995), and Shoshanna Zuboff (1988). Jenkins's study on fan culture is particularly relevant to the study of online relationships. Jenkins argues for a shift from totalizing accounts of social and cultural processes toward partial, particularized, and contingent accounts of specific encounters within and between cultures (p. 4). This newer conception of ethnography is particularly relevant to the study of online relationships because electronic computer culture is still in its initial stage of formation. Studies done during the evolution of this new phenomenon will help future researchers understand how people developed the norms, values, and behavior patterns used in more advanced stages of online culture.

Behind every study, a viewpoint is used to analyze the data. My commitment to understanding social phenomena and communication technologies has been shaped by the media ecological perspective. Media ecology is based on the criticism and theory of scholars such as Harold Innis (1951), Marshall McLuhan (1962, 1964), Joshua Meyrowitz (1985), Walter Ong (1982), and Neil Postman (1985). These scholars are concerned with the social, cultural, cognitive, and psychological impact of communication technology. The following example illustrates how Innis's (1951) concepts of time and space can be used to analyze electronic mail. Electronic mail or email

is the primary method of communication used by online participants.

According to Innis (1951), "Western civilization has been profoundly influenced by communication and that marked changes in communications have had important implications" (p. 3). A communication medium tends to create a bias that emphasizes the idea of space or time. "In Western civilization a stable society is dependent on an appreciation of a proper balance between the concepts of space and time. We are concerned with control not only over vast areas of space but also over vast stretches of time" (p. 64). When a new major communication technology is introduced into a culture that shifts the bias from time to space, this new technology could have profound cultural consequences. Therefore "it becomes necessary to study its characteristics in order to appraise its influence in its cultural setting" (p. 33).

Computer networks and the use of email alter our concepts of time and space. Sproull and Kiesler's (1991b) research on networked organizations indicates that "the networked organization differs from the conventional workplace with respect to both time and space" (p. 116). Because email messages are sent and received in asynchronous time to different locations (the same office or geographically across the world), "email creates a communication situation that has no shared physical space or shared sense of time" (Barnes & Greller, 1994, p. 131). William J. Mitchell (1995) describes the process as follows:

> The keyboard is my cafe. Each morning I turn to some nearby machine – my modest personal computer at home, a more powerful workstation in one of the offices or laboratories that I frequent, or a laptop in a hotel room – to log into electronic mail. I click on an icon to open an "inbox" filled with messages from round the world – replies to technical questions, queries for me to answer, drafts of papers, submissions of student work, appointments, travel and meeting arrangements, bits of business, greetings, reminders, chitchat, gossip, complaints, tips, jokes, flirtation. I type replies immediately, then drop them into an "outbox," from which they are forwarded automatically to the appropriate destinations. (p. 7)

This correspondence does not take place within any particular physical space. It

occurs in what William Gibson calls the "nonspaces" created by computer systems or cyberspace. Cyberspace is illusory. It lacks physical presence. Participants construct an illusionary social reality through written exchanges. This socially produced space does not require physical attendance. People can connect anywhere there is a computer and telephone line. As a result, the current use of computer networks significantly alters our relationship to space in the communication process. In contrast to traditional concepts of interpersonal communication that require face-to-face participation, online communication enables individuals to form friendships and conduct business without ever meeting in person. Therefore, geographic proximity is no longer a requirement for human communication to transpire.

Email correspondents are dispersed spatially and temporally. This method of communication occurs in an asynchronous mode. We do not hear words, instead, we read textual messages at our own convenience. Lance Strate (1995) in his article *Experiencing Cybertime: computing as activity and event*, states that "although the e-mail messages we receive were composed at some point in the past, there is a tendency to experience them as if they were being communicated in the present" (p. 80). Cybertime blurs the distinctions between past, present, and future. As a new communication medium, computer networking alters our awareness of real time and our relationship to physical space.

Is cyberspace real?

Gibson's original observations about video games creating a new sense of space, relates to Joshua Meyrowitz's research on television. "The computer has, along with television, altered the social and psychological experiences of space and time in an unprecedented and unexpected manner" (Bukatman, 1993, p. 104). Joshua Meyrowitz (1985) in *No sense of place* describes television's encroachment upon physical places such as our living rooms, dens, and bedrooms. He argues that the unidirectional mass medium of television offers the illusion of face-to-face interaction with performers and political figures. Simply stated, the television has the psychological impact of a face-to-face encounter. Meyrowitz refers to the relationship between the audience and television performer as a "para-social interaction" because the television set is a mediated form of com-

munication. Despite the fact television is mediated, "viewers come to feel they 'know' the people they 'meet' on television in the same way they know their friends and associates. In fact, many viewers begin to believe that they know and understand a performer better than all the other viewers do. Paradoxically, the para-social performer is able to establish 'intimacy with millions'" (p. 119). Establishing the "feeling" of having an interpersonal relationship with a television performer, Meyrowitz contends is making "media friends."

Ten years after Meyrowitz's observations about how the television screen is changing our sense of place, many people spend most of their day alone staring into a computer screen. When computers are networked, sharing the same scrolling text on multiple personal computer screens creates a new place for people to share the same information. By nature, human beings are social creatures. Given the opportunity and the technology, people will try to communicate with each other.

Moreover, adding networking to your personal computer, changes the isolating experience of interacting with a machine into a social event. Used as a medium of communication, the computer is different from the television set. In contrast to making media friends through the unidirectional message of television, computer networks enable people to interact with each other one-on-one or in small groups. Making media friends through a computer network is actually establishing a connection with another individual – a real person, not a performer. For example, a theater professor living in an isolated area in New York State describes making cyber-friends as follows:

> [An] aspect of CMC [computer-mediated communications] which I have discovered is that I can make friends. The medium, however, has forced me to re-define what I mean by a "friend," since I have never seen any of the people with whom I can share my professional and personal concerns. By virtue of the medium's anonymity, CMC becomes rather like a confessional. I sit alone in my den, compose my messages, and send them out to people who "hear" what I say and then give me advice or cut me down or share their own thoughts. One friend I have, a prominent writer and scholar, has been kind enough to listen to my concerns about the future of uni-

versity teaching and the fears and worries a young professor who is striving for tenure has to face. The benefit of having such a friend off my own campus has been enormous ... This quality of anonymity in friendship, however, is a totally new experience. I find myself trying to picture what each of these people looks like, what the sound of their voice might be ... While gaining the benefit of their words, their thoughts and advice, I lose that subliminal interaction so important to friendship. On the other hand, were it not for CMC I might not know these people at all. (Loughlin, 1993, no page.)

People can now communicate and develop relationships without ever meeting each other in a face-to-face situation. Allucquere Rosanne Stone (1995) makes this point in her new book, *The war of desire and technology at the close of the mechanical age*. She states that "the constitution and evolution of social worlds, the form and structure of community as expressed spatially in architecture and proxemics, need not be dependent upon distribution in a physical space the arrangement of which acquires ontic status,[1] but instead could as validly be based upon symbolic exchanges of which proximity is merely a secondary effect" (p. 87). As complex technologies increasingly mediate communication, they enable people to communicate with each other in electronic space instead of real space. Thus, computer networks and email messages introduce new conditions of attendance into the process of human communication. For this reason, Cathcart and Gumpert (1986) refer to interpersonal exchanges through computers as "mediated interpersonal communication." They argue that for this type of "mediated exchange to work as interpersonal communication, there must be tacit agreement that the participants will proceed as though they are communicating face to face" (p. 325).

Stone (1991), has observed that people who converse in electronic space act as if they are meeting in a physical public space. Therefore, online participants act

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[1] *Ontic is a phenomenological term that is used as an adjectival form of "Being." It is described in Edmund Husserl's (1931) book,* Ideas: general introduction to pure phenomenology, *New York: Collier Books.*

as if they are in a real and not a virtual place. As a result, "there exists the pervasive recognition that a new and decentered spatiality has arisen that exists parallel to, but outside of, the geographic topography of experiential reality" (Bukatman, 1993, p. 105). Although cyberspace does not exist in a physical sense, people believe and behave as if it is an actual place. "Our experience of electronic space is a 'real' experience" (p. 118).

Are electronic relationships real or virtual?

Erving Goffman (1959) describes the methods and strategies people use to make connections with others. Goffman states: "the expressiveness of the individual (and therefore his capacity to give impressions) appears to involve two radically different kinds of sign activity: the expression that he *gives,* and expression that he *gives off*" (p. 2). The first comprises verbal symbols or their known substitutes that convey information. "The second involves a wide range of action that others can treat as symptomatic of the actor, the expectation being that the action was performed for reasons other than the information conveyed in this way" (p. 2). An underlying assumption is that there is some special "magic" in nonverbal presentation. Facial expression, gesture, body movement, and costume are crucial to the development of how we present ourselves. Presenting oneself to others involves both the narrow use of language and the broad range of nonverbal messages. When visual and verbal messages conflict, people tend to believe the visual rather than the verbal meaning.

Visual structure and action can be more compelling than verbal expression or formal rhetoric. Daniel Boorstin (1961) makes this point in *The image*. He states: "Now the language of images is everywhere. Everywhere it has displaced the language of ideas" (p. 183). Moreover, Stuart Ewen (1988) argues that Americans physically live in a culture of "all consuming images" – a culture of photography, advertising, magazines, films, and television. In American culture, the power of visual media can be greater and sometimes perceived as better than real life. "As individuals and as a nation, we now suffer from social narcissism ... We have fallen in love with our own image, with images of our making, which turn out to be images of ourselves" (Boorstin, 1961, p. 257).

In contrast to the image orientation of mass media, there is the Internet. Despite the emerging visual technologies, such as Netscape and the World Wide Web that turn online services into multimedia computer screens, the Internet remains predominantly a text-based medium. People primarily use online services to exchange email messages. Thus, people presenting themselves to others online use written communication. Consider the following message:

I realize at the moment that I am writing this that the bulk – 99 % – of my friends, the people I am close to, exist as text. The idea and ideas of these people are more real right now than the people themselves. Perhaps there is something to be said for bonding via machines, then. It is as close as we will ever come to communicating as the angels do – without bodies, pure consciousness.

And yet, this medium is strangely akin to that wonderful, lapsed genre of letter writing. We've come full circle, for now the necessitating distance that separates us isn't one of miles, it is one of bytes. Too little access to proximity in previous centuries led us to throw out the written word as a lifeline to our fellows; too much access to proximity overwhelms us, and we fall back on the written word to stay in touch. Virtual reality is as old as Homer; our time together has been short-lived indeed. (Personal correspondence, April 5, 1995.)

Relationships that develop through textual exchanges on the Internet have been referred to as "virtual" instead of real. They are not considered to be real because we do not "see" our electronic friends. Their physical presence does not exist in cyberspace. We read their words, but, we cannot look into their eyes. Vir-
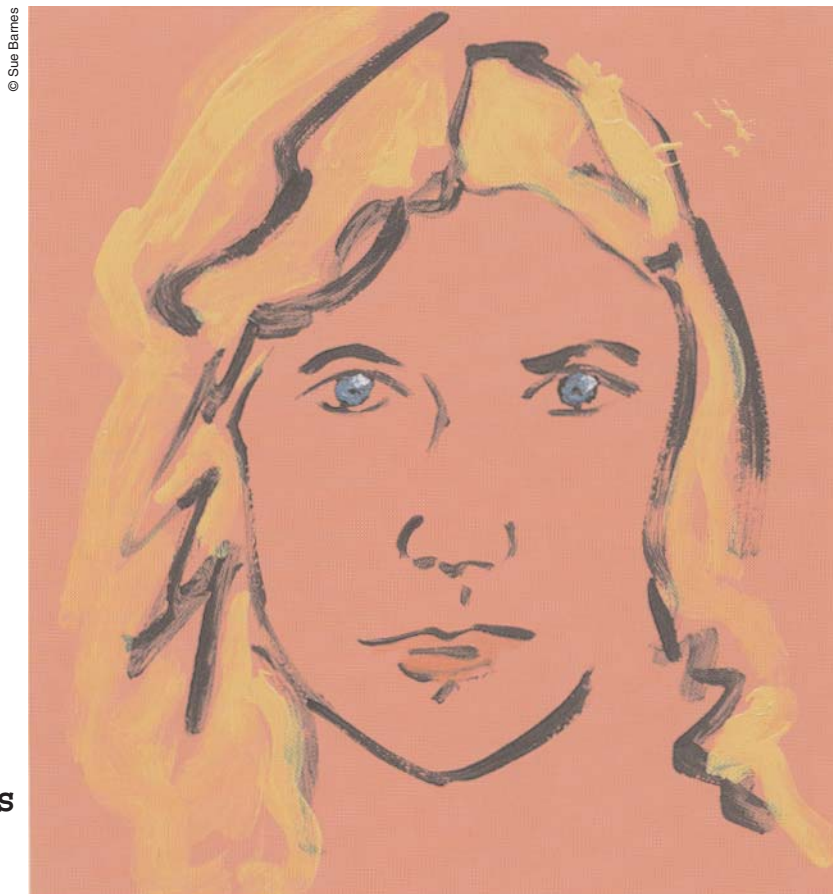
FEMALE
TALL
BLONDE
BLUE EYES
AGE: 20
SINGLE

Figure 1 Relationships that develop through textual exchanges on the Internet have been referred to as "virtual" instead of real. We can read their words, but, we cannot look into their eyes

tual relationships have been described in a number of ways. The popular press sees them as sources of sexy stories. *Intimate strangers* by Jill Smolowe describes both the successes and failures of meeting and dating cyber-friends. *Confessions of a Cybertramp* is a tell-all book about the perils of virtual sex. Despite the author's many failures, she finally meets the man of her online dreams. In real life, they get married and live happily ever after. Tales of meeting the man or woman of your dreams offer hope to desperate singles. Additionally, stories of meeting a kindred spirit to share one's idiosyncratic interests lures the lonely. In *Virtual relationships: the solitary world of CMC*, Thomas W. Loughlin describes how he met numerous like-minded theater people with whom to discuss and debate political, cultural and educational aspects of performance studies. Moreover, depictions of equalization attract the socially unattractive. Online communication is an equalizing experience. It enables short people to pretend that they are tall, shy people to be bold, and the socially reticent to become gregarious. Turkle's (1995) chapter, "Aspects of the Self," describes how a variety of different socially reticent individuals were drawn to online relationships. Love, a cure for loneliness, and popularity are the promises on which the major online commercial services are built. These are the stories of virtual encounters in cyberspace.

The word virtual has a connotation that the relationships we develop in cyberspace are not real. For example, Turkle (1995) describes the Internet as a place for role-playing and to experiment with different virtual personae. She does not consider online experiences to be the same as actions in the real world. She states that "today what disturbs us is when the shifting norms of the virtual world bleed into real life" (p. 230). In contrast to Turkle's perspective that separates virtual from real, I content that online relationships are a source of genuine relationships. Meeting, sharing experiences, and collaborating on books are very real activities. Therefore, another way to consider Internet connections is to regard them as real contacts.

An example of a genuine electronic encounter is the relationship formed by Robert Werman, M.D. and Gerald M. Phillips, Ph.D. These two men first encountered each other on the Internet in January, 1991. Since that time, they have written two books together. The first

book, *Notes from a sealed room,* was Robert's diary from the Gulf War. It was written while he was locked in his gas shelter. Robert first published instalments of the story in an electronic newsletter called CRTNET (Communication Research and Theory Network). Gerald M. Phillips collected them, put them together, proposed them to a press for which he worked, edited the book, and wrote the introduction. It was an artistic success, and it bonded the two men in a most unusual way. Their second book, *Living with heart disease*, subtitled "Cardiyakking" is the record of nearly two years of their daily exchange of symptoms over the Internet. The following is a sample of a message sent from Gerald M. Phillips to Robert Werman prior to writing their second book:

> I regard this exchange as a fine collaboration and I hope we can build something publishable out of it, but even if we don't it has been very valuable to me. I look forward to it, it is sharpening my writing, giving me some insights, testing my argumentative skills and helping me to examine my life. Not a bad deal. I hope you are getting as much or more. (Personal correspondence, May 2, 1991.)

The process of writing and editing these books happened electronically in cyberspace. Producing two books without ever meeting in person is difficult. Gerald and Robert did meet face-to-face three times augmented by several overseas phone calls. People who build strong relationships online usually have the desire to meet in-person. Despite the real world verification, the foundation of their friendship was established and maintained in cyberspace.

What are the criteria for developing cyber-friends?

The criteria for establishing face-to-face relationships pertain to electronic ones. A primary reason for establishing a relationship is making a connection with others. People need other people. This need drives the search for relationship. Loneliness is a normal way of life for a great number of people. "The ever-increasing number of people experiencing loneliness is a good indicator that human relations are at a point of crisis" (Ablamowicz, 1993, p. 17). With today's accelerated pace of life, we do not expect to develop long-term friendships. In contrast, "we tend to build and dissolve rela-

tionships quickly, and we move through them rapidly" (p. 17). In this context, meeting people online is another way to meet people and find friends. The following email message was written about loneliness by a senior citizen who was starting to develop a new online relationship:

> Most people think they like to be detached. Their motto is "a friend in need – is a pest." They do not comprehend that the only identity they will get is conferred on them by others, and often they grow to old age bitter and alone. The Internet is a refuge for these lonely people. It is kind of an Eleanor Rigby kind of thing. "All the lonely people, where do they all come from."
>
> I have some people who have been very close to me in recent years/months. For a time I had a surfeit of close friends, but so many have died or moved away ... So I depend on people like you. I listen to you, I really do. And then I talk to you. It is almost like being friends. (Personal correspondence, March 15, 1995.)

For a great many people, Internet contact is a genuine source for making social connections. Consider the following story. A young single woman named Carol in her twenties has a small child. Carol lives in a major city and is struggling to finish college, so money is tight. Recently, the news reports have been doing stories about baby sitters who abuse children. She is afraid to leave her child with a baby sitter. It is Friday night, the baby is asleep, and Carol would socially like to interact with some adults. Going out is costly and risky. What are her options? Carol could call a friend, but most of them are out for the evening. Or, she could log-on to America Online's TGIF (Thank Goodness It's Friday) chat room. Many online commercial service "providers offer Chat areas, also called forums, where people can converse online in real time. This means that your typed messages appear on the screens of other users only moments after you type them in" (Moore, 1995, p. 208). There is always someone to talk with online. Instead of spending the evening home alone, Carol can now electronically interact with other people. The baby is safe and she is being entertained. Moreover, some people find online discussion lists better than face-to-face conversations. A member of an online community states:
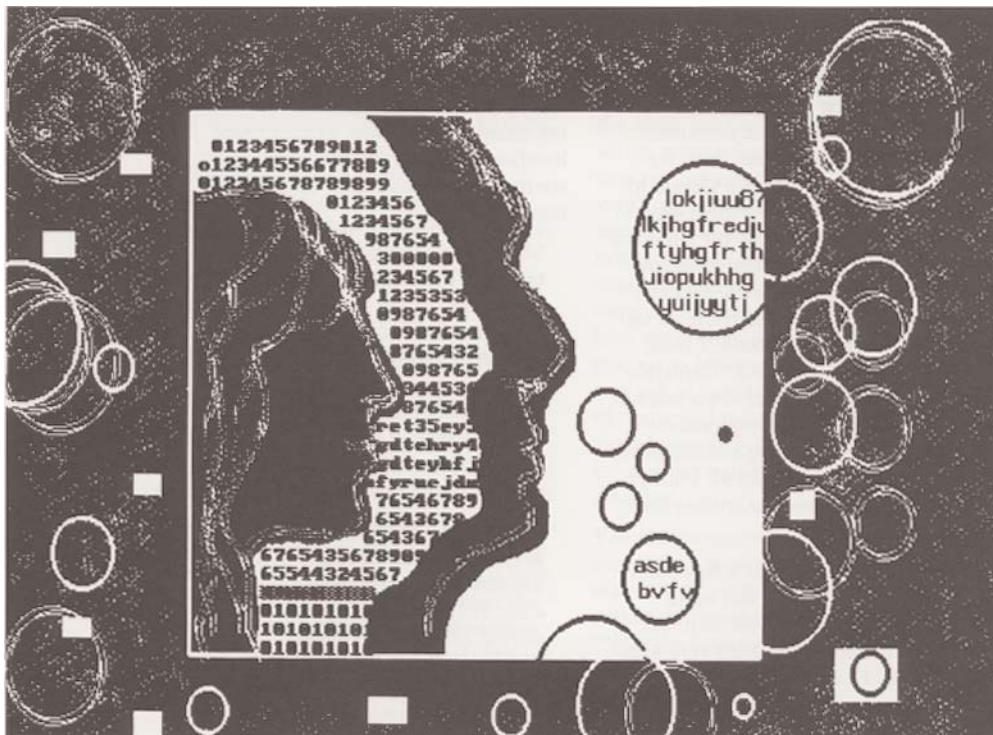
Figure 2 Fantasy is a necessary ingredient for Internet interaction. Since the early days of computer bulletin boards, fantasy has been at the heart of every online relationship. Each participant creates a mental image of the other person

I have personally mused from time to time as to whether these lists allow us to communicate differently or not. On the one hand, to me anyway, the conversations on this list have the feel of a congenial, happy-hour TGIF after-work get together. I see the same conversational dynamics I see among a moderate sized group at such gatherings: conversations among sub-groups, multiple topics under discussion by the sub-groups, a natural flow of the conversations.

OTOH [on the other hand], the multiple conversations are at a slower pace, and everyone more or less follows all of them. As a result, I feel there is a lot more cross-topic interaction than in a real-life conversation group. I also feel that there is a lot more synergism, which I attribute to the slower pace and the increased potential for interaction between the conversations. (Personal correspondence, August 30, 1994.)

After loneliness, the second criteria for establishing an online relationship is voluntary involvement. Two people can connect only if both make a voluntary

decision to do so. Involvement on the Internet is less institutional than real life. Joining an online service is not quite the same as belonging to a community group because it carries less obligation. On the Internet, one can relate without making physical contact. It is convenient and there is an easy way out if the contact does not work. When people get boring, we can hit the delete key and not respond to their messages.

Reasons to voluntarily make cyber-friends can vary. Some people connect because they have physical handicaps and the Internet is their only choice. This was Gerald M. Phillips's primary reason for developing online relationships. He states:

Keep in mind, my compulsion to connect comes from my personal problem not from the capability of the medium. I use these devices to meet people and I have had some fine encounters because I have purposely invited them.

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2 *Bulletin boards are computer-based systems that allow people to connect to a remote computer to read and respond to posted email messages.*

It is cheaper to use this medium than the phone. (Personal correspondence, October 20, 1994.)

In contrast to above, many senior citizens state that they are drawn to computers because "they simply didn't want to be left behind by progress" (Dickerson, 1995, p. 41). SeniorNet, a San Francisco-based network formed in 1986, allows senior citizens to form new friendships and become more intellectually mobile. "In addition to communicating with one another and sharing memories about everything from the Great War to the once ubiquitous Burma Shave highway ads, seniors are connecting with the generations below them" (p. 41). SeniorNet is a forum that enables different generations to interact and share personal histories.

Fantasy is a third ingredient for online interaction. Stone's (1995) research on early bulletin boards supports this premise.[2] She states: "from the descriptions given by participants in the earliest virtual interactions, it is already clear that virtual communication required a propensity toward play or fantasy on the part of participants, either as a precondition of the interaction or as a concomitant" (p. 111). An examination of email correspondence reveals that fantasy is at the heart of every Internet relationship. Each participant has an image of himself or herself and a mental image of the other person. Fantasy games illustrate this point most clearly. Multiuser computer fantasy games are generally referred to as MUDs (Multi-User Domains). "You join a MUD through a command that links your computer to the computer on which the MUD program resides. Making the connection is not difficult; it requires no particular technical sophistication" (Turkle, 1995, p. 11). Here is a description about MUDs written by a college student who regularly plays in one.

MUDs are worlds which are created by programmers. MUDs do not have pictures. They are a computerized version of the popular role-playing games that gained popularity in the 1980s. The users become players, who create characters in the MUD. My friend John and I play on a MUD which is in a computer in Greensboro, North Carolina. John plays from North Carolina and I play from New York City. When John first started playing he created a character named Lazerus. John defined Lazerus as per the parameters of the MUD. My character is named Faust.

The computer knows Faust as a six-foot tall salamander. The MUD operates (for the most part) in real time and the communication is transactional. John does not see the characters I type as I type them, only when I "send" them out of my computer into the network.

MUDs are just like electronic "Choose Your Own Adventure" books. They don't have pictures, just words. My screen shows me what I am typing, what my character is "seeing" or "experiencing" and what other characters are "telling" my character ...

The MUD is free enough to allow any conversation. When Faust encounters Lazerus, John and I both could have disregarded the MUD and just typed back and forth, like a visual phone call. For John and I, it is a fun way to interact when we are far from each other (March 8, 1993).

Role playing is the fourth criterion for online relationships. It can occur between two correspondents exchanging messages or it can take the form of sharing long narrative statements. These exchanges blend fantasy and curiosity together to form the foundation of email relationships. A concern is that "normal" correspondents do not understand that a game is being played. They can get carried off into their own world of "never-was." It is possible when dealing with text-only correspondence to endow our online friends with qualities that they do not have. We can turn them into people they are not, and relate to them as we would ideally like them to be. Here lies a central danger in trying to establish cyber-friendships.

In addition to creating false illusions about our cyber-friends, many people on the network present false images of themselves by using alias names of the opposite sex. The most publicized example of this dates back to 1982, when a male New York psychiatrist pretended to be a woman. In *The strange case of the electronic lover,* Van Gelder (1985) describes how Alex created a female persona that established long term friendships with other women on CompuServe. Stone (1995) describes the incident as follows:

He opened a second account with CompuServe under the name Julie Graham. He spent considerable time working out Julie's persona. He needed someone who would be fully functioning on-line, but largely unavailable

off-line in order to keep her real identity secret. For the most part, he developed an elaborate and complex history for Julie, but creating imaginary personae was not something with which he had extensive experience. So there were a few minor inconsistencies in Julie's history from time to time; and it was these that provided the initial clues that eventually tipped off a few people on the net that something was wrong (p. 71).

There have been numerous accounts of this story. However, all of the versions have one detail in common: "The discovery of Alex's deception led to shock and outrage. In some versions of the story, the anger erupts because of the initial deception – that a man had posed as a woman" (Turkle, 1995, p. 229). Today, virtual gender-swapping is quite common. People developing relationships in MUDs and commercial online services expect this to happen. However, Turkle (1995) warns that gender-swapping is not that simple. "Not only can it be technically challenging, it can be psychologically complicated. Taking a virtual role may involve you in ongoing relationships. In this process, you may discover things about yourself that you never knew before" (p. 213). Or, you may discover things that you do not like about yourself from the feedback of others. Consequently, people should not embark on playing a role without realizing there is an emotional risk.

Slouka (1995) observes that feedback is a key element in role playing. "It was the element of feedback, more than anything else, that provided the alchemy of cyberspace, that seduced the imagination into accepting the fantasy as real" (p. 49). Feedback relates to the final element needed to develop online relationships – interaction. Human interaction is required by all types of computer use, including games, software applications, and email correspondence. When people sit down at a computer screen, they do not automatically make a distinction between using a computer software program and emailing a message to a friend. Human-computer interface researchers, Brennan (1990) and Laurel (1992) have observed that computer users' expectations about human-to-computer interaction are often based on what they expect from human-to-human interactions. Conversational interactions from the real world create the norms for computer interactions. As a result, interactive computer programmers

attempt to make their programs appear conversational. The conversational tone used by programmers also applies to email. However, using a conversational style of discourse in electronic writing, blurs the distinctions between written and oral language.

Reciprocity: relationships in progress?

According to Phillips and Wood (1983), "to survive, a relationship must meet some of the goals of everyone concerned. There can be no relationship if everyone does not benefit in some way. The more equal the perceived benefits, the stronger the relationship" (p. 278). In a relationship, parties exchange reciprocal patterns of behavior. When one party fails to deliver, the relationship deteriorates.

On the Internet it is possible to cultivate skill with reciprocity. A small amount of reflected listening and a set of computer commands that copy the other person's original message are usually sufficient. The original message is indicated with this symbol >. All you do is add a response at the appropriate place. Here is an excerpt from a discussion called "real life versus cyberspace."

> The Internet is conducive to friend-
  ships because it permits:

> 1. Disclosure at will.

> 2. Voluntary connection.

> 3. Mutual consent.

> 4. Concealment of defects.

Conducive to friendships, yes. But also more easily discarded. Also the Internet while a great conduit for initial stages of friendship, none the less does not protect against the clarifying agent of familiarity over the course of time. Eventually, reality comes into play. Internet relationships are not sustainable over the long term on their own terms. Either we meet or we disappear. (Personal correspondence, August 31, 1994.)

Quoting sections of previous messages encourages the online communication process to continue for two reasons. First, it helps readers to contextually understand who and what the writer is replying to. Second, it supports the concept of reciprocity by providing direct feedback to the original message sender. Feedback and reciprocity are essential for maintaining online relationships.

MUDs have several noteworthy features that relate to reciprocity. First, they are games and games have built-in reciprocal rules. People assume roles, play the game by the rules, and either win or lose. Second, players voluntarily engage in the fantasy together. Finally, major game players invest a great deal of time and energy creating their various online characters and interacting with others.

All relationships build over time, they are episodic and regular. Every time a relationship encounters a new stimulus, or even a new person, it must adjust by developing new rules. Time influences both electronic and face-to-face relationships. People who spend large amounts of time interacting with others online begin to develop reciprocal rules of behavior. For example, Linda sends Jerry one note a day that is 80 lines or longer. She sends it before she starts her work day or just before she goes home. Linda expects a daily response from Jerry. There are no notes exchanged on weekends and the pattern is to exchange one note for one note.

When the rules of reciprocity in Internet communication are disrupted, people get uneasy. For example, if Jerry did not send Linda her daily note, it would disrupt their relationship. An actual example of an online disruption occurred when Jerry mistakenly changed the behavioral rules with Tina by mixing up messages that were written for Sarah. Jerry exchanges "tell" messages on Bitnet with Tina.[3] Jerry and Tina get together regularly at appointed times and carry on a conversation. They banter over the Internet and it is an exclusive game between two people. However, Jerry acquired another correspondent, named Sarah, with the same "tell" facility. Occasionally, both Tina and Sarah would come online at the same time. Periodically, he got messages crossed. Sarah took the mix-up for granted because she was new and understood that Jerry was also talking with other people. Sarah was not con-

cerned about crossed messages and would occasionally note that she "got the wrong message." In contrast, Tina, the original correspondent, was quite distressed. Tina complained that trying to carry on a conversation with two people was "schizophrenic." After this reaction, Jerry made sure that he did not get the messages mixed. Moreover, he did not mention Sarah to Tina when they were all on line at the same time.

Rules of reciprocity occur in both face-to-face and online friendships. When they are disrupted, people complain. But on the Internet, the failure of maintaining regularity in reciprocal correspondence often means the end of the relationship. People do not respond back for a variety of reasons. The most frequent reasons are vacation, illness, and work pressure. People come and go on the Internet. It is easy to join an online service or discussion list. There are thousands of them available. Internet connections are convenient contacts and easy to sustain. People exchanging email messages, MUD players, occupants of chat rooms, and those who exchange "tells," are able to simulate face-to-face encounters. Thus, online conversation is a new method of building friendships. However, not everyone uses the medium to develop positive forms of communication.

Provocateurs: turning responses into negative communication patterns

Performance is a concept that applies well to the Internet. Some people assume active roles in Internet discourse, while others prefer to watch the show. The vast majority of people on the Internet are audience members or lurkers.[4] Frequently, people will listen and not contribute feedback to electronic discourse. They watch the show as various performers take the stage. Those with a story to tell and a need for an audience, cultivate their style. Styles run the gamut from carefully crafted professional presentations to deeply personal spontaneous reflections.

The Internet is filled with lurkers. They are the spectators who occasionally take the time to read what the contributors post. They rarely respond and it is hard to tell how many of them are out there.

Lists need people to ask provocative questions. To stir the pot when conversation starts to get dull. Gerald M. Phillips played this role on the Interpersonal Computing and Technology List (IPCT-L). He would carefully monitor the discussion and note points of irritability. Then he would act as "agent provocateur" and post something to the list when the volume of mail started to drop. Most lists have only about fifteen or twenty active members regardless of their size. Consequently, it does not take much analysis to get a conversation started. For example, GMP posted a short essay called "A response to the dreamers" on IPCT-L. This essay was written as a reaction against the optimistic future predictions for the Internet. The following is an excerpt:

What I see is a school system, already filled with illiterates, teachers and students, imprisoned by technology and cut off from the flow of ideas.

Our contemporary school systems do not do well teaching the alphabet and simple number concepts. Children cannot read, cannot add. Many educators ascribe the decline in intellectual accomplishment to corruption of time by the media.

Children do not have the time to dream and to play because their work is structured for them so they are autistic ... There is no time to learn to make friends. There is no time to learn to write poetry or appreciate music ... Now, our mavens want to go further and mechanize the whole thing by taking our children away from any contact with reality and making cyborgs of them. This medium is an addiction ... Spare my grandchildren from your technology.

(Personal correspondence, July 22, 1993.)

This nihilistic description of the future, generated over a hundred responses during a three week period. The end result was a lively conversation that engaged many members of IPCT-L. GMP's role was a positive one on the list. However, not all provocateurs act out of altruistic intentions. There are a great many malicious people who persist in destroying the flow of conversation. This type of behavior can destroy a discussion list. Here is a list manager's perspective on the provocateur problem:

The list manager should make it clear to the members generally that such a

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[3] *Tell is a command that allows users to exchange messages in real time over the network. It is similar to a private "chat" session on a commercial online service. Bitnet is a networking service that originally provided service to academic and research communities. It was not originally part of the Internet, but established connections to allow the exchange of information between Bitnet and Internet users.*

[4] *Listeners on the Internet are often called lurkers and there is no derogatory connotation associated with the term.*

problem really does exist, and that they should be aware that those who seem to be deliberately provoking outraged responses are probably not legitimate members of the list at all. The last point is very important. The aim of the provocateur is to destroy the confidences people have in the other people on the list, to the extent that it comes to be accepted that people cannot disagree with one another in public discussion without resorting to destructive attacks. (Personal correspondence, April 7, 1995.)

A symptom of the provocateur problem is flaming. "Flaming is when someone, usually someone you don't know and never will, sends you a rude, insulting, often obscene message" (Moore, 1995, p. 101). One discussion group called alt.syntax.tactical uses flaming as a tactic to invade other groups that are open and accessible on the Internet.[5]

Their methods consist of military-style reconnaissance, the insertion of spies followed by flame wars ... First they decide which newsgroup to invade (like the cat group), then they send their spies in. The spies pretend to be cat lovers and talk about feeding problems, getting other people to comment. To start the fun off, one of the spies will calmly ask, for instance, for a recipe for roast cat, because his cat died and he doesn't want it to go to waste. The real cat people get all excited and say nasty things to the spy. That's the signal for the other spies to act: Some defend the first spy, some pick fights with the defenders and so on. (Fiedler, 1994, p. 20.)

By the time the members of alt.syntax.tactical are done, all of the original members of the discussion group under attack have left in disgust. Moore (1995), an observer of electronic group invasions states that "they are sort of fun to watch, assuming one of your favorite groups is not the victim, but it is rude, sophomoric, and does little to promote the idea that the Internet will raise mankind to some kinder, gentler level of consciousness" (p. 180). Flaming can tear electronic groups and friendships apart. In contrast

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[5] *Groups on the Internet are called "newsgroups." Newsgroups are part of an Internet bulletin board system that discusses thousands of different online topics.*

to this type of negative behavior, many people use online connections to make friends and build romantic relationships.

Falling in love online

In building traditional relationships people tell us their tales with expression, intonation, and gestures. We learn about them from their costuming and how they fit into the setting. When people know each other very well, their expression, gestures, and movements can provide more information than their spoken statements. For example, some people smile when they are angry instead of happy. "An interesting phenomenon takes place once you get to know a person well. Nonverbal behaviors that were initially annoying and confusing seem to disappear. If you like the person, disqualifying features like obesity, for example, or baldness, tend to disappear" (Phillips & Wood, 1981, p. 72). Internet advocates content that the medium eliminates disruptive nonverbal behavior that could prevent a successful relationship from forming. Some argue that the Internet is a better place to get to know someone because you learn about their thoughts and are not biased by their physical appearance. For example, Michael Hyman (1994) argues that Internet romances can work. He states:

For many years I've pursued the traditional method for beginning a relationship: face-to-face contact, typically over several dinners. The primary goals over dinner usually concern appearance rather than substance, such as maintaining a casual yet respectful demeanor, trying not to spill your wine, eating with chopsticks without dropping a shrimp in your lap, and the like. In contrast, the primary goal of a new Internet-based relationship is to learn about another's thoughts. Because the Internet is a far less formal medium than snail mail, Internet-based relationships start as friendships, which tends to set your priorities straight from the beginning. (No page.)

Advocates of online love argue that getting to know someone first through the Internet is a good way to meet because the relationship starts off slowly and builds over time. People can talk in-depth about themselves and what they like. In some cases this can lead to marriage. For example, Ann and Jim McElhinney married after meeting through a local Los Angeles online service. "Although the couple lived and worked within a few

miles of each other, they were strangers before the net" (Kantrowitz, 1993, p. 45). Dating online can be thought of as an audition for an actual date. There are several ways to pre-screen candidates for the role of a girlfriend or boyfriend. "The most useful prescreening tools in brief are: personal profiles, which display a basic public 'face' for surreptitious viewing; messages boards and chat rooms, where you can see what someone is like in a group setting; and online portraits, which tell you whether someone is within your acceptable range of attractiveness" (Geller, 1996, p. 46). Although the rehearsals for a date may go smoothly, the actual performance is another story.

Meeting someone for the first time is fraught with risk. Some people feel misled when they meet in person because the face-to-face romantic chemistry is not there. Moreover, gender-switching can be an issue. Online gender switching is easy to do. Frequently, men take on the identities of women to balance the male to female ratio in cyberspace. Currently, there are more men online than women. For example, the Japanese MUD Habitat has a ratio of four real-life men to one real-life woman. In contrast, the online ratio is three male characters to each female character. A percentage of the men are playing the role of women. It is easy for a man to pretend to be a woman. "For a man to present himself as female in a chat room ... or in a MUD, only requires writing a description" (Turkle, 1995, p. 212). However, maintaining the fiction of being a woman can be difficult.

Gender switching is complex role playing. For example, Slouka (1995) observed an online romance between a man using the alias Janie and someone named Allison. "Since Janie had fallen in love with someone named Allison, the relationship had to be lesbian" (p. 59). In reality, Janie was a man and the actual gender of Allison is unknown. Over time, Allison had become real to Janie. But the man could not reveal his true identity without destroying the persona of Janie, the female image he presented online. As a result, meeting face-to-face was out of the question. Moreover, if he wanted the relationship to continue, the man had to play the role of Janie. People serious about love should verify that their online partner is actually who he or she claims to be. Some people "always insist on a phone conversation or two before meeting someone" (Geller, 1996, p. 46). Others exchange photographs. Currently, local online services have become new

electronic singles bars. Like real life, sometimes these relationships work, but more often they do not.

Married people also are experimenting with cyber-romance. These online flirtations explore virtual sexual fantasies. However, cyber-romance can also impact on established real world relationships. For example, spouses have different reactions to their partner's online sexual flirtations. Turkle (1995) states that one wife "made a conscious decision to consider [her husband's] sexual relationships on MUDs as more like his reading an erotic novel than like his having a rendezvous in a motel room" (p. 224). For this couple, the husband's online affairs are a way to expand his sexual experience without jeopardizing their marriage. In contrast, a New Jersey man recently filed for divorce after he discovered sexy email messages between his wife and a man called The Weasel. This first case of computer "adultery" made the front page headline of the New York Post (February 2, 1996) – "Cybersex Divorce." The case is being called a "ground-breaking suit – an Information Age twist on the most ancient of human foibles" (Kennedy, Ben-Ali & Bertrand, 1996, p. 5). It is the first time that anyone has accused a spouse of adultery with a person the spouse has never actually met face-to-face. Cyber-sex raises the following question: What is at the heart of sex and fidelity? Is it the physical action or emotional intimacy? "The fact that the physical body has been factored out of the situation makes these issues both subtler and harder to resolve than before" (Turkle, 1995, p. 225). To date, spouses of cyber-sex participants have mixed reactions to this new social phenomenon.

Building online communities

Society has become fragmented. "Many of the institutions that used to bring people together – a main street, a union hall, a town meeting – no longer work as before. Many people spend most of their day alone at the screen of a television or a computer" (Turkle, 1995, p. 178). But, human beings are social creatures. They do not want to be alone. People who have networking capabilities on their computers are connecting with each other. They are trying to make Marshall McLuhan's (1962) concept of electronic tribalization a reality. The Internet has the potential to be a meeting place to develop authentic relationships. In fact, sometimes there is a frightening intensity about online experiences. For example, Loughlin (1993) discovered this aspect of computer-mediated communication. He states that "the most frightening aspect of it all is that I find on many occasions I like my computer-mediated communication (CMC) better than talking with most real people with whom I come into daily contact face-to-face" (no page).

Slouka (1995) observed that the people he discovered in online communities "truly 'lived' in these alternate communities. Many had come to think of them as a second home" (p. 44). One group that built an online community is Quiet Communications List (QC-L). QC-L first formed around the middle of 1993. There were about 25 original members virtually all of whom are still corresponding to other members of the group. The initial members "seceded" from another discussion list on the topic of Clinton politics. The Welcome message to QC-L states: "This list was established by a group of people who became friends because of their almost two year discussion on Clinton. We decided we needed a refuge from the roaring debate of the political lists, so that we could contemplate issues of our own choice and enjoy each other's company." (Moderator, personal correspondence, May 25, 1994.)

Approximately a year after the group started QC-L, they decided to get together for a face-to-face meeting. After members met face-to-face, this online community changed. These changes were later described by the list's moderator as follows:

> The intriguing thing about the contact was expectations, hopes, and realities in conflict. For some it was a euphoric high. Others were depressed. They went home and dropped off the list. The character of the conversation changed materially. The in-group, people who had met, had a shared mythos. They talked 'in-talk.' It became imperative to add new list members to rejuvenate the conversation. The list is still struggling to come back to its vigor, dropped from 50 to 37 despite the additions.

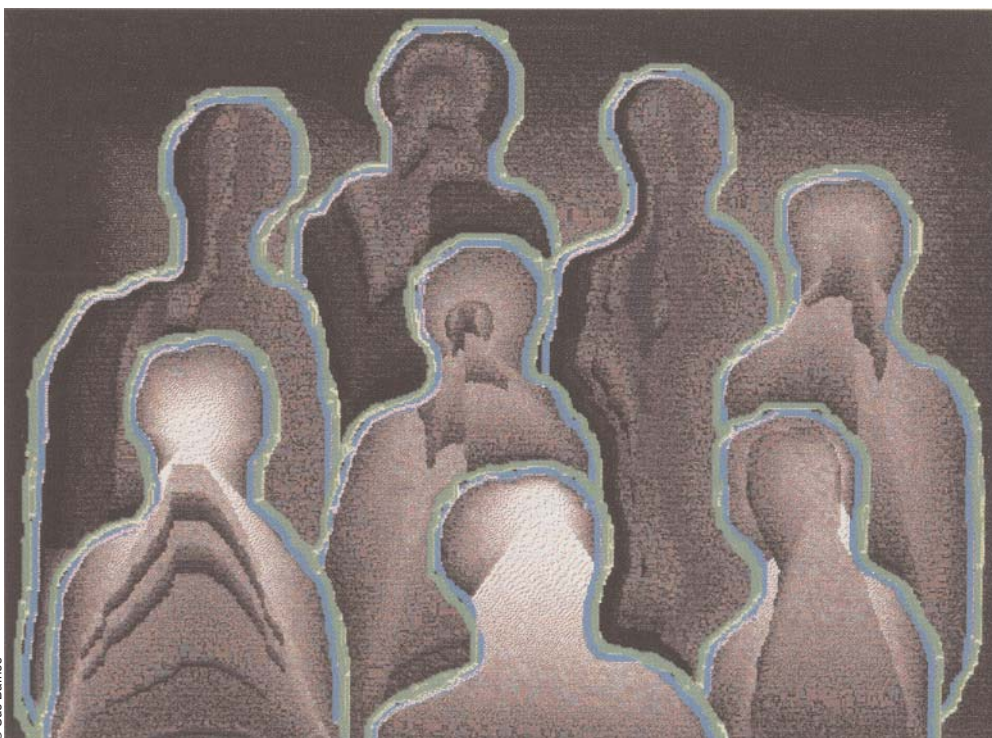(Personal correspondence, September 1, 1994.)

Figure 3 People who have networking capabilities on their computers are attempting to make Marshall McLuhan's concept of electronic tribalization a reality. But, physical appearance is not part of how we communicate through networks. Despite the lack of visual information, people are forming strong emotional bonds by participating in online communities

In online communication, physical appearance is not part of how we represent ourselves. Language is the primary form of representation. Textual conversations can create fictional roles, present false illusions, and build imaginary hopes for face-to-face friendships. When online personas do not match the real people, members of an online community can become disappointed or disillusioned. As a result, conflict is created and the emotional bonds of cyber-friendship can dissipate into the nonspaces of cyberspace. On the other hand, when real people do match their online representation, genuine friendships can develop. Despite the numerous changes that have occurred on QC-L, a core group of members are still active on the list. In many ways, QC-L is a private support group for a small group of cyber-friends.

Online emotional support

When people don't have friends and family, the Internet can provide consolation. The Internet can help people find information and connect with support groups. Electronic support groups (ESG) are a type of online community. For example, recovering addicts can log on 24 hours a day and participate in sending and responding to messages. Storm King (1994) states that an advantage to using ESGs as a recovery tool is "the thoughtfulness of the replies to issues that recovering addicts face in common" (no page). He argues that "writing can be different from spoken conversation in that thoughts can be formed more slowly and edited more carefully. The experiences and personal triumphs, as they are expressed in written form, may seem more powerful and clearer than similar messages shared in person" (no page).

"Technical expertise, privacy and convenience are the main reasons support groups are flourishing" (Kantrowitz, 1993, p. 48). There are numerous lists available through a variety of different online services. Topics include support for drug addiction, asthma, transplants, depression, stuttering, and loneliness. "America Online, for instance, has Monday meetings for infertility, chronic fatigue, and 'Marital Blisters.' On Tuesday, there is an AA meeting, a support group for depression, one for eating disorders, a meeting of Adult Children of Alcoholics, and a forum for Panic Support" (Moore, 1995, p. 68). The list goes on and on. People can find advice and help on just about any topic. However, for some people, the Internet is an addic-

tion itself. Addicts can get addicted to the cure. As a result, people can get lost in cybertime and cyberspace.

Cyber–addiction: getting lost in cybertime and space

There is so much posted, so much available, so much that can be filed that in the final crunch we are overwhelmed. Neil Postman's (1990) contention that we are "informing ourselves to death," rings true. There is only so much time in one day to read and respond. The cosmic overload of millions of lines of text that pours across the Internet daunts a normal life. The addicts attempt to keep up with it, compulsively connecting, reading, responding, flaming, and hoping that someone will notice. Eventually, you either make some friends and get a life, or you immerse yourself in online relationships.

Internet addiction is now a new topic of discussion. There are reports of people spending up to 12 hours a day online. Others compulsively log on twenty times a day, just to make sure that they don't miss that important message. The Internet is addicting and seductive. It generates friends. But, it can also become a friend substitute. For some, the Internet can become a serious addiction that takes time away from professional and family commitments. In "Confessions of a Cyberholic," Tom Mandel (1995) describes his problem as follows:

> At first, the net had seemed so exotic and cutting edge. But I quickly worked my way through the list of local BBSes [bulletin board services]. Brief stops at nearby fantasy-game systems, electronic porn parlors and digital meet-a-date services proved tiresome. A few weeks of arguing with cyberfeminists in *alt.soc.women* on Usenet taught me that all was not fun and games. Then I found the WELL, acronym for Whole Earth 'Lectronic Link. "Hello," I typed in. "I'm new around here and don't know what to do next."

> The gang on the WELL welcomed me with open arms. I was soon "talking" around the clock to people all over California and beyond about important issues of the day – like the latest technology or how the 49ers were doing. As a reward for my enthusiasm, the powers that ran the WELL asked me to run my own conferences and gave me a free account. At least it seemed free

at first. The real, hidden costs – professional, financial, physical and emotional – were only just beginning to mount (p. 57).

Internet addiction is a serious condition. Time spent online takes time away from real life. Business people neglect their jobs, students forget to do their homework, girlfriends overlook their boyfriends, and husbands ignore their wives. Moreover, Internetting can become expensive. People report spending hundreds of dollars per month in telephone bills and online service charges. Tom Mandel confesses, his addiction was so bad that commercial services would cut him off because he was not off-line long enough to pay the bills!

For some people, the Internet is an addiction that becomes as compulsive as alcohol, shopping, or exercise. These people spend enormous amounts of time on the net inventing personas and establishing what appears to be electronic friendships. But in reality, the technology becomes a dysfunctional codependency. People can become so obsessed with their online relationships that they neglect their real world responsibilities. The boundaries between maintaining cyber-friendships and personal real world relationships gets blurred. The destruction of real life relationships because of online compulsive behavior is one of the darkest aspects of cyberspace.

Exploring the dark alleys of cyberspace

Counter culture and pornography are the two most current topics discussed about the dark side of cyberspace correspondence. There is an element of 60s counter culture on Usenet groups. "By the 1980s the free-form cultural movement built around the consumption of hallucinogens was no longer visible, and even the prophet of psychedelia had found a new drug" (Bukatman, 1993, p. 139). Timothy Leary (1990) embraced computer technology the same way he extolled the powers of LSD in the 1960s. He states that computer "designers are about to unleash equally undreamed-of changes in the consciousness of people all over the world by giving them a tool for expanding the power of their minds" (p. 229). Some people compare cyberspace to mind-expanding drugs without the side effects. But, the negative addictive nature of drugs can also apply to cyberspace.

Figure 4 There is an element of 60s counter culture on the Internet. In the 1990s, Timothy Leary embraced computer technology the same way he extolled the powers of LSD in the 1960s

Others argue that cyberspace is an antidote to commercial mass media. In contrast to one-directional and censored information distributed through mass media, the Internet is mass participation. It enables people to participate in a fully bi-directional uncensored form of communication. Elmer-Dewitt (1995, Spring) contends:

The Usenet newsgroups are, in their way, the perfect antidote to modern mass media. Rather than catering to the lowest common denominator with programming packaged by a few people in New York, Atlanta and Hollywood and broadcast to the masses in the heartland, the newsgroups allow news, commentary and humor to bubble up from the grass roots. They represent narrowcasting in the extreme: content created by consumers for consumers. While cable-TV executives still dream of hundreds of channels, Usenet already has thousands. The network is so fragmented, in fact, that some fear it will ultimately serve to further divide a society already splintered by race, politics and sexual prejudice. That would be an ironic fate for a system designed to enhance communications (p. 10).

Recently, a movement has started to monitor and censor network communications. "The April 1995 terrorist bombing of the Oklahoma City federal building triggered further calls for Net anarchy to be more closely monitored" (Moore, 1995, p. 181). It was suggested, with no evidence, that the bombers used the Internet to communicate their plans. The Internet was publicized as "fertile ground for anarchist and antiauthoritarian thought, Net political culture also includes heaps of right-wing conspiracy theory, racist patriotism, Waco obsession, weapons fetishism, and bitter, seething resentment against the [American] federal government" (Davis, 1995, p. 28). You can find a conspiracy theory on just about any topic. "Taken individually, many of the posts are just the angry, ignorant, or sad barkings of ordinary men and women. But, collectively they take on the dark obsessive drone of a fever dream" (p. 38). Emotionally charged messages are encouraged by the speed of information being exchanged. According to Davis (1995), "a host of demons, fetishes, and vengeful archetypes crawl onstage straight from white American's political unconscious" (p. 28).

In addition to politics, the Internet has been receiving negative press about the subject of cyber-porn. On July 3, 1995, *Time* magazine ran a cover story called "Cyberporn." The article discussed an academic study that found 917,410 sexually explicit pictures, short stories, and film clips on the Internet. Simultaneously, *Newsweek* ran an article titled "No place for kids?" that described tales of sexual predators. "Until now parents have believed that no physical harm could possibly result when their progeny were huddled safely in the bedroom or den, tapping on the family computer. But then came news of cases like the 13-year-old Kentucky girl found in Los Angeles after supposedly being lured by a grown-up cyberpal" (Levy, 1995, p. 47). Leading the crusade against cyber-porn is United States Senator James Exon, who is trying to promote a new American Decency Act.

However, cyber-porn is not only an American issue. "All over the world, a growing number of governments, schools, special interest groups and families are struggling to find acceptable ways of tapping into the riches of the Internet without also hitting the darker veins of the global computer network" (Lewis, 1996, p. D1). For example, German officials recently persuaded CompuServe to cut off access to approximately 200 sex-related discussion groups worldwide. "Pressure is intensifying to restrict the flow of pornography, hate speech and other offensive material in electronic form, Internet technologists say that ultimately there is not a completely effective way to block the relatively small number of 'bad bits' out of the torrents of data available to tens of millions of people in more than 150 countries" (p. D1). Internet pornography and hate speech are now global issues. As individual nations begin to censor Internet information, the vision of the Internet uniting the world into a "global village" could come to an abrupt end. Currently, there are conflicting views on whether or not the Internet will culturally tear us apart or bring us together.

Cyberspace, community, and self

Cyberspace has been described as a new tool for community building. Nader (1995) argues that the Internet is a resource for citizens to share ideas. "When hundreds, thousands, or even hundreds of thousands of persons orga-

nize themselves in forums to debate important public policy issues, they bring together vast amounts of specialized expertise and information, creating synergies that are more powerful and useful than the most sophisticated database system" (p. 74). Thus, computer networks are viewed as a way to bring people together to renew a sense of community. However, a different perspective argues that using a mediated form of communication complicates the process of building societies.

"In traditional communities, people have a strongly shared mental model of the sense of place – the room or village or city where their interactions occur. In virtual communities, the sense of place requires an individual act of imagination" (Rheingold, 1993, p. 63). Will people be able to make the transition from small geographic groups to globally dispersed electronic ones? Some argue that in the process of making the transition to a globally networked community, we will lose our sense of individual identity.

"In traditional communities, with their relatively unchanging interconnected cast of characters, coherence of personality was favored. Relationships tended to be reliable and repetitive, supporting consistency of action" (Gergen, 1991, p. 174). Eliminating shared space for human interaction impacts on the concept of a unified self. By replacing physical presence with textual or symbolic representations of self, we create a new way of relating that is no longer grounded in a common overall reality. This fragmentation can lead to conflict and confusion because the Internet provides individuals with the opportunity to create their own fragmented subrealities. In cyberspace, "the self is decentered, dispersed, and multiplied in continuous instability" (Poster, 1990, p. 6).

Howard Gardner (1983) describes two different perspectives on concepts of self. One describes the individual as an integrated or self-actualized individual. "A self that is highly developed and fully differentiated from others ... individuals who appear to have understood much about themselves and about their societies and who have come to terms successfully with the frailties of the human condition" (p. 252). In contrast to this concept of an autonomous self, is the notion of a set of selves. "Rather than a central 'core self' which organizes one's thoughts, behavior, and goals, the person is better thought of as a collection of rel-

atively diverse masks, none of which takes precedence over the others, and each of which is simply called into services as needed" (p. 252). Cyberspace tends to encourage the second perspective of self.

As a result, Poster (1990) states when computer communication replaces face-to-face communication the subject is affected in the following ways: (a) new possibilities for playing with identities is possible, (b) gender cues are removed, and (c) the subject is dispersed and dislocated in space and time. Gergen (1991) and Poster (1990) argue that the individual is a unified self, and that computer-mediated communication is harmful to the development of a concept of self because the individual becomes fragmented in electronic space.

Writing from the opposite perspective, Turkle (1995) argues that cyberspace can be beneficial to developing concepts of self. For instance, MUDs enable adolescent identity development by creating what Erik Erikson (1963) calls a psychosocial moratorium. According to Turkle (1995), "the notion of moratorium was a central aspect of Erikson's theories about adolescent identity development ... the adolescent moratorium is a time of intense interaction with people and ideas. It is a time of passionate friendships and experimentation" (p. 203). In MUDs, adolescents can experiment with roles, relationships and virtual sex without the consequences of real world experiences, such as reckless driving that leads to teenage deaths and careless sex that can lead to pregnancy. Turkle contents that while the experiences on MUDs are removed from the structured surroundings of one's normal life, the moratorium facilitates the development of a personal sense of self. Thus, game playing can have a positive influence on real life because individuals can use online role playing to act out and experiment with different aspects of their personality.

Turkle views electronic communication as positive for the development of self. In contrast, Gergen and Poster argue that it is negative. Although these authors disagree on the future impact cyberspace could have on developing a concept of self, they all agree that "cyberspace becomes the characteristic spatiality of a new era" (Bukatman, 1993, p. 156). As real world interpersonal relationships become less stable (Ablamowicz, 1993), cyberspace provides an alternate method for developing human relationships. How

cyberspace will influence the development of self in a postmodern world is a topic for further investigation.

Conclusion

On the bright side, cyberspace is a new meeting place. A place to find kindred spirits to share interests. A place to go to avoid loneliness. Cyberspace is a way to reach out and stay in touch with your friends and family. For people in emotional distress, it can provide contact through electronic support groups. Cyberspace can help people become more politically involved and build a sense of community. Finally, cyberspace can be a place to develop genuine friendships. On the dark side, cyberspace can be addictive and disruptive to real world relationships. Cyberspace can be a fertile ground for anarchist movements. Spreading hate speech and conspiracy theory throughout electronic space could tear us apart instead of bring us together. Moreover, cyberspace can be deceptive. People do not always present their true selves in text-only correspondence.

There is a risk involved with building online relationships. As a result, a key ingredient for establishing authentic relationships online, is the belief that your cyber-friend is an actual person. For a bond to form, there is usually some verification about a person's real identity. That is why the members of QC-L had to finally meet each other in-person. People who just play in cyberspace and perform various fictional roles, will not develop real friendships. Or worse, they can find themselves trapped in a fictional persona and unable to reveal their true identity to a cyber-friend.

Like any medium of communication, cyberspace can be used to make both positive and negative connections. How you use online communication is your personal choice. But always remember that cyberspace relationships should be considered real and not virtual. Although the space is imaginary, people behave as if they are in a real place. Moreover, the time you spend online is always real and is never virtual.

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Privacy and technology

BY GARY T. MARX*

"It's a remarkable piece of apparatus."
– F. Kafka, *The penal colony*.

The industrial age was dependent on technologies that extracted value from the earth, trees, and water. Our age too relies on extractive technologies. However, the technologies are not pumps or drills, nor is the substance extracted valued because of its physical properties. The technologies are computers, transmitters, spectrographs and video lens. The substance extracted is personal information.

In 1928 United States Supreme Court Justice Brandeis wrote "discovery and invention have made it possible for the government, by means far more effective than stretching upon the rack, to obtain disclosure in court of what is whispered in the closet. The progress of science in furnishing the government with means of espionage is not likely to stop with wiretapping." His haunting and prescient words clearly apply today, as the line between science and science fiction is continually redrawn.

New technologies for collecting personal information which transcend the physical, liberty enhancing limitations of the old means are constantly appearing. They probe more deeply, widely and softly than traditional methods, transcending barriers (whether walls, distance, darkness, skin or time) that historically protected personal information. The boundaries which have defined and given integrity to social systems, groups and the self are increasingly permeable. The power of governmental and private organizations to compel disclosure (whether based on law or circumstance) and to aggregate, analyze and distribute personal information is growing rapidly.

We are becoming a transparent society of record such that documentation of our past history, current identity, location, and physiological and psychological states and behavior is increasingly possible. With predictive profiles and

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DNA there are even claims to be able to know individual futures. Information collection often occurs invisibly, automatically and remotely – being built into – routine activities. Awareness and genuine consent on the part of the subject may be lacking.

The amount of personal information collected is increasing. New technologies have the potential to reveal the unseen, unknown, forgotten or withheld. Like the discovery of the atom or the unconscious, they surface bits of reality that were previously hidden, or didn't contain informational clues. People are in a sense turned inside out.

To be alive and a social being is to automatically give off signals of constant information – whether in the form of heat, pressure, motion, brain waves, perspiration, cells, sound, olifacteurs, waste matter, or garbage, as well as more familiar forms such as communication and visible behavior. These remnants are given new meaning by contemporary surveillance technologies.

Through a value-added, mosaic process, machines (often with only a little help from their friends) may find significance in surfacing and combining heretofore meaningless data.

The ratio of what individuals know about themselves (or are capable of knowing) vs. what outsiders and experts can know about them has shifted away from the individual. Data in diverse forms from widely separated geographical areas, organizations and time periods can be easily merged and analyzed. In relatively unrestrained fashion new (and old) organizations are capturing, combining and selling this information, or putting it to novel internal uses.

In the United States we celebrated the 200th anniversary of the Constitution, a document that extended liberty. Unfortunately, the bi-centenary of another important document that restricted liberty has been virtually unnoticed – the 1791 publication of Jeremey Bentham's *Panopticon or the Inspection House*.

Bentham offered a plan for the perfect prison in which there was to be constant inspection of both prisoners and keepers. His ideas helped give rise to the maximum security prison. Recent developments in telecommunications, along with other new means of collecting personal information give Bentham's image of the panopticon great contemporary significance.

The stark situation of the maximum security prison can help us understand societal developments. Many of the kinds of controls and information gathering techniques found in prison and in the criminal justice system more broadly, are diffusing into the broader society. We may become a "maximum security society".

Such a society is transparent and porous. Information leakage is rampant. Indeed, it is hemorrhaging, as traditional boundaries disappear. Actions, as well as feelings, thoughts, pasts, and even futures are made visible, often independent of the individual's will or knowledge. The line between the public and the private is weakened; we are under increased observation, ever more goes on a permanent record, and much of what we say, do and even feel may be known and recorded by others we do not know – whether we will this or not, and even whether we know about it or not. Data in many different forms, from widely separated geographical areas, organizations, and time periods can easily be merged and analyzed.

As the technology becomes ever more penetrating and intrusive, it becomes possible to gather information with laser-like specificity and with sponge-like absorbency. If we think about the information gathering net as being parallel to a fishing net, then the mesh of the net has become finer and the net wider.

It is easy to get carried away with science fiction fantasies about things that might happen. We are of course familiar with computer data bases that record personal information. From the perspective of the United States, Scandinavian countries, and perhaps in particular Sweden, take this to new heights (or lows) depending on one's point of view. However, those concerned with civil liberties and privacy issues also admire such countries because of the stronger legal protections they give to personal information.

Looking just to the next decade we will likely see technical developments with implications for personal privacy such as the following:

- DNA screening and monitoring. Beyond identifying persons likely to develop serious illnesses or to have children at risk of illness, this may lead to claims to identify tendencies to alcoholism, homosexuality, and poor work habits

- Vehicle tracking devices as part of "intelligent" highway systems

- Personal tracking devices via chips implanted under the skin (this is now available for pets)

- Pressure to use "smart cards" which could contain all of an individual's health, financial and legal records

- The expanded commercial use of spy satellites, capable of producing photographic images of a square meter or less

- Smart image-recognition systems which could permit computer matching of faces in large crowds in an effort to locate persons of interest

- Wireless portable personal communication devices in which persons might be assigned a phone number at birth which they would be expected to also have with them and ever smarter telephones that deliver video images and information about the person (or the number a call comes from)

- Paperless electronic safety deposit boxes

- Ever more intense work monitoring

- Smart homes in which data (electricity, communications, temperature) flows into and out of the home are all part of an integrated system

- The increased use of the Internet and of various locater devices (e.g., one called "cookies" that keep a record of what sites are visited and what information is accessed).

The head of a computer database company providing reports on potential tenants to landlords says, "the more you know about somebody else, the better off everybody is." The assertion, typical of a view held by many persons in the United States ignores the strategic, aesthetic, diplomatic and self-definitional aspects of personal information. It is increasingly easy to know "more" about others without their knowledge or consent. Technology creates new possibilities for the invasion of privacy and other problems which our laws, policy, manners and culture have not kept pace with.

The increased availability of personal information (whether in audio, visual, telemetric, bio-chemical, or data base forms) is a tiny strand in the constant expansion of knowledge witnessed in the last two centuries and of the centrality of information to the working of contemporary society.

As a sociologist, my research interest is in the new technologies and questions and themes these raise about the individual and society. Beyond any given technology, this reflects a more general interest in the discovery/revelation and concealment/protection of personal information. Under what conditions is it appropriate to gather personal information and what are the social correlates and consequences of revealing or concealing it? A morality for the collection of personal data ought not to depend on how weak or powerful a means is, but on more transcendent ideas about what is right and wrong and the social consequences.

The new information technologies involve larger issues regarding the complex inter-relations of technology and society; the growth of large governmental and private organizations; information flows and restrictions in a democratic society; the social functions and dysfunctions of anonymity; the public and the private; and the nature and experiencing of trust and distrust, the social bond, and social control in mass society. To the extent that the vast increase in what can be known about the individual is joined with a declining ability to protect that information, the implications are profound for behavior and social organization.

Most analyses focus on only one technology such as telecommunications, computer data bases, drug testing or location monitoring or apply only one perspective – technical, ethical, legal, social or policy. In a forthcoming book tentatively called *Windows into the soul: surveillance and society in an age of high technology,* I seek to be integrative and comprehensive – looking across technologies, disciplines and methods.

I treat the various extractive technologies as a unit and from a variety of perspectives. I suggest cross-cutting analytic dimensions which permit uniting seemingly dissimilar, and separating seemingly similar, phenomena. I offer a set of questions and concepts intended to help in understanding and contrasting extractive technologies, regardless of their specifics. In a previous study of undercover police practices I focused on human informers and infiltrators as the means of data collection, while for this project material technologies are central.

The new information technologies raise at least four broad types of question: social scientific, cultural, comparative

and ethical. With respect to social science we need to empirically describe the technologies (what are the facts/data?), how can they be best classified (what are the types, dimensions and contexts of variation and generic or ideal-typical forms?). We need explanation. What theories or ideas best account for the observed patterns and trends? Why have we seen such a rapid expansion in the diffusion of these technologies in the last decade? What inhibits or facilitates the use of extractive technologies? What social processes of facilitation and resistance can be identified? What are the implications for the changing nature of, and the social functions and dysfunctions of borders and boundaries? What type of society would we have if there was greatly enhanced visibility for our current actions and thoughts, as well as for the past and the future?

Secondly, the techniques occur within and against a cultural backdrop and personal experience which must be understood. How are these techniques treated in popular culture as represented by advertisements, cartoons, jokes, music, art and surveillance toys for children? What images and symbols predominate? What does this material tell us about the lived experience of being either the watcher or the watched?

This material raises major questions for our comparative understanding of different societies. This is particularly important in an age of globalization where communications technologies weaken borders. Societies (and regional complexes such as Northern vs. Southern Europe or Europe vs. North America, Asia vs. the West) differ in how they view, experience and treat the borders that define personal and social space as it involves these technologies.

An issue of particular importance is that of public policy and ethics. How should the technologies be judged? What is at stake? What competing values are present and how can and have conflicts between them been responded to? What is most problematic or desirable about extractive technologies? What are the major forms of abuse and how can they be minimized? What are the social consequences of control as a result of etiquette, organizational policies, laws and the design of technology?

The first part of Appendix I suggests a number of general questions that can be asked of any new technology. The second part deals with information technolo-

gies and, by way of illustration with the information highway specifically. The specific questions offered here can guide research and policy. In the remainder of this paper I wish to do three things; 1) discuss the issue of privacy and why it is important, 2) list some techno-fallacies regarding information technology, and 3) list some principles that can guide us in the development and use of these new technologies.

Does privacy matter?

The new technologies may raise a variety of troubling issues including injustice, intrusion, denial of due process, absence of informed consent, deception, manipulation, errors, harassment, misuse of property and lessened autonomy. Privacy as it involves the control of personal information is central to many of the social concerns raised by new information technologies.

The United States does not have the recent European experience with totalitarian governments, and has a rather uncritical view of technology. Those factors, when joined with the value placed on free enterprise, rampant consumerism, freedom of speech and information, and concerns over declining productivity in a global economy, AIDS, drug use and crime mean that in the United States the laws and policies for the protection of personal information are much weaker than in Europe. For example, there are no data protection commissions or commissioners. Personal information is commodified (e.g., a list of the magazines one subscribes to) can be bought and sold without the consumer's knowledge or consent.

One response to privacy concerns often expressed by some industry spokespersons and many citizens is simply, "So what? Why worry?" These technologies fill deeply felt needs. We increasingly live in a world of strangers, rather than in homogeneous rural communities in which people knew those with whom they had contact. The United States Supreme Court has said in its famous Katz decision that privacy was only protected when it could be reasonably expected. Technology changes and social expectations can't remain static. With more powerful technologies we can reasonably expect less and less and hence, privacy must become more restricted. Most so called "privacy invasions" are not illegal in the United States.

Given the free market, you can also buy technologies to protect yourself from privacy invasion. Personal information is often viewed as just another commodity to be sold like any other. Companies have an obligation to stock holders to make money. Government must find the guilty and protect the innocent.

In addition, we are an open society that believes that visibility in government brings accountability. With respect to individuals a valued legacy of the 1960s is personal openness and honesty. The only people who worry about privacy are those who have something to hide. Right? Wrong!! There are at least 10 reasons why privacy and anonymity are important:

1 The ability to control information about the self is linked to the dignity of the individual, self-respect and the sense of personhood. Self-presentations and back-stage behavior are dependent on such control.

2 Anonymity can be socially useful in encouraging honesty, risk-taking, experimentation and creativity.

3 Confidentiality (via dissemination protections) improves communication flows and is vital to trust in professional (doctors, lawyers, psychologists) and corporate settings.

4 Privacy is a resource in inter-personal relations, doled out and exchanged as relationships progress. Intimacy is based partly on the voluntary sharing of personal information with others. Individuals feel free to be "themselves" as they get to know others better, and reciprocal exchanges take place.

5 The control of information is a strategic resource in impersonal relations. Trade secrets and copyrights are a formal expression of this.

6 Group boundaries are maintained partly by control over information. Individuals are in or out, and occupy organizational positions based partly on what they are entitled to know and have access to.

7 Privacy makes possible the American ideal of starting over and the fresh start.

8 Fairness can be protected by denying access to information which could be put to unfair use. For example, while religious discrimination is illegal, if employers, schools, and landlords could ask it (as in most cases they

now can not), such protections would be weakened.

9 Privacy can help provide the solitude and peace necessary to mental health and creativity in a dynamic society. Here, it is a question of control over what is taken in, rather than what is given out.

10 There is a broader, all encompassing symbolic meaning of practices that protect privacy. Such practices say something about what a nation stands for and are vital to individualism. By contrast, a thread running through all totalitarian systems from the prison to the authoritarian state is lack of respect for the individual's right to control information about the self. It has been said that the mark of a civilization can be seen in how it treats its prisoners, it might also be seen in how it treats personal privacy.

Of particular importance are the strong political implications of the topic. A thread running through all totalitarian systems, from the prison to the authoritarian state, is denying the individual the right to control information about the self.

Privacy is a value which may only be appreciated once it is lost. It is important that individuals be made aware of what is at stake and what their rights are. It is not a foregone conclusion that technology will develop in such a way as to reduce the power of the individual relative to large organizations and the state, although the forces favoring this tend to be stronger than those opposing it. Schools and religious organizations should deal more directly with what the individual's rights are with respect to means such as third party records, computer dossiers, drug testing, and the polygraph. It is important that citizens act back and ask organizations about their information policies. Assertions such as "the computer says" or "that is the policy" must lead to questions such as "is the computer reliable?" Why is it the policy? What moral and legal assumptions underlie it? What alternatives are there? How was the data gathered? How is it protected and used?

It is also important that the technology be demystified and that citizens not attribute to it powers that it doesn't have. There is a chilling danger in the "myth of surveillance" when the power of information technology is oversold. On the other hand, when technologies are revealed to be less powerful than authorities claim,

legitimacy declines. There should be truth in communications policies, just as we have truth in advertizing and loan policies. The potentials and limits of the technology must be understood.

Yet in noting the social functions of privacy this is certainly not to deny that privacy taken to an extreme can be harmful. Or that privacy will never conflict with other important values such as the public's right to know and the First Amendment to the United States Constitution, or accountability, health, security, and productivity.

Unlimited privacy is hardly an unlimited good. It can shield irresponsible behavior – protecting child and spouse abusers, unsafe drivers, and money launderers. Taken too far it destroys community. Without appropriate limitations it can trigger backlash, as citizens engage in unregulated self-help and direct action. The private subversion of public life carries dangers as well as the public intrusion into private life.

Contemporary information extractive technologies can of course also be used to protect liberty, privacy and security. Without the incriminating tapes secretly recorded by President Nixon, Watergate would have remained a case of breaking and entering; without the Xerox machine the Pentagon papers might never have reached the public; and without the back-up computer records kept in NSC files which Oliver North thought he had erased, we would know far less about the Iran-Contra affair. Aerial surveillance can monitor compliance with pollution standards and help to verify arms control treaties. Tiny transmitters can help locate lost children or skiers caught in an avalanche. Devices that permit fire fighters to see through smoke may save lives. Remote health monitors can protect the elderly living alone (in one form an alarm is sent if a day goes by without the refrigerator being opened).

But elements of a Greek tragedy are also present. The technology's unique power is also its tragic flaw. What serves can also destroy, absent increased public awareness and new public policies. With a topic as complicated and changing as this one, it is easier to ask the right questions than to come up with the right answers. The two appendices list some questions which I think must be asked about new technology. It is also important to identify the cultural assumptions that underlie attitudes towards new technologies, a topic to which I turn next.

Information age techno–fallacies

The belief that privacy is not important and should matter only to those who have something to hide is one of a large number of what I see as tarnished silver-bullet "information age techno-fallacies" (the silver bullet image refers to an American popular culture figure "The Lone Ranger" who always left the locals with a silver bullet as he rode off into the sunset, having subdued the bad guys).

As an ethnographer in watching and listening to the rhetorics around information technology, I often hear things that simply sound wrong to me, much as a musician hears things that are off key. A sampling of such techno-fallacies:

> "Turn the technology loose and let the benefits flow."

> "Do away with the human interface."

> "When you choose to make a phone call, you are consenting to have your telephone number released."

> "Only the computer sees it."

> "Those of us who are involved in consumer marketing are the best agents for protecting the consumer's privacy."

> "That's never happened."

> "The public interest is whatever the public is interested in watching."

> "There's no law against this."

> "The technology is neutral."

The fallacies which I discuss below differ in kind – some can be shown to be empirically false or logically suspect, and hence, if the argument is correct (whether factually or logically), persons of diverse political perspectives can agree that they are fallacious. Others are normative fallacies and will be rejected only when there is agreement about the values, or value priorities on which they are based. But even here, I think the values that I am expressing are central to American and western society.

Table I lists 30 techno-fallacies. In this limited space I will comment on only some of them.

The fallacy of the free lunch or painless dentistry (a frequent assumption of the techno-boosters), is that a technical change will involve only benefits and no costs. Therefore it must be adopted since it is basically free. Of course this is nonsense – there are no free meals and your teeth may hurt when the novacaine wears off. If nothing else a given use of resources involves foregone opportunity costs. The resources might have been used for some other purpose.

The fallacy of quantification is particularly important in the United States where policy setting tends to be dominated by economists and lawyers. It's important to realize that there are values that can't be measured by bottom lines and market-driven phenomena.

The fallacy of the short run speaks for itself. There's a wonderful story about a farmer who was having a hard time making ends meet. Someone advised him to feed his animals less, so he cut down their feed by 25 %. It worked – he saved a lot of money. He then said "hey, this is great, I'm going to cut their feed in half" and he saved even more money. And of course he kept on reducing their feed and you know what happened.

The legalistic fallacy is often expressed by advocates of a technology. The basic idea is that if you have a legal right to do something, it therefore must be the right thing to do. But we ought to start with the law and not stop with it. The fact that a practice is legal, (sometimes because it is too new to have resulted in restrictive legislation, or because power differentials prevent that), does not mean that it is right or wise.

The pragmatic or efficiency fallacy holds that the most important thing is whether or not the technology gets the job done. But there is more to collective life than pragmatism. Certainly, given scarce resources and a scientific ethos, we must ask that question. But again an affirmative answer shouldn't lead to the automatic unleashing of the technology and the overruling of other competing values. Values that are difficult to measure rarely receive adequate attention at conferences which are inspired by a particular innovation or problem. Pragmatism must be weighed along side of other values such as fairness, equity, and the external costs imposed on third parties.

The fallacy of the lowest common denominator morality assumes that if your side doesn't use the technology your opponents will, giving them an unfair advantage.

A common fallacy is to assume that personal information (whether deduced from broader aggregate data or collected from a particular individual) is simply another commodity. It is believed that if you are

Table 1 Some techno-fallacies of the information age

1 The fallacy of immanent development and use which holds that if a technology can be developed it should be, and if it is developed its use can not be stopped.

2 The fallacy that greater expenditures and more powerful technology will continually yield benefits in a linear fashion.

3 The fallacy that pragmatism and/or efficiency should automatically overrule other values such as fairness, equity, beauty, and external costs imposed on third parties.

4 The fallacy of thinking that the meaning of a technology lies only in its practicality or material aspects and not in its social symbolism and historical referants.

5 The fallacy that the means will never determine the end (or if you can't fix the real problem fix whatever the technology permits you to fix).

6 The fallacy of the free lunch or painless dentistry.

7 The fallacy of perfect containment or non-escalation (or the Frankensteinian fallacy that technology will always remain the solution rather than become the problem).

8 The fallacy of thinking that a given, carefully circumscribed change will not create a precedent.

9 The fallacy of technical neutrality.

10 The fallacy of societal consensus and homogeniety in which it is assumed that conflicts and divisions are non-existant and what's good for those with economic and political power is necessarily good for everyone else.

11 The fallacy of implied consent and free choice.

12 The fallacy of quantification.

13 The fallacy of the short run.

14 The legalistic fallacy that just because you have a legal right to do something it is the right thing to do.

15 The technocratic fallacy that the experts always know what is best.

16 The populist fallacy that the people always know what is best.

17 The fallacy of lowest common denominator morality in which if the competition or others push moral limits, you are justified in doing the same.

18 The fallacy of permanent victory.

19 The fallacy of the 100 % fail-safe system.

20 The fallacy of delegating decision making authority to the machine.

21 The fallacy of a passive, non-reactive environment.

22 The fallacy of believing that because it is possible to successfully skate on thin ice, that it is acceptable to do so.

23 The fallacy of assuming that if a critic questions the means he or she must also be against the ends.

The following apply particularly to information technologies:

24 The fallacy of assuming that only the guilty have to fear the development of intrusive technology (or if you've done nothing wrong you have nothing to hide).

25 The fallacy of assuming that personal information on customers, clients and cases in the possession of a company is just another kind of property to be bought and sold the same as office furniture or raw materials.

26 The fallacy of assuming that data are simply there waiting to be delivered or plucked from the data tree (the social and political factors involved in collection/construction are not seen).

27 The fallacy that the facts speak for / produce themselves.

28 The fallacy of assuming that because our privacy expectations are historically determined and relative, they must necessarily become weaker as technology becomes more powerful.

29 The fallacy that if a value such as privacy is relatively new or new in form, or applies to only a fraction of the world's population, it can't be very important.

And finally, a more general fallacy:

30 The fallacy of re-arranging the deck chairs on the Titanic instead of looking for icebergs.

able to gain access to the data, it's yours to use as you wish. But personal information has a special quality, something that's almost sacred. It is the not the same as raw materials or office furniture. Europe has recognized this to a greater extent than has the United States.

There's the fallacy of assuming that the facts speak for themselves. But the "facts" are socially generated and interpreted. Any human knowledge, no matter how powerful and useful, is always abstracted out and partial. It is only a sample or a fraction of what might be attended to. Alternative information or a fuller picture might suggest a different

meaning. To adequately interpret, we need a context and a broader picture. When you apply acontextual data to human beings you run terrible risks of error and injustice in particular cases (although in the abstract the system may be rational).

Now to deal with broader context, of course, you have to have more data and that requires more money. This leads to another (and in some ways opposed fallacy) that if some information is good, more is better. This equation of bigger with better is particularly strong in the United States. It is no doubt related to capitalism and has a gender component.

It is simply not necessarily true that if only we spend more money and create more powerful technologies that things will improve. There are issues of scale and threshold, not to mention the hubris of thinking that terribly complex problems existing within contexts of human conflict will always yield to technical solutions. There's nothing inherently good or bad about the increased power of a technology. Our judgements must flow from analysis, not from the fact that a tool exists, or might exist. In this sense technology differs greatly from artistic expression.

Just because privacy expectations are historically determined and relative, it is a fallacy to assume that they have to become weaker as technology becomes more powerful. As noted, such a view is reflected in some United States court decisions. A related point is that because privacy as we know it in our complex, industrial democratic society is a historically new phenomenon, not experienced, or perhaps even valued, by much of the world's population, that it is not important.

The populist fallacy of assuming that the public knows best. There is the opposite fallacy that elites know best. There is the fallacy that the means will never determine the end. It has been said that to a person with a hammer, the whole world looks like a nail. Yet a major critique of industrial society is that means increasingly determine ends. It is vital for civilization (if not always for self or organizational interests), that we start with goals and ask what do we want to accomplish, instead of starting with a tool and asking how can I apply it.

There is the dangerous fallacy of believing that because it's possible to successfully skate on thin ice, it's acceptable to do so. A standard response to social critics of technology is "ok, it could happen, but so far its hypothetical." Foresight is better than hindsight, even if it sometimes errs in its conservatism. There was a time when the United States nuclear accident at Three Mile Island and the large Exon oil spill in Alaska had not happened as well. In the Nordic countries and in the Northern United States, it may be fun to skate on thin ice, but it's a dumb thing to do.

There is the fallacy of permanent victory. Here we have the assumption that environments, especially those where there are conflicts of interest, are passive rather than reactive. But we know that isn't the case.

There is the danger of delegating decision-making authority to a machine. It is also often assumed that technology is necessarily good because it's new, that you can't stop progress and if we can do something we should. I study social control and one of my favorite quotes is from a police chief, who said "if we have the technology, why not use it?" That is a frightening assertion absent a wide ranging consideration of multiple consequences. Such statements ought to be approached as empirical and ethical

questions and not unreflectively accepted as conclusions.

There's a very important fallacy of thinking that the only meaning of the technology is in its application. Of course we have to be concrete, we have to think about whether or not the technology will work. But technologies involve social and human meanings and historical references. The meaning of a technology does not lie only in its ostensible use. Technologies also have symbolic meanings. Police dogs can be an efficient crowd control device. Yet if you were the police chief in Birmingham, Alabama, (where Americans have vivid television memories of police dogs attacking civil rights demonstrators) would you use dogs for crowd control?

There is the fallacy of not considering issues of precedent. This assumes that "we will just do this one time and never again." And finally, there is the fallacy of rearranging deck chairs on the Titanic, instead of looking for icebergs. The problem here is looking at superficial issues, or at symptoms, rather than at deeper causes.

I realize that some of my assumptions could be turned around and called fallacies (or worse). Someone holding different values might come up with a different list including items such as "the fallacy of listening to academics who make broad generalizations." The fallacies also differ in seriousness and some are in conflict. My basic point is not to argue strenuously for this particular list, but to argue for the importance of undertaking a critical examination of the assumptions that we make about new information technologies whether this involves new forms of telecommunication, Geographic Information Systems, drug testing, electronic location monitoring, DNA predictions, or computer matching and profiling. In doing this we need humility in the face of complex and interdependent problems.

Principles

One way to deal with these issues is have publicly accepted principles by which new information technologies will be assessed.

Here we need to clarify values and rights in order to reasonably balance what is at stake. An important example of the kind of principles needed is the Code of Fair Information Practices developed in 1973 for the U.S. Department of Health, Edu-

cation & Welfare. The Code involves five principles:

- There must be no personal data record-keeping whose very existence is secret.

- There must be a way for a person to find out what information about the person is in a record and how it is used.

- There must be a way for a person to prevent information about the person that was obtained for one purpose from being used or made available for other purposes without the person's consent.

- There must be a way for a person to correct or amend a record of identifiable information about the person.

- Any organization creating, maintaining, using, or disseminating records of identifiable personal data must assure the reliability of the data for their intended use and must take precaution to prevent misuses of the data.

These are generally reflected in European data protection standards. In addition, other related principles are needed. For example, a *principle of minimization* such that only information that is directly relevant to the task at hand is gathered; a *principle of restoration* such that in a communications monopoly context those altering the privacy status quo should bear the cost of restoring it; a *safety net or equity principle* such that a minimum threshold of privacy is available to all; a *principle of timeliness* such that data are expected to be current and information which is no longer timely should be destroyed; a *principle of joint ownership of transactional data* such that both parties to a data creating transaction must agree to any subsequent use of the data and must share in any gains from its sale; a *principle of consistency* such that broad ideals rather than the specific characteristics of a technology determine privacy protection; and a *principle of redress* such that those subject to privacy invasions have adequate mechanisms for discovering and being compensated for violations. Table II lists principles which I believe are central.

It is unrealistic to have principles which apply equally in all contexts and across all technologies. To argue that, they would have to be so general as to be vapid, or simply too rigid. Yet I think these principles must be weighed when we consider public policy with respect to information technology.

Table II Some privacy protection principles

1	Informed and consenting subjects
2	Minimization
3	Restoration
4	Safety net / equity
5	Timeliness, validity, relevance of data
6	Joint ownership of transactional data
7	Unitary usage and non-migration of data
8	Consistency
9	Subject involvement in standard setting
10	Reciprocity
11	Inspections
12	Correction-commentary procedures
13	Data security
14	Confidentiality and anonymity where appropriate
15	Redress
16	Human review of machine decisions

Sunrises and sunsets

Former Supreme Court Justice William O. Douglas has written that the United States Constitution with its Bill of Rights "... guarantee to us all the rights to personal and spiritual self-fulfilment. But the guarantee is not self-executing. As nightfall does not come at once, neither does oppression. In both instances, there is a twilight when everything remains seemingly unchanged. And it is in such twilight that we all must be most aware of change in the air – however slight – lest we become unwitting victims of the darkness." We are in such a time period now with respect to new information technologies. This goes far beyond particular laws to what it means to be human and to how we think about society.

There is the possibility of becoming an even more stratified society based on unequal access to information in which individuals live in glass houses, while the external walls of large organizations are one-way mirrors. There is a significant (and perhaps growing) gap between the capabilities of the new surveillance technologies and current cultural, legal and technical protections.

Powerful social and psychological forces work against any easy assumptions that a decent society is self-perpetuating. The masthead of a black civil rights era newspaper in Sun Flower County, Mississippi reads "Freedom is a Constant Struggle". This heralds an important truth. There are no permanent victories in democratic society. As past and contemporary events of this century indicate, liberty is fragile. These technologies require new cultural standards and public policies. The technologies offer wonderful possibilities. Yet they are also reminiscent of Franz Kafka's short story *The Penal Colony* in which a prison officer invents a sophisticated machine for punishing inmates. The story ends with the officer being killed by the machine he created. There is no guarantee that hard won conceptions of the dignity of the person, the autonomy of organizations and rights of citizenship will stay won or be extended in the face of continual social and technical change – absent knowledge, wisdom and vigilance.

Appendix

Some questions for social research and public policy raised by new information technologies.

A Some general questions to ask about any new technology

- What human needs or goals is the technology intended to serve?

- What other means are (or might be) available for obtaining the same goals?

- What logical, empirical and normative assumptions are made about the technology?

- Who needs or wants the technology? Where does the pressure to develop and apply it come from?

- What groups are most involved in making decisions about the form of the technology and how it will be used?

- Who will the technology be available to and who will control it?

- What groups are likely to profit most from, or be hurt most by, the technology and in what ways?

- What are the likely social impacts of the technology on things such as the economy, the environment, work, education, mental and physical health, the arts, leisure and interpersonal and group relations?

- What are the likely impacts on values such as democracy, equality, civil liberties and civil rights, fairness, accountability, individual autonomy, choice, growth and achievement, creativity, tolerance, inclusion, centralization and decentralization, standardization and differentiation, social participation, and beauty?

- What new forms of crime and victimization, as well as of social control, might appear?

- Will market forces provide for the efficient and equitable distribution of the benefits of the technology?

- How valid, reliable and effective is the technology?

- What can go wrong as well as right? What are the major short and long run risks associated with the technology and the likelihood of their occuring?

- What unintended positive and negative consequences might occur? How sure can we be that the technology will only be used for its intended purposes? How great is the danger that the machine will control us rather than the reverse? Is there adequate provision for the human vigilance and discretion?

- What forms of recourse are available if the technology is misused and individuals and groups are wrongly harmed by it? How easily can this be discovered?

- What precedents will use of the technology create and where might this lead?

- What symbolic meanings does the technology communicate?

- What legislative, judicial and administrative/bureaucratic policies are needed? Is there a role for industry-wide standards and policies? Are new manners needed? What new technologies may be needed to deal with the problems of the one in question?

- What lessons can we learn from previous technologies?

- What are the best and worst scenarios involving the technology that can be imagined for the next 5 – 10 years? The next 50 years? What factors are operating to push us toward or away from these outcomes?

B Some questions specific to electronic highways

Access:

- How useful is the highway analogy when the vehicular highway was built with government funds and the information highway is likely to be built with private funds?

- Will information highways be free-ways or toll roads?

- Will the predominant form be like a public library in which all have easy access, or will it be commodified? What are the myriad and conflicting consequences of treating information as a commodity or as a public good?

- What does "universal access" mean in a context where there are multiple services and providers? Where will the funds to maintain and use systems come from even if they can be initially made available? What motivation, skills, and money are required beyond access, if the technology is to be effectively used at a mass level? How will schools that don't have money to buy library books suddenly be able to afford access to new forms of information delivery, even if they are given the necessary hardware and software? Will simply providing equal access increase inequality, given different starting points?

- Will we see new forms of inequality between the information rich and poor? Can a way be found to benefit from the positive aspects of de-regulation while not losing the subsidization benefits of regulation (a key factor in universal phone service)?

Producers and distributors:

- Who will provide which services – telephone, cable television, or entertainment companies, non-profit organizations, government (and in what combinations with what consequences)?

- Will we see a horizontal switched network like the telephone system, in which any user can communicate with any other, or a vertical network in which messages only go one-way, as with traditional television?

- Is the Internet a realistic model, given its subsidization and technically relatively sophisticated users?

- Will companies invest when the legal and regulatory climate is so muddled and uncertain?

- What lessons can be learned from the history (and hype) that accompanied the appearance of the telephone, radio and television?

Uses:

- Will there be balance among the various potential uses such as interactive means of communication for far flung citizens, education, public service information and discussions, shopping, and entertainment, or will the commercially driven forms predominate?

- What are the social and ethical implications of the general public favoring entertainment and shopping over the lofty cultural and educational goals of net visionaries? Does a democracy that is inseparable from the market have a built-in contradiction relative to the notion that professional elites have an obligation to tell the public what is best for them?

Legal issues and responsibilities:

- Will electronic communication come to be fully covered under the Fourth Amendment's protection against unreasonable government search and seizures?

- Will communications over a network be given the freedom of speech and assembly protections of the First Amendment? Should the providers of a service be entitled to censor messages and restrict participation?

- For public policy purposes should e-mail be viewed as a post-card, a first class letter, or a telephone conversation, or something different from each of these?

- Is a posting on a bulletin board best seen as a form of publishing or simply a conversation?

- Should the network system operators be responsible (both morally and legally) for what is sent out over it?

- Will medical and other professionals feel at ease to disseminate their knowledge if they have to worry about liability?

- Should electronic communications and software be entitled to the same copyright protections as a book? If so, will this inhibit use of the medium and be impossible to enforce? If it is not granted does it lessen the incentive to innovate? How free should the recipient of electronic information be to change and retransmit it?

- Can networks be secured against malicious hackers, criminals?

- Can children be encouraged to use networks, yet be protected from exploitative communication?

- Can systems be user friendly and inexpensive and yet secure?

Surveillance and privacy:

- There are tire marks all over the highway. Electronic trails create unprecedented possibilities for knowing where a person is, whom they are communicating with, what is being expressed, and what information they are using. Will this facilitate demands for a national id card, will this lead to even greater sale of personal information without the knowledge, consent or profit of the subject and to new forms of inclusion and exclusion beyond the control of the individual?

- Can systems be technically, legally and socially designed such that their advantages do not come at a cost of the destruction of personal privacy? Can the social functions of anonymous communication be balanced with the dysfunctions? How wiretap-friendly should the technology be? How can the authenticity of a sender and a document be insured? Do we want the government to be the only locksmith in town holding the keys to data encryption? How should the protection of individual privacy be balanced against the broader needs of the society for protection?

Implications for social inter-action and psychological well-being:

- Will the new "virtual" communities and interactions that occur in cyberspace mean greater equity in communication (e.g., race, gender, age and physical condition are not readily apparent on a computer screen), increased chances for social participation, and reduced social isolation?

- Will such interactions be as satisfying as those in the world of face-to-face interaction? Or will social skills decline and interaction become more mechanical and emotionless as a result of being electronically mediated?

- What are the reciprocal effects of machine and face-to-face interactions likely to be? Will the first lead to new forms of the second? Will traditional relationships be enhanced? Will face-to-face interactions become more social, expressive and playful because there will be less need to functionally exchange information that can now be obtained through the computer? Will there be a "freeing up" of time for pure sociability? Will computer communications become less functional and more socially expressive, as human needs play a greater role in shaping the technology (e.g., the appearance of the "smileys" [:-)])?

- Can information overload be avoided given the potential number of communicators and amount of information? Is more always better? Will clear road maps, stop signs and rest stops be available to prevent individuals from getting lost, feeling invaded and overwhelmed and tuning out? Can unhealthy escapism and even addiction to the computer be avoided? Will individuals find it difficult to separate or navigate between virtual and the other reality?

- In permitting the formation of narrowly specialized groups will there be increased fragmentation at the societal level? Will it encourage withdrawal and even secession from local affairs?

- What neo-Luddite social backlashes might occur, such as a refusal to co-operate with the IRS or the Census because of fear that privacy is inadequately protected and that information linkages have gone too far, or attacks on computing centers via viruses or more traditional means?

- What will be the consequences of the blurring of traditional boundaries (e.g., between work and home or week days and weekends) that the technology makes possible?

- What happens to national borders when the state can no longer control the information flowing into and out of it (e.g., the centrality of the fax and e-mail to the 1989 recent protests in China? Will the citizens of cyberspace form a new nation? Will a relatively homogeneous, commercial, Western-oriented culture overwhelm local, previously isolated cultures lacking in the resources to communicate back?

- Will rural-urban and low-high density population distinctions become less important for life chances as geography becomes less salient for interaction?

- Is there really a free lunch and are we as smart as we think we are?

The switch-board corporation
Modernity and the emerging informational systems

BY TERJE RASMUSSEN

Introduction

Three kinds of transformations are addressed in this article with regard to the interrelationship between communication technologies and large-scale social systems, such as nation-states and big corporations: *First,* technology-mediated practices have transformed historically from the use of the isolated tool with only limited connection to electronic networks, to the standardised, wired node in global technological systems. As tools become transformed into nodes or terminals connected to standardised and global telenetworks, they establish new modes of communication technology which open for extended interaction. *Second,* such advanced technical infrastructures integrate with social systems like hospitals, banks, state administrations, multinational corporations, and so on. More and more they enhance the functional inter-dependency of elements in social systems. Tele-based integration of such systems implies stronger and denser technical networks of social co-ordination and transport, of supply of goods and information on a global scale. Ever more advanced networks enter into the circula-

tion of communication and information, which reproduces stronger interdependencies in and between social systems. *Third,* the intervention of both electronic infrastructures and social systems referred to above into everyday life allows more continuing and interdependent connections between daily conduct and social systems, leading to various unintended consequences for the everyday life as such.

Hence, communication technologies are related to three kinds of systems. They are standardised and large-scale mass-products of *production systems*. Second, they constitute *technological systems* like the global telecommunications system, Internet, and so on. And they are integrated with social organisations into social *systems*. The integration of electronic networks and the social organisation of the social system may merge to the degree that in some cases, we may speak of *informational systems*.

Generally, this essay is concerned with the relationships between communication technologies and the variability of contexts and regions which together consti-

tute social systems. In informational systems, communication technologies appear as systemic properties that organise circuits of information internally and externally, and in fact, constitute an inevitable grid of ever more information-saturated organisations.

First, I shall recapitulate the role of media technologies in the *historical* building of the modern world of corporations, bureaucracies and nation-states, to the present-day world of global technological and informational systems. In advanced societies, the technical intervention of telecommunications participates in the development of large social systems. The fundamental changes in the variability and range of action and the vastly extended forms of interaction, is for a large part enhanced by the innovation and application of a wide range of new transport and media networks. Communication technologies continue the tasks of disembedding and reembedding that has characterised modernity since the advent of the printing press, and essential and typical in the rationalisation in modern societies. *Electronic* disembedding and reembedding is a typical aspect of the rationalisation process of modern society, just as the manual, mechanic and electric (dis)embedding which preceded it, and continues with it.

Second, I discuss the current communication-technological mediation of social systems, which occasionally transform into *informational systems*. Social systems become increasingly saturated by information internally.
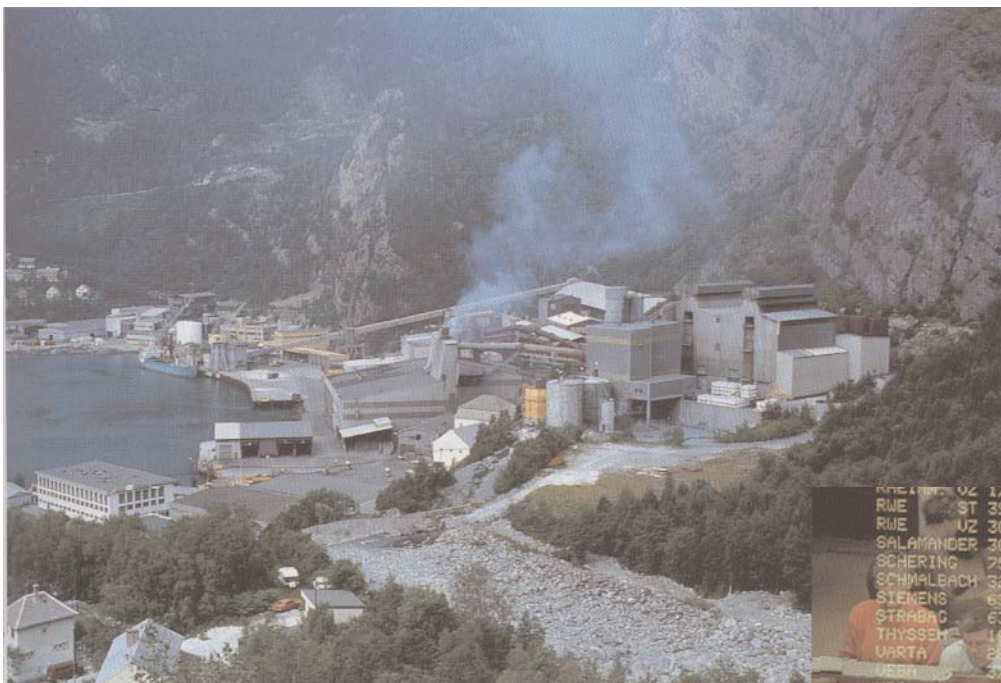

Photo: Helge Sunde/SAMFOTO

Photo: Hartmut Schwarzbach/Argus/SAMFOTO

With industrial society the tools and factories have only a limited potential to interact on a more general, or networked basis. Thus, production facilities were often in relatively remote locations forming the basis for isolated local societies. By contrast, with electronic communication and information technology one is no longer isolated, rather they are a wired node in a global network. This shift opens the possibility for new modes of communication and the possibility for extended forms of interaction

Some systems can be characterised as much by their processing of information, as their other operations. What are often called 'information-systems' are no longer merely 'support-systems' for the organisation, but its very essence. Circulation of information is in some cases an ideal-typical feature of the organisation, perhaps more essential than printed information in Weber's classic bureaucracy-model. To throw light on the roles of communication technologies in social systems, I shall also go into Giddens's concept of 'expert systems'.

Third, in social and particularly in informational systems, communication technologies operate in two ways; the first is what I call *systemic properties:* Circulation of information has always been the typical feature of organisations, and with new communication technologies, enabling co-ordination in extended time and space, this fact becomes ever more visible and evident. Systemic properties refer to the systemic aspect of communication technologies in social systems, (vis-à-vis the individual aspect of the tool) as technical modes of transmission, connecting each node into a technical network, and as the backbone of institutional circulation of information.

Fourth, the second way communication technologies connect individuals with the system, is as *electronic fields of interaction*. They contextualise the external meeting between the individual and social systems in advanced societies. Externally, communication technology serves increasingly as co-ordinating, electronic fields of interaction, mediating social systems and individual agents. Systemic properties and fields of interaction are both cause and effect of the growing normative distance between social systems and agents.

The armour of modernisation

One may say that modernity implies a *constant* and *intensified* process of innovation in all provinces of public and private life. Manipulations of time and space are among the most typical features in that process. One evident effect of this is co-ordinated interaction via global networks. Just as architecture and means of transportation, transport- and media technologies like the telegraph, telephone and the automobile or the cinema etc. are central to understand geographic proportions and conceptions of events in time and space. New

telecommunication networks underline the relevance of time and space in modern organisations. Advanced societies have invested enormous energy in developing such means for the control of distance and time.

Media technologies are involved in the 'uncoupling' of time and space. This facilitates the detachment of social institutions from specific places. Today, most social systems are extended beyond the locale. Communication technologies and other mechanisms of time and space extension enable them to reach all corners of the world. For Giddens, this is one of the core mechanisms in the development of modernity:

> Besides its institutional reflexivity, modern social life is characterised by profound processes of the reorganisation of time and space, coupled to the expansion of disembedding mechanisms – mechanisms which prise social relations free from the hold of specific locales, recombining them across wide time-space distances. The reorganisation of time and space, plus the disembedding mechanisms, radicalise and globalise pre-established institutional traits of modernity; and they act to transform the content and nature of day-to-day social life (Giddens, 1991: 2).

Certainly, several writers have observed the ability of modern media to dissociate the connection of 'place and space', in the construction of modernity (e.g. Innis, 1986; 1991; Anderson, 1992; Meyerowitz, 1986: 115). Communication technologies not only ensure the rapid transportation of messages between places, they enable the disembedding of communication from any particular place, into a 'space', which cannot be pinpointed on a map. With the social use of the telegraph, the connection between places which once defined special kinds of interaction and the interaction patterns itself became less clear. Content was no longer an inherent part of the medium, as with parchment or paper. It was no longer necessary to transport the physical medium of the message – only the message itself, mediated by a true communication medium. The telegraph, the telephone, radio and television signified a constant flow of *communication without transportation* for the first time in history. In the historical building of modern society and modern social systems, I shall distinguish between fixation of time and space (timing and mapping), and institutional reembedding.

Fixation of time and space

Identity and culture are always situated and reproduced in time-space schemes. From a sociological perspective, time and space refer to contextual features of social interaction, the phenomenal intermingling of presence and absence, 'here and there' in social life. Much of the experience of time and space have their factual backdrop in the process of 'stretching', action in time and space, what is here called distanciation and conservation. Distanciation is the 'shrinking' of distance in terms of the time needed to reach from one place to another – the 'annihilation of space by time' as Marx put it. Here, time-space distanciation and conservation refer to separate standardisation and flexibility of *time,* and distance along with various transport and media technologies that manipulate *space.* Over the last two hundred years, in particular, time and space have been gradually emptied of meaning of specific locales. Rather, they have explicitly incorporated themselves into purposive social processes as *resources,* stemming from their mutual disconnection from place. We may distinguish between two processes which clear the way for the disembedding of institutions.

First, universal and standardising mechanisms of mechanical fixation of time; *timing,* such as the clock, personal watches and calendars serve to co-ordinate practices which are separate in space, and which subsequently allow for their recombination as resources in co-ordination of practices (Carey, 1988). New means of transportation created new techniques of calculation and standardisation of time, like time zones and the train schedule. Timing assists co-ordination without reference to specific places. Following Mumford and Weizenbaum, the transformation started with the appropriation of the clock and the calendar, which made it possible to calculate time in relation to work processes, and to co-ordinate geographically dispersed action (Weizenbaum, 1976). The standardising of time across geography included time and space into rationalisation processes more effectively than previously: Following Anderson, the medieval imagined reality was overwhelmingly visual and aural. The medieval Christian mind had weak conceptions of history as an endless chain of cause and effect or of radical separations between past and present (Anderson, 1992: 23). Simultaneity was something that had always been, and would be fulfilled in the future, some-

thing eternal. The idea of simultaneity was a past and present in an instantaneous present (Anderson, 1992: 24). Fixation of time implied that 'the future' and 'the past' became introduced into human activities as explicit resources, milestones, plans, markers and symbols (Giddens, 1991: 17).

Second, mass production of more accurate maps signified a fixation of space; *mapping.* Co-ordination became mechanisms of control of time and space. Increasingly advanced transport technologies, such as the seaways, the train and the car, made standardisation of space increasingly optional and imperative, and enhanced world-wide trade, as well as political relations. Technologies of communication made communication independent of the slower, one-directional transport technologies. Giddens emphasises that: '... the most radical disjuncture of relevance in modern history (whose implications today are very far from being exhausted) is the separation of media of communication, by the development of electronic signalling, from the media of transportation: the latter having always involved by the mobility of the human body. Morse's invention of the electromagnetic telegraph marks as distinctive a transition in human cultural development as the wheel or any other technological innovation ever did' (Giddens, 1984: 123). Whereas periods of time were narrowed to nothing through telecommunications, spatial relations expanded to a global scale.

Institutional reembedding

The writings of Innis (1986; 1991), McLuhan (1964), Ong (1982) and Meyrowitz (1986) and many others all explore the consequences of fixation of time and space; the relationship between the emerging new media and the temporal-spatial transformations of social institutions. More concretely, media theory is concerned with the ways new media reorganise time and space as dimensions of social interaction. What Giddens calls 'institutional disembedding' is first of all powered by mediated language across time and space. It depends entirely on mechanisms allowing for limited individual presence to be transcended through the 'stretching' of social relations in time and space.

Disembedding of social institutions refers to the fact that media technologies enable relative, institutional independence from time and space. Fixation of

time and space allows social systems to 'stretch' across spans of time and space. Today, explicit and functional re-coordination of time and space is an absolute precondition for modern organisations. Institutional disembedding means both differentiation and specialisation of social institutions, but it also emphasises 'lifting out' of social institutions from local contexts and their expansion and relocation in time and space: 'This 'lifting out' is exactly what I mean by disembedding, which is the key to the tremendous acceleration in time-space distanciation which modernity introduces' (Giddens, 1991: 18).

The means that came to solve the problem of long distance control were money, ship routes, the railway, the telegraph and other means of interaction over large distances. Print capitalism printed communication, which then could be disseminated through the market.

Following Anderson, the basic structure of the imagining of an enlarged community which flowered in Europe in the eighteenth century was the novel and the newspaper: 'For these forms provided the technical means for 're-presenting' the *kind* of imagined community that is the nation' (Anderson, 1992: 25). The novel fused the fictional world with institutions, remote village, large territories, with the real world. The boom of book publishing from Gutenberg onwards ignored regional as well as national frontiers. Also, print-capitalism furthered the Reformation, which undermined the power of Rome and enabled, through the use of the new print languages, conceptions of nationality (Anderson, 1992: 39). Along with time measuring by the calendar and the clock, an empty conception of time emerged, which enhanced (along with transport and print media) a territorial consciousness: 'The idea of a sociological organism moving calendrically through homogenous, empty time is a precise analogue of the idea of the nation, which also is conceived as a solid community moving steadily down (or up) history' (Anderson, 1992: 26). The date on top of the newspaper, for example, connected homogenous, empty time with the day-to-day remote 'world'. The newspaper, as a daily book, provided images of the world, as well as established reading as a private 'mass ceremony', which connected everyday life to the larger community.

Anderson proposes that nationalism has to be understood by aligning it with the cultural systems that preceded it. One of

the main reasons for the decline of those systems was the gradual demotion of the sacred language, Latin, through the means of the printing press. The fall of Latin, according to Anderson, exemplified a larger process in which the sacred communities integrated by old sacred languages were gradually fragmented, pluralized and territorialized (Anderson, 1992: 19).

Hence, print capitalism created unified fields of communication 'below' Latin. They marked language as an objective, time-space independent practice of vast collective significance, and transferred power from Rome to local regional/national communities: 'What, in a positive sense, made the new communities imaginable, was a half-fortuitous, but explosive, interaction between a system of production and productive relations (capitalism), a technology of communications (print), and the fatality of human linguistic diversity ... The new essential thing is the *interplay* between fatality, technology and capitalism' (Anderson, 1992: 43). This interplay created the possibility for the new imagined community, and subsequently set the stage for the modern nation. Also, the new print technology triggered a *factual* process of centralisation: 'In short, state power could grow because the new forms of organisation and the improved transportation and communication infrastructures (based partly on the new technologies but, at first, more on heavy investments in the extension of old methods) enabled the spread of increasingly effective administration throughout the various territories of a country.' (Calhoun, 1992a: 214.)

Expert systems

Today, this development of fixation of time and space, and institutional disembedding and re-embedding has opened for a phase of modernity characterised by large social and technological organisations, which constantly move persons, goods, information and money globally. In this transformation, local, national and global networks have become indispensable. The systemic aspects of communication-technologies and their role in social systems (as systemic properties) are not identical with Giddens's notions of 'expert systems' and 'abstract systems', nor with Habermas's concept of 'media'. Still, mediation as systemic properties contain many of the same characteristics. In order to understand the role of communication-technological systems in social systems, I shall first con-

sider Giddens's notion of 'expert systems', and then Habermas's theory of symbolic 'media'. Both theories are presented to explore some aspects of the technological coordination of current social systems.

Giddens calls the mechanisms that are engaged in the disembedding of institutions, 'abstract systems' (Giddens, 1991: 18). He distinguishes between two such types of abstract systems: 'symbolic tokens' and 'expert systems'. Symbolic tokens are media of exchange that have standard value across geographical contexts. The prime example of symbolic tokens is money. Money is a flexible and universal means to store and transport labour, and to transform it into commodities and services. Expert systems bracket time and space through deploying modes of technical knowledge that have validity independent of their users and clients, such as mass produced goods and services, buildings and transport. Expert systems are 'systems of technical accomplishment or professional expertise that organise large areas of the material and social environments in which we live today' (Giddens, 1990: 27). Most kinds of materiality and technology, along with increasing kinds of expertise make up such systems, which influence everyday life continuously. Telecom companies, airlines, train- and postal systems, electricity networks, traffic systems, travel agencies, banks, to mention but a few, are abstract constructions based on, and administered by expert knowledge, in which we place our confidence that they work as they are supposed to do. Expert systems are disembedding mechanisms in that they remove social relations from the local context (Giddens, 1990: 28). They presume and foster the separation of time and space. They provide 'guarantees' of expectations across distanciated time-space. This 'stretching' of social systems is achieved via the impersonal nature of tests applied to evaluate technical knowledge and by public critique (upon which the production of technical knowledge is based).

Social systems

From these considerations of the coordination of social systems, I can now present an understanding of formal organisations as social systems based upon expertise, and examine communication technologies as 'system properties'. 'Social systems' are social institutions of all forms, from schools to global capitalist firms, reproduced by systemic proper-

ties. Systems of interaction is characterised by the fact that interaction are unmediated *and* technologically mediated. They appear as patterns of social interaction and social relationships across time and space. Social systems are stable connections of clusters or interlocked sets of regions, of institutionalised interaction located in particular areas and periods of time. Locales are woven together in space and time through systemic properties of mediated information and communication. In Giddens's terminology, social systems are reproduced through social *and* system integration. Private and public bureaucracies, enterprises, multinational companies and formal organisations are systems in this empirical sense.

The close connection of distanciation and conservation enabled by various transport- and media technologies on the one hand, and the disembedding of social action leading to social systems on the other, suggests that formal social systems (organisations, companies, bureaucracies, etc.) depend entirely on mediated communication. This recent and still rapidly developing affinity between technology and activities can only be explained by the social and technological change itself. Progress and development have entailed the growing interweaving and interdependence to such a degree that they can no longer be imagined separately.

In social systems, mediation increases efficiency in an environment of increased complexity. The complexity consists of increased transaction within, and among an increasing number of systems in shorter spans of time, and in a more extended space. For these purposes, social systems must rely more and more on constant circulation of information, on routines and the constant *revision* of existing routines. Of growing importance is the increasing wide-spread mediation of social interaction and transaction, both internally with the employees and partners, and externally with consumers and clients, via telecommunications. Through increasing communication-technological mediation with individuals as both employees and consumers, systems save time, reach more individuals, and reduce transaction costs. Furthermore, with communication technologies, systems possess a flexible means for mapping markets, targeting products, and even marketing and debiting of the services and products.

A number of reasons can be listed to treat social systems, such as modern corpora-

tions or state agencies, as socio-technical systems of control and coordination, beyond the power of agency (Luhmann, 1982). Communication technologies seem to enhance the development and operation of abstract socio-technological systems. Indeed, it is hard to make sense of the affairs of big systems on the basis of everyday experiences. Our understandings from the world of day-to-day life are likely to appear insufficient, when applied to social systems. For example, the policy of IBM to co-operate with Apple cannot be understood simply as a decision made by the general director of the company. On the other hand, much social theory has gone too far in this direction, and is unable to explain satisfactorily the connection between the de facto social practices, and system change. Similarly, in arguing for the further automation of systems by communication technologies, one forgets that technologies are applied – that they are tools for action, and that technology requires users. Although large social systems do not reflect personal interaction, they depend upon actual, social relationships involving identities, action and power. The patterns of interaction are constantly reproduced by the established practices of agents. A challenge for social theory is to acknowledge the existence of social action in advanced societies, without losing sight of the enormous science-technological powers embedded in it.[1]

Consequently, the present understanding of social and informational systems here is *not* derived from systems theory but from a view of systems as collective action and sustaining patterns of indirect (and compartmentalised, direct) social interaction (Honneth, 1991). This view also indicates directions in social theory in need of being resolved: The *institutional* boundary between systems and lifeworlds is broken down, which makes it possible to conceive of lifeworld experi-

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[1] *As Calhoun states, 'The general theoretical problem behind this set of concerns is one that has occupied both functionalism and marxism and a good deal of the rest of modern social theory. It is the question of how to relate understandings of social life and cohesion of social relationships based on actors and action to those based on notions of self-regulating systems, unintended functioning, or structure. This is the age-old problem Giddens has newly posed in his attempt to overcome such dualities with a language (perhaps a theory) of structuration' (Calhoun, 1991: 98).*

ences in social systems. My later discussion of communication technologies as systemic properties are concordant with *first,* a *deinstitutionalisation* of the habermasian concepts of system and lifeworld: Social systems are here accumulations of interaction, objectified and extended in time and space. *Second,* it suggests a step back towards Schutz and social phenomenology, to which the lifeworld was more individually and experientially conceived. Although the lifeworld is dialogically constructed, it can never be equated with social institutions, like the family or the social movement. And *third,* it politicises the role of 'media' crossing systems and lifeworlds (such as communication technologies), since they are not viewed as system-neutral.

Social systems are here considered as generic, ideal-typical formal institutions analytically abstracted from the wide range of *specific* institutions and organisations, such as insurance companies, police, banks, universities, the telecommunication companies, or the state apparatus. I thus confine myself to discuss some *generic features* of large social systems, particularly formal systems which provide some service to the individual, such as work, education, insurance, security, financing, leisure, entertainment, transport and tourism, etc. To stress the informational aspect, I shall review some recent observations made by organisation researchers, which point toward an information-intensive, 'post-bureaucratic' organisation.

The 'switch-board' corporation

A key feature of the large organisation, is that relations are extended in time and space, through media of storage, processing and transmission. The corporation is dependent on the flow of objectified knowledge and is, in a way, following Calhoun (1992a: 216) an 'accumulation' of (mostly) indirect social relationships. Corporations, large-scale markets and so on cannot be understood without a parallel view on the advances in communication technologies that have enabled their extension and growth. They imply a dramatic increase in indirect relationships, contributing to a modern world of multinational and global organisations.

In large corporations, communication technology not only mediates social communication and monitor various production machinery. It enables automation of the flow of goods, raw materials, of stor-

Photo: Ole A. Buenget/SAMFOTO

age, of employers. Externally, it supervises the transportation of products to retailers, the statistical monitoring of competitors, etc. Computerisation enables automation of ever more complex processes, which allows for both rational growth and flexible specialisation in highly competitive markets. What takes place is a computerised integration of design, production, marketing, internally and externally. Production processes are integrated through communication technology, which in fact integrates managers/employers and the technical production on a more general level, furthered by the growing complexity of the external market and the internal organisation. As communication technologies take over various functions of control and coordination, they signify a blending of social and the technical power at all levels of production. The corporation is as dependent, it seems, of networked computer technology as on employees, raw materials, production machinery and accounting.

Since Weber, a general perspective on formal organisations, public or private, has been that they are characterised by bureaucracy and hierarchy. Following Weber, bureaucracy is formalisation of duties and ranks, involving specific, normally written, rules and procedures. Hierarchy involves formal positions, authority relationships and explicit ranks of command. A third assumption suggested by the organisation theorist Rosabeth Moss Kanter, is the notion of a closed and bounded system with adequate control over the resources required

In the early 1920s the German sociologist Max Weber suggested that hierarchy, with its explicit definition of rank, relationships based on authority and formalized rules, is an important organizing principle in industrial society. New forms of global communication and information technology may represent a break in Weber's assertions. These developments give one the ability to carry out commerce in a way that can hardly be characterized as bureaucratic or hierarchical. Rather, they allow a flexibility and leanness to the entrepreneurial form that stands in sharp contrast to the traditional corporation

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(Kanter, 1991: 64). Since Weber, organisation researchers have pointed out the unintended consequences of bureaucracy and that informal communication is an important aspect of bureaucracies. However, the post-war development of public administration and private corporations suggests that what is needed is more than a revision of the bureaucracy paradigm. Kanter holds that companies in the U.S. and Western Europe

'... are confronting new economic realities of global competition, characterised by rapid technological change, often constrained resources (due to capital market pressure, debt load, and higher costs of capital than in Japan), and a speed of information transmission and market reach that multiplies the number of competitors in nearly every industry, plus legal changes that create competition for former monopolies, such as the government-mandated break-up of AT&T, or help 'upstarts' get a foot in the door, such as airline deregulation' (Kanter, 1991: 64-65).

This new environment of increasing competition and global reach, combined with new technologies of production, transport and information, set off new strategies of the companies, which can

hardly be characterised as simply bureau-cratic or hierarchical, or for that matter, entrepreneurial. They constitute a process of organisational forms that attempt to combine flexibility, creativity and lean-ness of the entrepreneurial form to the large corporation. This shift constitutes not only an empirical, post-war change, but an *ideal-typical transformation*. This new form Kanter calls *post-entrepre-neurial* (Kanter, 1991: 65). As long as we speak of a change of ideal-type, it could even be called *post-bureaucratic*. It trans-cends (or seeks to transcend) both entrepreneurial and the bureaucratic/hier-archical forms of organisation, in order to play the new game of global business. This new form is characterised by *motion*. All ingredients; technology, sup-pliers, customers, employees, corporate structure, government regulations, are chronically unstable. The new game requires rapid responses, decisions and reorganisation, all of which bureaucra-cies and formal hierarchies are incapable of dealing with.

This requires less hierarchical structures, more focused attention, constant reorgan-isation, entrepreneurial 'compartments' within the larger structure (R&D), tem-porary external alliances, 'flexible spe-cialisation', etc. Corporate relationships are replaced with market relationships, both internally and externally. Employ-ees are treated as, or actually become 'contractors'. In sum: 'The goal is to design leaner, more co-operative, more integrated organisations with fewer lay-ers of management and smaller corporate staffs. A key concept guiding the new corporate ideal is focus: maximising the core business competence. This contrasts sharply with a tendency to form diversi-fied conglomerates in the period begin-ning around the 1960s.' (Kanter, 1991: 66.) The new ideal is *better integration:*

> The post-entrepreneurial company also builds the connections between its var-ious products or businesses, en-couraging such co-operative efforts as cross-selling, product linkages in the marketplace, exchange of technologi-cal or market information, resource sharing to apply one unit's competence to another's problem, or letting one division serve as the lead for particular innovation to be used by the others. *This means that the emerging company is itself more network-like – a federa-tion of semi-autonomous divisions – than the hierarchical.* (Kanter, 1991: 69–70, my emphasis.)

Externally, the new strategy is to develop close working relations with other organi-sations, and so extending the reach of the company without increasing the number of employees. Such relationships are more flexible and less costly than simply letting the company grow. Companies pool resources in common service centres, they make alliances in joint ventures, and they link together in production chains. The relationships with 'blurred boundaries', replace organisational relationships with the market, creating complex and con-stantly changing networks between an increasing number of companies and organisations. They keep their formal sta-tus as independent companies, and yet reduce their autonomy by making ties to other organisations and sharing authority over decisions (Kanter, 1991: 71). The corporation is being turned 'inside-out', where previous internal relationships are becoming more externally oriented, and consequently, where external, mediated relationships become more imperative. The new corporate ideal is a relatively small core involved in many, global, tem-porary, flexible and complex relationships with a wide range of other organisations. The new paradigm is not bureaucracy-centred, but 'post-bureaucratic, person-centred and creation-oriented'.

The strategy of delegitimising bureau-cracy weakens the power of hierarchy and loosens the employment relationship, '... require degrees of information-sharing unprecedented in the traditional corpora-tion' (Kanter, 1991: 71). Everyone needs to know more. Quite illustratively, Kan-ter's metaphor for this new corporate form is *'corporation as switch-board'* (Kanter 1991: 68). The company acts like a central information centre and command-point for networks of other organisations. The metaphor of 'switchboard' suggests the main consequence of this 'paradigm shift in corporate thinking'. All the ingredients of the trend that Kanter describes suggest that information circulation becomes the critical factor, both as an initial factor of change, and as its consequence. To trans-form the company towards a post-entrepreneurial and post-bureaucratic form, new flexible and complex channels of information must be established. And, as a more or less unintended consequence, the 'amount' of information (in whatever way one measure it) increases dramati-cally. The switch-board corporation is what I call an informational system, because hyper-circulation of information increasingly decides the fate of the corpo-ration on its markets.

The increasing differentiation and spe-cialisation of 'Post-fordist' work, admin-istration, marketing, sale, etc. requires that a larger ratio of the work is dedi-cated to control, coordination, hence *reflexivity*. While not replacing machine production entirely, the firm or the multi-national company uses (relatively) less production energy and more information, turning its profile towards the informa-tional. Scott Lash and John Urry (1994: 62) argue that the growing complexity of the social division of labour entails the proliferation of large numbers of tasks of coordination, control and steering in order to bring together many separate work processes. This makes the work more reflexive, in that one increasingly must confront the work of others as object. The informational aspect increas-ingly permeates social systems. Control and coordination cannot be executed without the gathering, processing and distribution of large amounts of complex information, about sales, production, profits, costs, salaries, etc., of which an increasing ratio are external to the corpo-ration.

In advanced societies, production is increasingly informational (Lash & Urry, 1994: 94; Castells, 1985). Information tends to be both raw material and out-come of production. Both economic and political, (public and private) systems seem dependent on electronic infrastruc-tures, information and the competence to handle such technology and information. Circulation of information is unavoidable in the monitoring of both internal and external complexity and change. One may argue that control of information is the overall strategy and rationale of the corporation. As the corporation rationa-lises all its components, information is the common denominator. Internally as well as externally, circulation of informa-tion grows, and becomes the critical fac-tor for management of resources, and success on the market. Hence, the enorm-ous investments in R&D, information technology and expertise.

Similarly, Lars Qvortrup argues that new communication technologies enhance a new and 'pure' type of organisation (Qvortrup, 1993: 109). Terms like 'vir-tual classrooms', 'elusive offices', 'net-work-organisation', 'invisible college' 'intelligent buildings', 'electronic libraries', etc., all indicate an emerging form of organisation, where members interact in and through computers and telecommunication networks. Members of the organisation co-operate and

socialise although in an extended time/space. This disappearance of the aspects involved in face-to-face interaction, demonstrates more clearly what an 'organisation' really is. It is *not* made of offices and desks with telephones and computers, nor of board-rooms or buildings. When organisations increasingly exist as processes of networking, it appears that organisations are *systems of communication*. They consist of relations and networks, whether in a locale or – increasingly – virtually in space.

The new organisational patterns described by Ross Kanter, Lash and Urry, Qvortrup and others, force the informational and communicational aspects to the fore, and other organisational features lose their relative importance. Network-based organisations are kept together by indirect information and communication, which become what define them *as* organisations. Organisations have always been characterised ideal-typically by – among other features – structurated communication. As this communication becomes increasingly mediated, other features like hierarchies, typed communication, clearly defined lines of rank and other bureaucratic features, fade. What is called network-organisations, elusive offices, telecommuting and networking are all various forms of organisation as mediated communication, and can be regarded as the pure form of organisation (Qvortrup, 1993: 110).

Like Qvortrup, the organisation theorist Gareth Morgan notes that it is possible to see organisations in terms of their information systems, since computer-based functions allow for organising without any organisation in a physical sense (Morgan, 1986: 84). Increasingly, this is correct for organisations in general. An organisation is a system that reproduces itself communicatively and with the pervasive communication-technological intervention in all organisation, this implies that other non-definitional aspects of organisations (common buildings and rooms, office-landscapes, etc.) may be rationalised away. Similar considerations have furthered new ideas within the area of business management itself. For example, 'Business process redesign' is a term referring to the use of communication technologies to reconstitute the corporation around the capabilities of communication technologies (mostly electronic mail), instead of fitting the technology into existing or slightly revised organisation structures. Consequently, organisation theory be-

comes increasingly theory of mediated communication.

'Informational systems'

When studied from a media perspective, advanced social systems like firms and formal organisations frequently appear as informational systems. Certainly, several other important components are central to the modern firm. The trends that Kanter describes, vary with the size of the corporation, between sectors and continents. However, the point here is not simply to argue that corporations in the US and Europe turn increasingly toward post-bureaucratic forms of organisation, giving information an almost independent role. Rather, ideal-typically and generically, large, multinational firms can be perceived as systems of information and information control, even if this information and communication are reproduced by mediated action. This means that social systems and technological systems overlap to such a degree that decisions, strategies, patterns, technologies directed towards the circulation of information are ideal-typically and methodologically an appropriate source or 'trace' to investigate policy and change in corporations. When assessing the structure of organisational and inter-organisational operations and transformations, one need to consider the structural constraints and enablements deriving from the networks of information and communication, and what rules and resources organisations provide to its individual employees.

I thus heuristically regard informational systems as social systems dependent on technical knowledge, which enable circulation of information and communications in all essential activities and processes. Informational systems exist in all advanced societies today. Certainly, they are more dominant in the service and media industries than in the traditional industry, since circulation of information in the media sector tends to be not only mechanisms of coordination and distanciation, but the main product as well (Lash and Urry, 1994). Also, the current change of information is to a great extent about *commodification* of information, which means that information is moved from public and open systems to systems based on private ownership. The opportunity to commodify information, that communication technologies provide, enhances this development. Information is not only critical for the coordination of the entire organisation. It is also increas-

ingly its commercial product. Labour processes are not easily separable from what is described as cultural activities (Lury, 1993: 153; Harvey, 1989). This only furthers the informational dimension externally. Also public administration and welfare agencies tend increasingly to take up the informational dimension. Every day, most public and private organisations go through processes of this 'rationalisation-as-informatisation'.

However, I have argued earlier for the necessity to operate with an analytical distinction between the human and the technological, rules and resources, the agency and tool, for the sake of keeping a humanist and critical perspective. Similarly (and in spite of the seemingly sparse individual influence on social systems), I wish to underline that informational systems are social systems, systems of mediated action.

Social systems consist of much more than extended communication networks and transmission of information. They are reproduced and changed through formal and informal rules, conventions and routines, of forms of co-operation and interaction, of hierarchy and division of labour, of means of production and administration, etc. I do not insist that my understanding of the informational system captures all aspects of social systems. Rather, my emphasis on social systems as informative and communicative processes in extended time and space should be understood as a particular perspective on social systems of growing empirical importance. This increasingly significant perspective stresses their relatively recent and astonishing ability to enhance internal and external coordination and control on a trans-national as well as an individual level. Information technology is about to become something more than simply an aspect of social systems. Over the last decade, communication technologies have clearly become the most important infrastructure in advanced, large-scale organisations.

First, in informational systems, knowledge becomes *objectified* (into information), traditionally in the forms of printed documents. As Weber noted, organisational rationality entailed accounting by means of double entry book-keeping, written documents processes according to impersonal rules and up-dated technical knowledge. In the eighties, such objectification was massively digitalised and computerised. This objectification was to ensure formally correct and 'just'

decisions. By means of databases, the volume of controllable information could be raised to new levels. The capacity to process information of such enormous amounts, enabled larger and more complex forms of organisation. In this sense, communication technologies present the overall *substance* – the *object* – of which members of the organisations work on, as well as the main practice on which they spend their time. Through technology-mediated practices, files are created and transferred, phone calls are made, faxes are sent, etc.

Second, communication technologies construct the boundaries of the organisation, through the nature of the circulation of information, according to individual membership and (horizontal and vertical) position. According to Luhmann, organisations are social systems where membership depends on certain distinct conditions, and generally appears as a response to increased complexity (see Qvortrup, 1983: 122). It is foremost the patterned circulation of information and communication according to certain rules that make the membership status clear.

The term 'informational system' then, implies that the information aspect is absolutely critical to larger modern organisations. Circulation of information is becoming perhaps *the* characteristic dimension of public and private organisations. If Weber's ideal type organisation, characterised by bureaucracy and hierarchy are becoming not only revised but entirely replaced, the informational aspect will be the decisive common denominator for the shift.

The concept is not entirely limited to the bureaucratic organisation. The 'Smart house', and the conception of the city as an 'information machine', 'electronic colleges' and 'virtual classrooms' are based upon similar ideas, which define a certain social institution or field as a communication phenomenon. On-line communities on the Internet, distance education, etc. cultivate the communicational aspect of social organisation, demonstrating the principle of *organisation-as-mediated communication*. Organisation is less something geographical, and more an elusive, communicational space, a pattern of extended interaction. Its boundaries are not constituted by the factory gate, the corporation building or the nation state, but by stable, distanciated patterns of communication, including some agents, and excluding others.

System properties and system transformation

Communication technologies are system properties, in that they are institutionalised features of social systems, which 'stretch' information and communication across time and space (Giddens, 1984: 185). *Communication technologies as systemic properties ensure flexible and regulated circulation of objectified knowledge in time and space.* Today, communication technologies are absolute requirements for the developing and administering of large organisations, since they cannot exist without rapid and flexible transmission, processing, storing and retrieval of information and communication on a global scale. Communication technologies are indispensable for system integration. In the process of regionalization, communication technologies function as structural properties in that they supply constraints and enablements to actors in and through time and space. Through system properties, social systems are constantly being transformed in and through extended, temporal and spatial boundaries. This takes place intentionally (according to decisions) and *unintentionally,* as transformations beyond decision. The concept of informational systems may provide specifications of the latter in particular. The internal unintended consequences of communication technologies as system properties can be distinguished into several different, however intimately inter-related types. I shall call the trends of transformation a) transparency and complexity, b) memory and self-referentiality, c) circuits of reproduction and d) information shuffling.

a) Transparency and complexity: The main function of social systems, according to Luhmann, is to reduce complexity. Leaving functional explanations aside, the communication technologies allow for the reduction of complexity and uncertainty by increasing transparency of information. For the organisation to adapt to its environment, relevant information must be scanned and sorted internally. Computer networks provide unique ways of processing and transferring huge amounts of information flexibly, which reports on changes in the environment. However, transparency also *produces* complexity, and even increases the risk of information overload, which paradoxically motivates further investments in communication technology. Hence, transparency is not optimal, rath-

er *controlled transparency* via deliberate mechanisms of 'noise' such as delays of information processing, virtual hierarchies, the application of rules, symbols and other virtual representations to regulate and filter the information flow.

b) Memory and self-referentiality: The capacity of informational systems to store and retrieve electronic information in time and space, allows one to organise projects by means of selected elements of past experiences. It means that one can organise and control action in time and space by developing *institutional memory*. In this respect, digitalised communication technologies are the most effective in a wide range of information processing media. They all record and represent human memory in some format. And to a large extent they condition what information is disseminated, who receives it in what format. Storing, retrieval and dissemination of information imply the controlled binding of time and space through knowledgeable action in the management of projects on the basis of the past. It means to transform information into means for future survival via various media. (See Giddens, 1984: 262.)

The memory-effect of communication technologies not only allows for supervision of the environments, but also helps the system to investigate itself. In order to function strategically, the system must constantly scrutinise its own transformations. It needs to redefine its elements and tasks continually, to be in gear with general societal transformations. It needs to define and redefine means and ends, hence to observe its own orientations, and observations in a process of *self-referentiality*. Communication technologies (for instance through the processing and presentation of statistics, budgets, and other forms of quantified data), allow for a systematic, sensitive and continuous circulation of 'self-knowledge' in a process of self-contact. No node or member act independently – all information on the level of the agent somehow become accumulated and modified into 'organisation data'. This point should not be overstated, however, to the extent that the organisation appears as an agency-independent system. (See Qvortrup, 1993.)

c) Circuits of reproduction: Communication technologies are indispensable for the reproduction of social systems in that they serve as trajectories for recursive processes. Time-space distanciation mediated by technological systems closes off some possibilities of policy and

change at the same time as it opens up others (Giddens, 1984: 171). This changes continually, for instance according to social and technological innovations and inventions of electronic communication. Such innovation transforms the very size and spatial pattern of the system. Like a wide number of other processes, communication technologies mediate positive feed-back cycles. These cycles take the form of snowball-effects, inflationary expectations or self-fulfilling prophecies (e.g. on the stock-market). Giddens refers to circuits of reproduction, which favour both stability and change: 'They serve indeed to indicate some of the main forms of change involved in the transition from one type of societal totality to another' (1984: 191).

Circuits of reproduction are defined with reference to illustrations of electronic circuits, as 'tracks' which feed back to their source, whether or not such feedback is reflexively monitored by agents in specific social positions. This is how communication technologies establish patterns that serve as actual conditions for system reproduction, the procedures and routines in and between various locales of social systems. As patterns, they are unintended consequences of mediation processes, of series of technology-mediated practices. As Giddens notes, one of the most important circuits of reproduction is '... the mechanisation of transportation, the tremendous expansion of means of communication from the late eighteenth century onwards and the development of electronic communication dating from the invention of the Morse Code' (1984: 192–3). Communication technologies mediate more or less expected feed-back cycles, depending on contexts and their modes. In formal organisations, the diffusion of computer-mediated communication may increasingly take over intra-organisational communication, and so make such information and communication more dependent on computer networks. It may also undermine more hierarchical channels of communication and power (Feenberg, 1991).

d) Information shuffling: The last point I shall make here, is that communication technologies allow for flexible mediation – relocation – of information and communication back and forth between local, regional and system levels. We may again apply Goffman's distinction heuristically: Social systems are dual in that there exists an official 'front stage' process of information and communica-

tion on the one hand and an unofficial process of 'back stage' communication on the other. Communication technologies enter the systemic communication on the front stage, and increasingly also on the back stage. The gap between front stage and back stage communication is likely to widen with the size and expansion of the system in space. To hold the system together, front-stage appearances become increasingly necessary and visible, whereas back-stage communication remains in gatherings among few in separate locales.

Front stage communication consists of official information about results and achievements, etc. The information has the shape of 'performances' and statements which represent the (public) image of the system to its members. Newsletters, bulletins and corporate newspapers, VCR, video conferencing, electronic bulletin boards and electronic mail systems distribute more or less official information. On the other hand, back-stage communication takes place face-to-face in various locales, over the telephone and increasingly through electronic mail. The backstage communication processes constantly comment, criticise, ridicule, rehearse and complain on front stage statements. Eventually, these may end as front stage statements. A well-managed organisation, one may say, is one *that allows for the controlled flow of back-stage communication to the front-stage*. A communication-proof curtain between the two stages will quickly produce frustration and stagnation.

Whereas front-stage information has applied a number of media, backstage communication has hitherto relied mostly on locale-based talk and telephone conversations. However, new communication technologies, particularly computer networks, extend the power of both stages. Yet, as social systems become increasingly mediated, back-stage communication is no longer restricted to the particular regionalized locale. Previously, back-stage communication had few means of conserving/storing itself in time, for others to receive at a later date. With the exception of the mobility of people themselves, back-stage communication of locales and region, had few means of merging themselves into larger conversations, with some influence on the front stage. With electronic communication of various sorts, back-stage communication is, as the systems themselves have been for some time, less restricted by places and their schedules.

Electronic fields of interaction

New electronic conditions of system articulation provide channels for objectified interaction between absent actors in time and space. Also, it is important to note how the electronically organised system reproduction creates paths for day-to-day practices of individual agents outside the systems. If one looks at the external structure of social systems, communication technologies provide new links to other systems. Of particular importance, however, is the fact that they constitute new and revised *fields of interaction* connecting social systems to individuals in their homes or elsewhere. The local place is no longer the only boundary of everyday routinized practices, but is enmeshed in larger social processes monitored by social systems of interaction.

Increasingly, this 'enmeshing' implies the implementing of technical infrastructures as systemic properties. Just as social systems are inextricably enmeshed with communication technologies for their very constitution and internal structure, they now increasingly rely on communication technologies for their *professional relations with individuals* as consumers, workers, students, clients, citizens, investors, patients, etc. From being an already endemic aspect of social systems internally, communication technologies are about to be of great importance *externally*. We may view this as *internal rationalisation extending to an external rationalisation of social systems*. In modern societies, the systemic features of social institutions refer to that role as new, and modifications of old, spaces of information, communication and interaction, which the individual or groups draw upon. As Giddens observes; 'Every time someone gets cash out of the bank or makes a deposit, casually turns on a light or a tap, sends a letter or makes a phone call on the telephone, she or he implicitly recognises the large areas of secure, coordinated actions and events that makes modern life possible' (Giddens, 1990: 113).

The modes of mediation bridge the growing gaps of space that emerge between, and within the gradual expanding social systems of interaction, that the individual mobilises in her identity-formation and realisation of life-plans. Today, human ideals and goals, through legitimate knowledge, safety, career and money can only be derived explicitly from modern
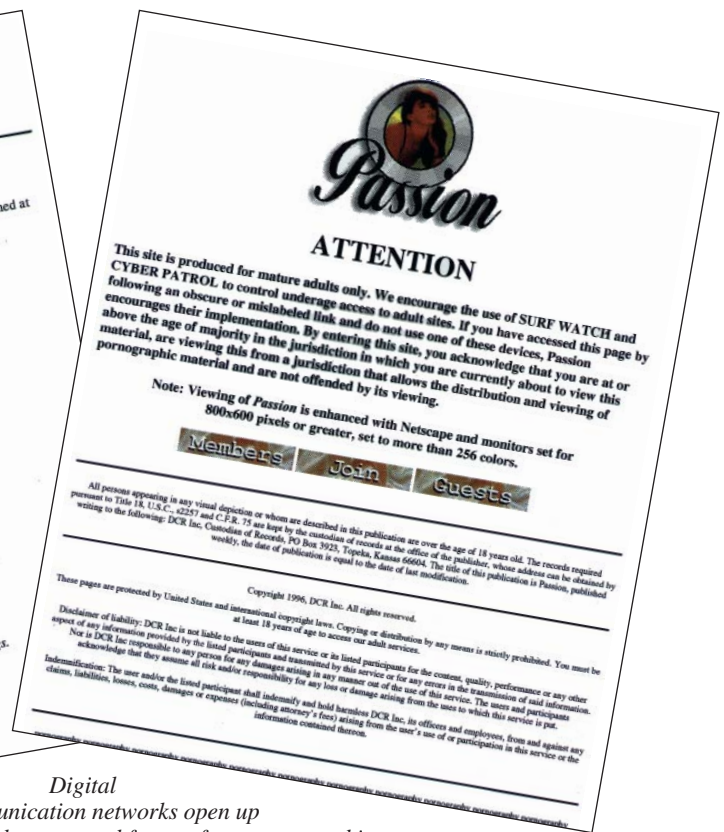
Digital telecommunication networks open up the possibility for new and unexpected forms of commerce and inter-action. A modern institution has the ability to enter into various relations with their customers, clients, patients, citizens, etc. The contact between the two parties is becoming increasingly mediated as we move from face-to-face interactions to those that are more network based. This transition allows for the development of, for example distance education, tele-working, home banking, tele-shopping, tele-sex, remote alarm and security systems, library services, video on demand, etc.

social systems. They are inseparable from the inherent systemic features. Social systems are integral to the various more or less necessary interactions and resources of the individual, through what Thompson (1990: 149) calls fields of interaction (learning, working, recovering, financing, etc.). With *electronic* fields of interaction, I shall similarly refer to this effect of external rationalisation, that is, of *mediated contexts of purposive interaction and transaction where information is accessible to individuals, who administer their life vis-à-vis social systems*. Modern corporations and other large formal organisations enter into various asymmetrical relations with individuals, as customers, clients, patients, citizens, etc. These contacts become increasingly mediated, in the form of telephone calls, banking tellers, databases, advertisements, computer terminal operators, typed contracts and regulations, etc. In a more sophisticated way, networks are used for activities such as a distance education, tele-working, home banking, teleshopping, tele-sex, alarms

and security, library services, public information, etc. Electronic fields of interaction are located where the individual meets and interacts with the informational system. I shall distinguish between three forms of electronic fields of interaction, administered by a) human operators, b) interactive nodes, and c) virtual contexts, respectively.

a) Human operators: In banks, travel agencies, libraries, assurance companies, etc. one interacts with humans controlling a terminal, connected to a technological system, dedicated to processing some kind of information. The operator is an agent with her tool, and is involved in technology-mediated practices, however, mediated by communication technologies heavily defined by the informational system aspect. The operator is foremost the representative of a system, and in control of an access point to the system, executing transactions that potentially involve risk. In some cases, reassurance is called for. This situation develops certain psycho-social features

on the part of the operator, like professional cheerfulness, in other cases grave personal authority or civility (Giddens 1990: 85). Transactions are legitimated by trust in persons as operators, that is, as experts or competent people. Still, the interaction is utterly impersonal, as it takes place between strangers, and concerns explicitly formulated purposes.

b) Interactive nodes: In many cases, the operator is substituted (rationalised away) by automatic access points, that is, interactive nodes for self-operation. Automatic bank-tellers, electronic fund transfer systems, automatic gas stations, information terminal stands (at libraries, post offices, etc.) are cases in point. The human operator is replaced with a node, and as an un-professional operator, the individual (as client, consumer, etc.) has herself become free labour power at one of the nodes of the system. Following this kind of rationalisation, of course, one may imagine a society dominated by automated interaction, increasing the possibilities for surveillance, increased

vulnerability and risk caused by techno-logical dependence, and generally, a more impersonal and alienated society. While many such critical arguments are in fact undervalued, the impersonality-argument needs to be reconsidered. As noted above, what becomes rationalised tends to be the impersonal relationship between the individual and the operator, which ideally means that the rationalisation may release time for personal relationships and activities. Direct interpersonal contact is reduced, but the individual (customer) has the greater flexibility such as when to use banking services (Calhoun, 1986: 336). In both cases the interaction is impersonal, but it may be less insulting or frustrating to be treated impersonally by a machine than by an individual. Automation, therefore, may not necessarily imply increased impersonality. This is another example of how communication technology emerges as a more potent political issue: Whether computer systems should computerise what is already impersonal (operator-based) or personal interaction, whether it should liberate or steal leisure time, intimacy and pleasure. These issues relate to the critical question of how communication-technological mediation may nurture personal, direct relationships and local community.

c) Virtual contexts: Trough telephone calls (800-numbers, etc.), computer communication, video conferences, and more generally as distance education, tele-working, tele-medicine, etc. the communication and information exchange takes to a large part 'place' in the medium itself. The access point is extended to wider aspects of the medium, which become the context of communication. New markets of information arise in a virtual space, which reduce transportation costs, billing costs, and access barriers to a minimum.

Conclusion

In the social sciences, transportation and communication technologies have predominantly been subsumed under the categories of economic and formal rationality, at least at the early stages of capitalism. Max Weber analysed what appeared to him as an accelerating dependence on rational thought. Purposive rationality, expressed in bureaucracy and calculate economy, enchained human activity to formalised and instrumental procedures. The erosion of regulating world-views opened fully the repertoire of human conduct to instrumental reason. Weber was predominantly concerned with the rationalisation processes in economy, polity and law, and never analysed the role of technology as a distinct power of the rationalisation of society. Though he was aware of the technological turmoil and the transformatory power of industrial machinery, he subsumed technology under the category of purposive rationality in capitalist economy.

Since Weber, a number of writers have analysed technological rationality as a social and cultural fact, contending that large-scale socio-technological change cannot be explained with reference to human action. In modern social theory, this has most clearly been formulated by Foucault on the one hand, and by studies inspired by functionalist theory on the other. The works of Jacques Ellul (1964) and Luhmann (1982; 1993) are examples of this. Systems theory is foremost a methodology that precisely attempts to explain social change without depending on action theory, since the latter is seen to be able only to account for individual practices and intentions. In the social theory of Habermas, for instance, systems theory explains integration and change in political and economic sectors of society, the worlds beyond agency.

The problem of social order so frequently referred to in social theory, however, is conceived of here as the problem of how technology-mediated practices are interlocked with socio-technological systems, and how they stabilise in extended time and space. Advanced social systems such as the trans-national corporations were discussed ideal-typically as generic informational systems. The development of a) the digital rationalisation of the economy, b) the emerging service- and media industries in what Bell calls the 'post-industrial society', and c) the distanciation of social systems, go together in what Giddens calls 'expert systems' and tend to become informational systems, because their pervading technical disembedding mechanisms have become foremost informational. Informational systems are reproduced socially by intentional and unintentional circulation of information and communication. I attempted, in a general sense, to clarify the technological principles guiding integration when people are absent from each other, and how we are to understand the 'stretching' of social relationships across time and space. Social systems are more than a group of interacting individuals. It is a whole, a 'social fact' that may pre-exist and endure longer than its members. It is external, capable of large-scale developments beyond the reach of the particular individual, occasionally resulting in large-scale and long-term, unintended consequences. Organisational practices make use of technologies that to a large extent are *given.*

This should *not* be taken to mean that social systems change beyond individual action. Social systems can, and should not be treated as natural facts outside human relationships and social practices. Here, I have emphasised the historic role of transport and media technologies in Western modernisation, leading to a world of a multitude of social systems. The inclusion of transport- and media technologies in a historic modernisation theory, makes it easier to conceive of large, impersonal systems as mediation of collective action, to analyse social systems without system-theory which tends to ignore agency. There is, as I have repeatedly pointed out, no technology without users. There is always a dialectic of control. *Technological and social change cannot be explained without reference to human action.* Informational systems are 'clusters' of technology-mediated action, accumulated and coordinated in processes of mediation.

One concept regarding the relationship of the individual and social systems I called electronic *fields of interaction;* patterns of purposive interaction where individuals and social systems meet and interact. In advanced societies, these are, due to the possibility of cost-reduction, increasingly technologically mediated. Electronic fields of interaction very directly suggest the new dynamics of communication technologies as new modalities of interaction 'between' social systems and individual life trajectories.

The diffusion of communication technologies among individuals should be understood as new system-induced modes of mediation, situated in, and giving shape to fields of interaction to which the individual becomes more intimately connected. Communication technologies entail increasingly profitable, efficient and flexible fields of interaction, hence of distributing information and services and providing communication and control. Social relations are structurally organised, in and through new forms of communication technologies. All social relations, and particularly those involving electronic networks, are structured differently by various forms of individual capital and hence asymmetries and in-

equalities. To live in a 'differentiated society' means that there are enduring and structurally differentiated access to, and use of communication technologies. The various communication technologies possess different attributes which require different levels of interactivity and participation. These and other attributes are linked to distinct skills and knowledge.

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The technological definition of social boundaries:
Video telephony and the constitution of group membership

BY RICHARD LING

Good fences make good neighbors.
– Carl Sandberg

Here the boundaries meet and all contradictions exist side by side.
– Dostoevski

1 Introduction

Boundaries are all around us. They can be physical, social, visual, economic, technical, psychological or all of these in combination. Boundaries can be self imposed or imposed by others. We may chafe at boundaries, or we may seek the security and freedom they provide. If a boundary is too flimsy it is only an inconvenience or a hindrance. By contrast, if it is too solid, its transgression is unthinkable and its existence is not an issue. Thus, one may say that the only boundaries that exist are those which are problematic for those wanting to uphold the boundary, those who want to eliminate it or the conflict between the two.

In the most literal sense boundaries are physical or visual. Doors that hold people either in or out, curtains that are (or are not) drawn or walls that should but do not hold out sounds. However, boundaries such as status boundaries, intimacy boundaries, personal boundaries, the boundaries regarding with whom one may interact and boundaries imposed by manners also have a social character.

Boundaries have a special interest for sociologists since it is at the boundary that one sees much of the underlying structure of society. When boundaries shift, the assumed ground-rules are exposed. The game is up for grabs. The order of things is open for redefinition. New institutions and conventions, be they large and long term or short and interactional, need to be re-established, tested, modified and reified. Power, gender and age differences, existing rules, economic wherewithal and institutionalized hegemony come into play in the reassertion of order.

The adoption of new forms of electronic communication means that we need to rethink boundaries. Where previously one could leave one's job behind and take a walk in the woods or drink coffee in a cafe, the mobile telephone has arrived. Where previously one's home was free from visual inspection, there is video telephony. Where the summer cottage was the reserve of thick novels and card games, the Internet has been installed. The adoption and use of these technologies mean that the previously taken for granted situation has to be reevaluated and new social agreements have to be struck. Does one cross the boundary into poor manners by talking on a mobile telephone in a restaurant, surfing the Internet or playing video games from a vacation cottage on a beautiful sunny day? These things are happening now. The techniques and conventions for dealing with these situations are, at the same time, under development.

This paper will examine the boundary issues that arise from the development of the video telephone. This is not an evaluation of the use of video telephones or videophone technology, that is left to others (Noll 1992). Rather, this study is based on the results of a series of focus groups. It will report on how people respond to the idea of video telephony and how they organize their perceptions of the device. This data will be examined using the dramaturgical approach to sociology developed by Goffman (1959; 1963; 1967) and further developed by Meyrowitz (1984a). This type of analysis will help illuminate the likely path of domestication should such a technology be introduced.

After a short discussion of the theoretical approach and the methods employed in the paper there are two major sections. The first is an examination of the ways in which video telephony removes barriers including a discussion of how respondents felt that video telephony will allow for more nuanced discussions and how it will help in the maintenance of social institutions. The greater intimacy provided by video telephony is, however, a two-sided coin. Thus, the second section will take up the issue of boundary maintenance. It gives respondents' perceptions of communication with intimates, how they experience integrity, openings for video telephony, placement of the device in the home, the staging of conversations and the ability to engage in parallel activities.

2 Theoretical background and method

2.1 Theoretical background: interactive and dramaturgical sociology

This essay finds its theoretical basis in the interactive sociology of Mead (1932, 1965) and the sociology of knowledge (Burger and Luckmann 1967). These approaches are integral for understanding the reciprocal nature of social interaction.

Figure 1 Video telephony has long appealed to the desire for more complete and nuanced interaction as seen in the 19th century illustration of a "Telephonoscope" (from Albert Robida "Le Vingtième Siècle")

In addition, this paper draws extensively on the dramaturgical approach outlined by Goffman (1959; 1963; 1967) and applied to electronic media by Meyrowitz (1984a).

The interactive approach asserts that culture, institutions and conventions develop in one's interaction with the social physical and historical context. One experiences a wealth of inputs from the social world. These provide the individual with what one might call incoming messages. To be seen as a socially competent individual, one has to take in the various stimuli, interpret and then respond to them. In its simplest form conversation is a series of such cycles. This process is illustrated in Figure 2 which shows a two-sided conversation. Here, the first person makes a statement, the second person perceives, interprets and responds. The response of the second person constitutes the basis for the perception, interpretation and response of the first person, and so on. As one prepares to speak, gesture or convey information, they adjust the communication event to their understanding of what has happened before. If I believe that I am speaking to a genius or an idiot, I will adjust my communications appropriately. If I am correct in my assessments, the response from the person will be along the lines which I expect. If not, I am likely to be surprised.

Figure 3 shows a slightly more complex, but far from complete, sequence of talk. In addition to the simple perceive, interpret and respond cycle there are an additional set of communications including groundings, signaling of intention to speak and clearance signals indicating

Person 1
Utterance

Person 2
Perception
Interpretation
Response

Person 1
Perception
Interpretation
Response

Person 2
Perception
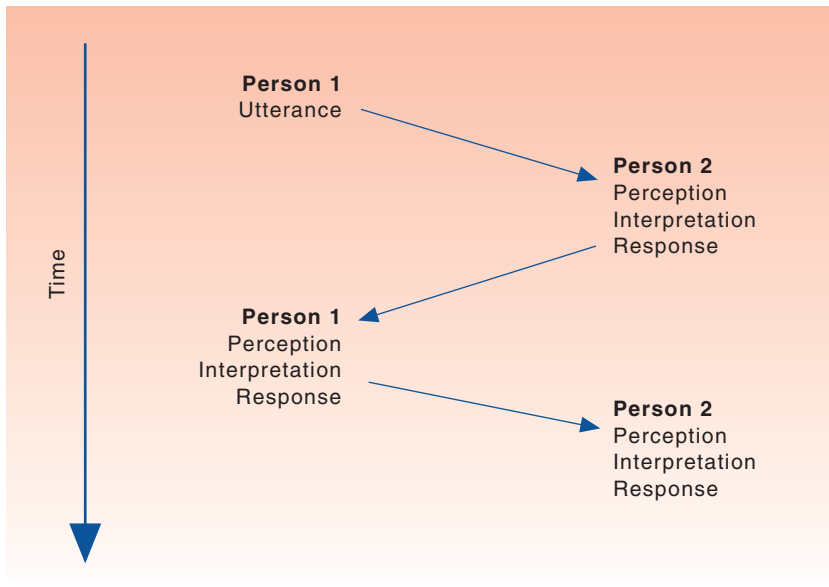Interpretation
Response

Time

Figure 2 A general pattern of communication shows that an utterance from one person is perceived, interpreted by a second. Based on this perception and interpretation a response, that is more or less appropriate, is formulated. This is, however, a fragile process. Interpretation may be faulty and perception may exclude various portions of the utterance. The child's party game where a sentence is whispered from person to person around a circle illustrates the problem of communication. Inevitably, the whispered sentence changes and becomes less and less intelligible as it proceeds from one person to the next.

the end of a speech act. These conventions and gestures constitute communication about communication, that is communication protocols (Goffman 1963, 99; Goffman 1967, 34 – 35). As one can begin to appreciate, the speech act is not a simple sequence of perfectly formed utterances. Rather, it includes half starts, poorly formed grammar, interruptions and disturbances. It is not enough that the speaker must restart and revise their statements. The listener may also become distracted, misinterpret utterances and fail to fill their role in the interaction. The content of the interaction also includes a multitude of subtle, and not so subtle verbal cues, inflections, visual prompts, proxemics, olfactory and tactile inputs, etc. (Allen and Perrault 1986; Clark and Marshall 1981; Clark and Schaefer 1989). Following McLuhan, even the medium through which the message travels is also part of the content (1994).

One's ability to participate in talk or any other social process is, according to Mead, due to the "generalized other" (1934, 155 – 156). It allows us to imagine how another person – not necessarily the person to whom we are speaking but

a generalized other person – might perceive our communications. The ability to imagine abstract interactions is, in many respects, the mark of a successfully socialized adult (Collins 1985, 197).

In Mead's own words:

> *It is in the form of the generalized other that the social process influences the behavior of the individuals involved and carry it on, i.e., that the community exercises control over the conduct of its individual members; it is in this form that the social processes or community enters as a determining factor into the individual's thinking* (1965, 165).

Thus, culture, institutions and conventions are an interactive agreement between the participants. There are aspects of culture that are predefined by tradition or the assertion of power just as there are those that are malleable. To use the concept developed by Berger and Luckmann, culture and its constituent institutions and conventions are "reciprocal typification[s] of habitualized actions" (1967, 54). To cope, that is to become socialized, we need to have a repertoire of habitualized actions and responses to

which we can refer. As we assemble our own set, we begin to understand that others also have a similar repertoire of habitualized actions and responses. Thus, we begin to set together our presentations based on the notion that we share similar communication protocols, language and experiences.

When a new situation arises we are forced to rethink the existing conventions. The response to new situations are not made of whole cloth, rather we collectively patch them together from bits and pieces of our previous common experience. Video telephony, for example, shifts the balance of communication (Mathisen 1988). With audio telephony, the clearance cues and groundings are completely verbal.[1] Thus, we have a set of audible "back channel" responses such as grunts, and short sounds like "mm-hmm" and "yea", appropriate follow-up statements and other social cues to indicate that we are paying attention or that we wish to speak. We also have another set of intonations, verbal gestures, and clichés to indicate that we wish to retain the floor while we collect our thoughts, that we have almost completed our current speech act or that we wish to talk further (Clark and Brennan 1991; Duncan 1972; Johnstone et al. 1994; Kendon 1967; Sacks 1974). In the world of video telephony one has access to many of the same visual clearance clues and groundings available in face-to-face interaction (Johnstone et al. 1994).[2] Thus, research

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[1] *A short coming of Goffman is that he focused almost exclusively on face-to-face interaction (Meyrowitz 1985, 345, n. 53). Goffman only peripherally considered electronically mediated interaction. It is Meyrowitz who has taken the step of applying the interactive and the dramaturgical approach to electronic media, largely broadcast TV (1985). It is the intention of this analysis to go the next step and to examine the social development of new institutions and conventions appropriate to new interactive communications technology, namely the video telephone (Rasmussen 1995).*

[2] *None the less, it has been observed that we revert back to the audio telephonic styles after the first period of the video telephone conversation. This indicates that the notion of video telephony has not been completely integrated into our style of telephone conversation (Nordby 1991).*

shows that video telephone users are able to assay the motives of conversation partners more clearly, that conversations are more personalized, more polite and broader in focus and that they are more flexible (Short et al. 1976; Reid 1977; Whittaker 1995; Williams 1977). The degree to which this is important, and the degree to which this causes unwanted access will be the focus of this paper.

2.2 Method

This paper reports on data gathered in six different focus groups. These included two on the general understandings of telephony, two on various types of new terminals and two on video telephony among the elderly. Respondents were recruited using both random and "snowball" sampling techniques (Bailey 1978, 83, 91; Morgen 1988). A total of about 65 persons participated in these sessions. The participants ranged in age from about 25 to 75. The actual group interviews generally started with an abstract discussion of video telephony followed by a demonstration of the technology and ended with what one might call an informed discussion. The transcripts from the focus groups were used as the basis for the analysis.

This study employs the qualitative approach, the strength of which is its validity. One is able to ask direct questions of respondents, rephrase where there has been misunderstanding, probe into areas of conflict, explore previously unrecognized issues, attack matters from different directions and generally poke around in the material which is available. This leads to a rich and complex description. One is not faced with a paucity of data, but rather an abundance. Several methods for this work have been developed (Glaser and Strauss 1967; Kirk and Miller; 1990 Lofland and Lofland 1984; Spradley 1979; Strauss and Corban 1990). The constant comparative method of Glaser and Strauss was used to develop the domains and concepts reported here.

The major problem with qualitative approaches is their generalizability. To be generalizable the data must fulfil certain requirements. In the case of social science these include random sampling to cancel biases and provide a statistical means for estimating sampling errors, and a sample of sufficient size in order to allow a narrow margin of error. It is difficult for qualitative data to meet these requirements (Bailey 1978, 76; Campbell
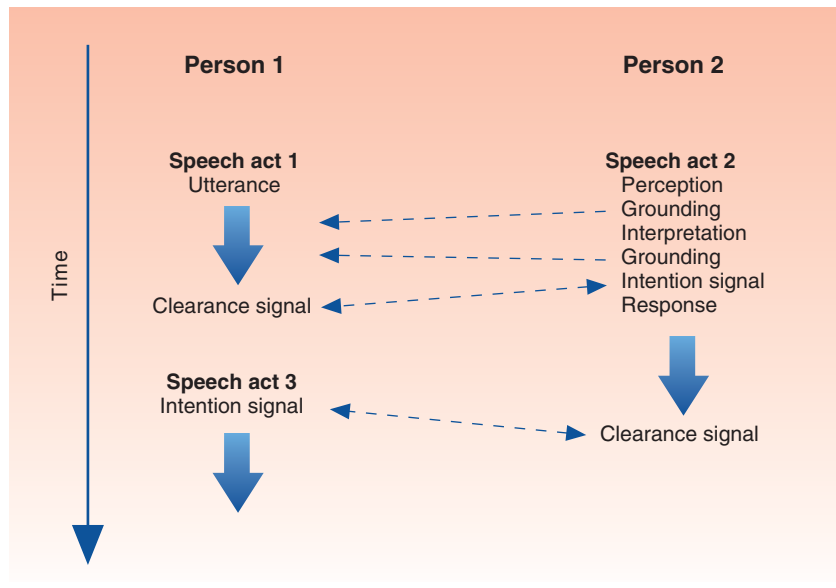

Figure 3 In this illustration one can see a slightly more complex diagram of talk showing groundings, signaling of intention to speak and clearance signals indicating the end of a speech act. These gestures and conventions are described as communication about communication or communication protocols. It is with the use of these devices that one indicates attention and turn-taking. Thus, the speech act is not a simple sequence of perfectly formed utterances, it includes half starts, poorly formed grammar, interruptions and disturbances. The listener may also become distracted, misinterpret utterances and fail to fulfil their role in the interaction. The interaction also includes a multitude of subtle, and not so subtle verbal cues, inflections, visual prompts, proxemics, olfactory and tactile inputs, etc.

and Stanley 1963; Cook and Campbell 1979). Quantitative analysis is an alternative. As practised in the social sciences this method is often based on the use of survey research techniques and questionnaires requiring large samples. Unfortunately, the limited experience of new technologies such as video telephony prevents this type of data collection.

3 Barrier reduction

This section will examine how respondents felt that video telephony could remove or relax communication barriers. There was the sense that it could provide more nuanced and insightful discussions. In addition, they described the potential for video telephony to help maintain social institutions.

3.1 Nuanced communication

One of the most striking results of this and other research on visual telephony is the degree to which it appeals to the desire for affective discussions with intimates (Reid 1976, Short et al 1976, Whittaker 1995). Respondents included

in this study felt that traditional audio based telephony does not enjoy the same broad repertoire of expression. Because of this and because of the desire for more intimate and nuanced contact, video telephony was seen as a positive development since it represented "more social talking."[3] Respondents felt that video telephone conversations would be more "pleasant" and have "more dimensions." There was the sense that it would open up the reciprocity that characterizes face-to-face interaction by allowing one to

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[3] *Quotations from the focus groups have been translated from Norwegian and are represented with either quotation marks or indented margins. In many cases the grammar reflects the vocal expression as opposed to the formal rules of writing. In some cases I have inserted editorial interpolations and explanations. These are marked with square brackets. Direct quotations from research material are indicated with a direct bibliographic citation.*

Figure 4 Many respondents were interested in the social contact provided by the video telephone. This was particularly strong in the case of cross-generational communication, i.e. grandchildren and their grandparents or parents who were separated from their children because of the need for remote schooling

very important. It could be medicine."[4] Several respondents thought that video telephony would appeal to the sedentary and those who were older. Younger respondents were more sceptical. An elderly man noted "I think that youngsters [are more sceptical to video phones] because they want to be where things are happening. We would rather sit quietly and talk to the person concerned and see them on this little screen."

The respondents expressed the desire for video contact not only in abstract comments, but also in concrete situations. They described the importance of a nuanced and deep understanding of family members and friends. This type of communication seems to be gendered, in that it was often women who were most interested in the ability for what one might call "tele-nurturing" (Ling 1994; Livingstone 1992).[5] In the words of a female respondent:

> *The family can see how they are, if they are OK, catch things that nobody says and so perhaps I can visit to make sure. I could see how people are doing, visually, the elderly and children, if you could contribute something. Within the family anyway.*

In addition to gaining insight into the well being of other family members,

measure the effect of their presentation and "see things that are not being said."

> *When you meet a person you see all the movements and expressions. You see the body language and can interpret it. You could do the same with a video telephone. You get a better feeling for how the other person reacts to what you are saying.*

This assertion is echoed by research into the role of visual cues in face-to-face communication. It has been found that visual access allows communication of facial expressions that last as little as 200 ms, various types of enhanced speech perception, better turn taking and traffic management, signaling of comprehension and (dis)agreement (Bruce 1995).

The ability to see others taped into a desire for greater contact. This was most obvious among those respondents who "would like to see [their family] more

often." For example, a mother living in Western Norway said:

> *I want that contact [that a video phone could provide] ... It would be wonderful if I could see my family when I talk to them on the telephone. For example it would be nice to see my old aunt when I talk to her on the telephone ... and that with children, the telephone is especially important. Here, as a rule, after the children are done with 9th grade they move away. The only contact you have with them in the middle of the week is over the telephone.*

The possibility for contact with grandchildren was mentioned quite often. Other respondents brought up the possibility for contact with elderly parents and friends who were lonely or sick and "can not travel much." They talked about how "nice it would be to hear and see others and get other stimuli" and that "the psychological with body language can be

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4 *There may be a certain comfort that an invalid gains from a video telephone, particularly the chronically sick for whom sickdom may be an ongoing aspect of their identity. However, for others the use of a video telephone that visually certifies their sickness may be more of a problem than a support. Goffman notes that one's "face" that is their presentation of self is difficult to maintain in these situations since "Should he (sic.) sense that he is in the wrong face or out of face, he is likely to feel ashamed and inferior and because of ... what may happen to his reputation as a participant ... his manner and bearing may falter, collapse, and crumble; he may become shamefaced. (Goffman 1967, 8 – 9).*

5 *See also Argyle et al. 1968 and Argyle et al. 1974 for a discussion of the importance of visual signals in gendered communication, and Rakow for a general discussion of the gendered use of telephony (1987; see also Fischer 1988; Wajcman 1991).*

respondents described video telephony as a technology that would give them the ability to remotely deal with sensitive situations. A man noted that:

I have a very old mother so I think I could reassure her in many situations if she could see my face. It would be great for her. A positive psychological effect for her and surely for many others too.

One respondent spoke of the ability to provide moral support and "cheer" to others who are experiencing difficulties.

[It would be] good to have both in happy and sad situations. We need each other both when we are sad and when we are happy. When video telephones come they will be useful.

Another suggested that: "It is perhaps in that situation that such a telephone would be useful is with death in families. To see the face of the family when you are in mourning."

Finally, some respondents offered more fanciful suggestions such as "If you are having a nice dinner and somebody from another part of the country calls it can be fun to see that we are sitting and eating dinner" and "Christmas would be nice, people all dressed up and presents, to see what their Christmas was like."

3.2 Institution building and maintenance

The discussion above describes the role of communication in the development and maintenance of social institutions. This role for audio telephony has long been recognized since it allows a depth and breadth of common reference points (Ling 1994). Events such as births, funerals, weddings, birthdays and other social events provide the raw material for the construction of a common past. These are the shared knowledge of family or group members. It is in fact access to this knowledge – along with its subsequent elaboration and embroidery through retelling – that constitutes one as a legitimate member.[6] Those who are members of the group will be able to signify this

by displaying a mastery of the lore. Members will be able to remember when Uncle Fred fell in the pool at his daughter's wedding and how sad Grandma was at her sister's funeral. They know about the time that Bill broke his leg in a car accident and when Martin won an award for music. In addition to the direct knowledge, they have access to the commentaries given by other group members about these events such as the knowledge that Uncle Fred drinks too much or that Bill is usually such a careful person. It is these embroideries and observations that indicate the degree to which one is privy to the inner workings of the family. In fact, for one to come into the group or the family, one must be introduced to and, to some degree, master its stories and mythology. The common lore of the group defines those who are in and those who are outside the group. Thus, the access to information serves as a type of membership boundary.

Before the development of electronic communication interaction was carried out either face-to-face or via letters. In her examination of the exchange of letters between Norway and emigrants to the US Krogh describes the strategies used to maintain family ties. The public nature of letters, the inclusion of cloth samples from wedding dresses, etc. helped the correspondents construct a sense of shared experience (1990). Telephones, answering machines, e-mail, fax machines, photographs and other communication media now allow one to carry out the work of institutionalization across distance and time. Results from the focus groups indicate that video telephony was seen as an aid in this process.

Again and again, those with family living in another part of the country expressed a particularly strong desire for contact.

I think to tie the family together, families that live apart with grandchildren and such to come in contact with these. Because distance causes distance. One can not know each other so I think this is great.

That the telephone has become a way to hold the family together and to create a common narrative of the life is seen here. The addition of a visual component allowing them to view, for example "a nice dinner," a grandchild's first tooth, to check the fit of the sweater that grandma knit or to show off the fish grandpa caught would enhance the institution building. The individual examples are

banal, but the sum of these interactions goes into the development of how the family defines itself. It makes obvious the ways in which the individuals are integrated and creates a common currency and a common set of reference points. All of these go to defining kinship, perhaps the most deeply rooted of all institutions (Rubin 1985, 15 – 33).

4 Barrier maintenance

While video telephony may allow a level of intimacy unknown in audio telephony, this has its problems. When there is disagreement between participants as to the appropriate degree of access, the management of boundaries becomes a focus of the interaction. Disagreement over the level of intimacy leads to socially explosive situations. One only needs to imagine the embarrassingly unwanted attention proffered by a bar-fly to see the drama of barrier maintenance. Experiments with, for example, personal space indicate that when personal space is misused, the interpretation of the situation becomes unpredictable (Hall 1966, 107 – 153; Meyrowitz 1986b). Video telephony thus presents a potentially problematic social institution. This section will examine these issues.

4.1 Integrity vs. intimacy in visual telephony

While many of the respondents welcomed the opportunity for greater and more nuanced contact with others, there was also a wariness. Video telephony could become too intimate as revealed by a respondent who said: "So you can have [the video phone] all the way into the face, count all the wrinkles ..." She understood the invasion of intimacy associated with the video phone. One is uncomfortably face-to-face.[7] The sub-

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6 *Photo albums, films, videos, pictures of grandparents on the wall and other artefacts remind the individuals of the events, provide an opportunity to relive them and contribute to the mutual sense of membership.*

7 *In face-to-face conversations one maintains eye contact only during certain portions of the exchange. Staring at another is considered impolite, or some type of power evocation strategy (Argyle et al. 1968, 14; Duncan 1972). By contrast we are accustom to televised "talking heads" such as television news readers looking directly at us – that is, they look directly at the camera. It is unclear if one will expect a video telephone conversation to approximate the face-to-face or the "talking head" convention in respect to eye contact (Dutton 1995, 94; Meyrowitz 1984b; Nordby 1991).*

Figure 5 The invasiveness of the telephone is summarized for many by the metaphor of being caught in the shower when the picture phone rings. The sense that others can see us naked, or perhaps socially unguarded, is a threatening idea. It illustrates the need to control our presentation of self. This also illustrates the delicacy and the problematic nature of granting visual access. With intimate family members, for example, it may be seen as an insult not to have this type of access. (Cartoon by Martin Holmes from Collins and Rabbitt, 1990.)

tleties, flaws and unintended aspects of display are available for examination.

By contrast, voice telephony makes it easier for a conversant to use a series of ruses to cover over the unintended communication; it is easier for one, in the words of Goffman, "to *have,* or *be in,* or *maintain* face" (1967, 7). One respondent evoked the idea of integrity.

> *I will say that one has a right to integrity. When you open a video telephone then the caller sees into your living room. Sees things that you do not want to come onto the screen. This effects my integrity, and one has a right to be shielded.*

The notion of integrity implies a unified facade. Technology, such as the video phone, threatens to pull the curtain back so that others can see the inconsistencies. We are left without the comfortable old cues as to how one should act in a given situation. As technology begins to approximate traditional face-to-face interaction we no longer have, in the words of Meyrowitz, "a place in the traditional

sense of a set of behaviors matched to physical locations and audiences found in them" (1986a, 7; see also Marx 1994). This puts us in the position of having to do what Goffman calls *face work,* that is "actions taken by a person to make whatever he is doing consistent with face" (Goffman 1967, 12). When one's "face" or integrity is threatened one is able to save the situation through displays of poise and *savoir-faire*. If this fails, the result is reciprocal embarrassment. That is, the participant who is out of face is embarrassed and the other is embarrassed for the party who is out of face.

The successful negotiation of an interaction often means that both parties are interested in avoiding or ignoring out of face situations and maintaining their own and the other's integrity. One has an interest in a defensive orientation towards saving one's own face and a protective orientation saving the face of others (Goffman 1967, 14).[8] Successfully socialized individuals in a conversation will have at their disposal a repertoire of habitualized reciprocal conventions and rituals for avoiding or glossing over incidents.[9] These will vary from culture to culture, as they will vary depending on the medium through which the conversation takes place (Berger and Luckmann 1967; Goffman 1967, 12-13, Meyrowitz 1994).

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[8] *One can well imagine that this principle holds in interactions between friends. However, when one is in an aggressive situation, one attempts to present a defensive stance in reference to their own face and an aggressive stance towards the face of another. This is seen when one is bargaining, gaming or when one suspects a scam is being carried out against them. Here the individual attempts to establish a line and to discredit or disrupt the line of one's opposite. This was seen in the comment by the man who thought that "People will not lie if you can see them." Here the informant described his desire to uncover the inconsistencies in the other's line and to exploit those to his favor.*

[9] *In many instances laughter allows us to marginalize and to encapsulate our embarrassment (Duncan 1970). It is a way of asserting that the foregoing incident was not as we intended and now that that episode is over we can continue with the business at hand.*

It is clear that video telephony will result in threats to integrity. Respondents were quick to think of situations in which embarrassment was possible. As one respondent said, "Some times you are presentable and other times you aren't." Common formulations included comments such as "I could imagine seeing but I could not imagine being seen all the time especially when I have not combed my hair", "Women have to go to the hair stylist before they can take the telephone" and "Before you had to formulate yourself correctly to be understood. Now you need to have on a suit to take the telephone." A woman who had been sick noted that "when I weighed 31 kilo I don't think I would have shown myself to anybody." Perhaps the most prototypical illustration was along the lines of "Think if you were in the bath tub."

Goffman describes people being caught unprepared for a particular type of performance as being "temporarily torn between two possible realities", that which they were in, and that in which the audience expected them to be. This results in the first instance in confusion as to the appropriate presentation and thereafter in embarrassment (Goffman 1959, 140).

Grandparents, in their eagerness to see a new born grandchild may come across *out of face* situations. A tired unkempt mother, disorderly laundry drying in the living room, dirty dishes on the kitchen counter or children's toys spread about on the floor may provide unintended visual cues. The presentation they receive will be different from that experienced when a guest enters the home on a prearranged visit (Ling 1995, 22).[10] Children living away from home will have the threat of a video telephone call from their well-meaning but intrusive parents.

> *I could imagine seeing their face when it has to do with my friends and family so that I can understand things that are not said by seeing.*

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[10] *Even with audio telephony, many respondents who were grandparents knew when they should call in relation to the family's daily routines, i.e. eating, bed time, children's TV etc., that is when grandchildren were socially available. It is likely that similar conventions will develop with video telephony.*

In this case, the speaker was interested in gaining insight so that she could carry out her role as a care giver more effectively. The idea of using video telephones to gain greater insight was also applied to more adversarial situations. One respondent, for example, liked the idea of video telephony since he felt that "People will not lie if you can see them."[11] In each of these cases there is an issue of managing one's facade.

Video telephony means that one is always visually available since refusal to accept one's call or refusal to grant them visual access sets one in a type of social peril.

> *Those present will be obliged to retain some readiness for potential face engagements. This readiness [is] one way in which situational presence is expressed ... participation in a face engagement can be a sign of social closeness and relatedness; when this opportunity to participate is proffered by another, it ought not be refused, for to decline such a request is to reject someone who has committed himself to a sign of desiring contact* (Goffman 1963, 104).

Goffman goes on to note that one generally "is obliged to make himself available for encounters even though he may have something to lose by entering them, and that he may well be ambivalent about this arrangement" (1963, 107). Thus, strategies for managing impressions are likely to be developed. Routines and conventions will have to be established to ease

these staging problems and to avoid embarrassment for both parties. A bib may hang near the device in order to cover up the baby's dirty clothes, the camera may be pointed at a blank wall, the focus may be deliberately off or one will develop a set of excuses for not being visually available.

4.2 Openings

One of the most critical points in a conversation is the opening. The warmth and poise expressed during a greeting sequence has consequences for the development of the conversation in that it "serve[s] to clarify and fix the roles that the participants will take during the occasion of talk and to commit participants to these roles" (Goffman 1967, 41, n. 30). With video telephony, the mechanics of the technology along with the powerful social meaning assigned to visual access mean that the process of gaining and granting visual access will also have meaning for the conversation (Goffman 1963, 99; Marx 1994). The ability to control the right to visual access and the conventions of how visual access is granted was a theme in the focus groups. The ability to turn the camera on and off at the beginning of conversations was an important concern.

> *I would consider having a video telephone if I could decide if the video was on or off. I get a lot of anonymous calls that are not always so pleasant so that way I could see who it was but that is an intrusion against one's will. So I support video telephones but they have to be such that one can agree from both sides if they will turn on the picture.*

These comments point to an asymmetry between the information that one allows and that one seeks (Argyle et al. 1968). With the video telephone one can gain visual insight but one can also be exposed to unwanted examination.

> *One does not always want to be presented, this with that they can see in your living room. It will develop with depth sharpness and angles and all of that so you can sit and see the other's dinner table. Such a telephone, as I understand the rules we have for microphones and everything possible, such a telephone needs to have an on/off function. To turn the whole problem, when you hear who it is and have said "hello" "hello" then you can agree to turn it*

on so you can see each other. So that you can turn it on when you have the need for it.

It is during the opening that the decision regarding visual access will be negotiated. The exact conventions and criteria for deciding on access are yet to be developed. It was obvious to the respondents, however, that these issues have social meaning. "You have a new problem. Who is it that you filter out and what do they think about that? 'No, I can not bear to see that person. I will see you'. It is easy to make enemies." The idea of friendship and acquaintance boundaries will be changed with video telephony. Deciding where the boundary goes will be a socially loaded decision. An indication of the contours of the discussion is afforded by the establishment of greeting procedures early in the telephone's development.

4.2.1 Traditional telephonic opening conventions and the determining of status

In general, gaining attention of another, particularly when there are status differences to consider, is a tricky business. There is the need for discretion when one of inferior status wishes to establish communication with one of superior status, i.e. a secretary with an executive or a butler with an employer. In face-to-face interaction visual cues such as dress, age, and gender provide one with insight into the appropriate strategy. Once status is determined the greeting can proceed. Use of one's eyes, adoption of a particular tone of voice, the use of certain understated phrases such as the discreet cough of the butler, are all strategies for the relatively inferior person to request the right for communication (Goffman 1963, 91). If the other is available for interaction, he or she can respond with what Goffman calls a "clearance" sign and the conversation can proceed (1963, 92).

It is difficult to open a successful conversation when the relative status of the conversants is unknown. The degree to which we are interested in the use of status is seen in the type and the extent of etiquette used in this speech act. In some cultures the very language imparts the degree of deference, or lack thereof, between the members of a conversation group. This is seen in the use of the formal and informal greetings and forms of address in many languages (Brown and

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[11] He felt that he would be better able to determine if the person was "in the wrong face." (Goffman 1967, 7). The consequences of being caught out of face are near at hand.

> *An unguarded glance, a momentary change in tone of voice, an ecological position or not taken, can drench a talk with judgmental significance. Therefore, just as there is no occasion of talk in which improper impressions could not intentionally or unintentionally arise, so there is no occasion of talk so trivial as not to require each participant to show serious concern with the way in which he handles himself and the others present (Goffman 1967, 33).*

Gilman 1972).[12] Such conventions, how-ever, become difficult when using the traditional telephone since the medium masks one's identity. Visual cues, such as age, clothing, or decoration, are not available. Thus, there is the need for special opening rituals during which identi-fication, and status assignment can take place. The introduction of the telephone gave rise to a discussion of how to best exchange greetings – and hence relative status information – in the absence of visual cues. Early in the history of the telephone users were advised in the fol-lowing way:

> *Would you rush into an office or up to the door of a residence and blurt out "Hello! Hello! Who am I talking to?" No, one should open conversa-tions with phrases such as "Mr. Wood of Curtis and Sons wishes to talk with Mr. White ..." Without any unnecessary and undignified "Hello's."*
> – Winner of the best hortatory essay in a contest sponsored by Bell in 1910 (cited in Fischer 1992, 70).

"Hello" was not acceptable in a medium that might allow lower status persons, such as servants, to directly address upper status persons as equals (Millicent Fenwick in *The Vogue book of etiquette* from 1948, cited in Fischer 1992, 186). Presumably, if one of lesser status is call-ing they will be required to identify themselves and request the appropriate party using a formal form of address. This follows from the general social rit-ual of social inferiors using titles when addressing superiors while superiors use familiar names when addressing both inferiors and equals. Duncan sums this up nicely by saying that "manners are the daily language of hierarchy" (1970, 266; see also Geertz 1972).

To deal with this issue, traditional tele-phone openings have developed into a special form of ritual. The social process of opening the conversation, as noted by Hopper et al. is partially addressed by the development of a "double opening." The first greeting is to establish contact and identify the caller and the call receiver. The second round of greetings allows one to come into the role which is app-ropriate for that particular situation (1990/91).

4.2.2 Likely opening strategies for video telephony

The widespread introduction of video telephony will mean that manners and etiquette surrounding openings will have to be constructed (Dutton 1995, 95). As described above, these conventions will probably build on already existing pat-terns.

> *... if the individual takes on a task that is not only new to him but also unestablished in society, or if he attempts to change the light in which his task is viewed, he is likely to find that there are already several well-established fronts among which he must choose* (Goffman 1959, 27).

As with traditional telephony the caller will be responsible for identification and justification of the call while the callee will be responsible for gate keeping in addition to the status issue discussed above. There is the added issue of visual access. In the case of intimates this access will either be quickly granted or, if visual access is denied, the callee will have to justify the denial.

If it is not opportune for the callee to grant visual access they will need to develop a repertoire of convenient reasons for demurring. These will com-monly play on the themes of either vanity or modesty. Rather than telling your par-ents that you don't want to turn on the camera "because my boy friend gave me a black eye last night," one might say "I have face cream on my face and I look awful." Another standard formulation, used in the focus groups, may be that "I just got out of the shower." Video tele-phony is not the first area in which such devices have been employed. Various cultures have developed more or less elaborate ways of dealing with this type of situation.

> *Centuries of practice in this form of evasion have made the Chinese matchlessly fertile in the invention*

> *and development of excuses. It is rare, indeed, that one is caught at a loss for a bit of artfully embroidered fiction with which to hide an un-welcome truth* (Holcombe 1895, 275).

During the opening, the callee must make quick decisions on their visual availabil-ity, e.g. who always gets visually ex-cluded, who always gets visual access and who is in the middle?[13] Obviously near intimates will almost always demand and be granted the rights to symmetric visual communication. In fact, among what one might call permanent intimates such as near family members, their exclu-sion from visual symmetry can be treated as a dramatic sign that something is wrong. To use the example cited above, a father calling his daughter might respond by thinking "Since when am I not allowed to see my daughter with face cream on her face? There must be some-thing else going on." In this case the transparency of the excuses may be called on and require either a more elaborate ruse or fessing up about the black eye.

When it comes to what one might call transitory intimates, such as friends and lovers, greetings take on a particular importance since they are a way to sig-nify that the status enjoyed during the previous encounter is intact (Goffman 1967, 41). In this case, visual inclusion can indicate a greater level of intimacy is in the offing while exclusion may indi-cate distancing in the relationship.

The boundary between "visual intimates" and those who are visually excluded will be difficult to establish and will vary from encounter to encounter. As one moves from close family and friends to acquaintances and finally to those who are only peripherally known or unknown, the callee will be less and less likely to turn on the camera. Those who are not able to justify their calls or adequately identify themselves can not expect visual access.

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[12] *The recognition of status in the lan-guages can go far beyond simple forms of address. In his study of Java, Geertz examines the imbedding of "status meaning" in the linguistic meaning of common words such as "house," "eat," "walk," etc. That is, one uses one form of the word when speaking to superiors, another when speaking with equals, a third when speaking to infe-riors with whom one is familiar. A sec-ond set of three are used in conversa-tion with partners that are not known (1972, 282-295).*

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[13] *The visual symmetry of communication seems to be more important to women than to men. According to Argyle et al. when talking with another person with whom they are unfamiliar, women have shown a preference for being hid-den while their conversation partner is exposed (1968). It is suggested that this arrangement results in a sense of dominance and comfort.*

In some situations there is likely to be great pressure on the part of the caller to gain visual access since it can make people less aggressive and more willing to compromise (Bruce 1995, 234). Visual access engenders a personal identification and an empathy towards their position. This means that once visual rights are granted, a sales person would be more likely to make a sale. This might lead to ruses such as needing to gain visual information about the callee before they are able to determine if the offer is valid or which offer is most applicable. One could imagine cosmetic sales people needing to see the exact eye color or those selling interior furnishings needing to see the color of the walls or the layout of the house.

Thus, the opening of a video telephone conversation takes on a social meaning that is somewhat different from that experienced in face-to-face encounters and via traditional telephony. In addition to the issues of status negotiation, the issue of visual access has meaning in terms of the intimacy shared by the participants. The fact that we do not have the experience of dealing with these issues means that the social conventions are yet to be developed.

4.3 Placement

Another area in which video telephony will force changes in our daily life is the physical placement of the device. Respondents indicated that the location of the home's telephone will likely change with the introduction of video telephony. Many of the respondents reported that their "main" (traditional) telephone was in a central hallway or entrée.[14] This was seen as a practical, or at least as the most common solution since "Most of the rooms are tied to the entrée so it is easy to hear the telephone if you are in some of the rooms." In addition, the hallway is somewhat removed from the rest of the home such that the broaching of delicate matters, such as an adolescent seeking a Saturday evening date, can avoid the scrutiny of other household members.

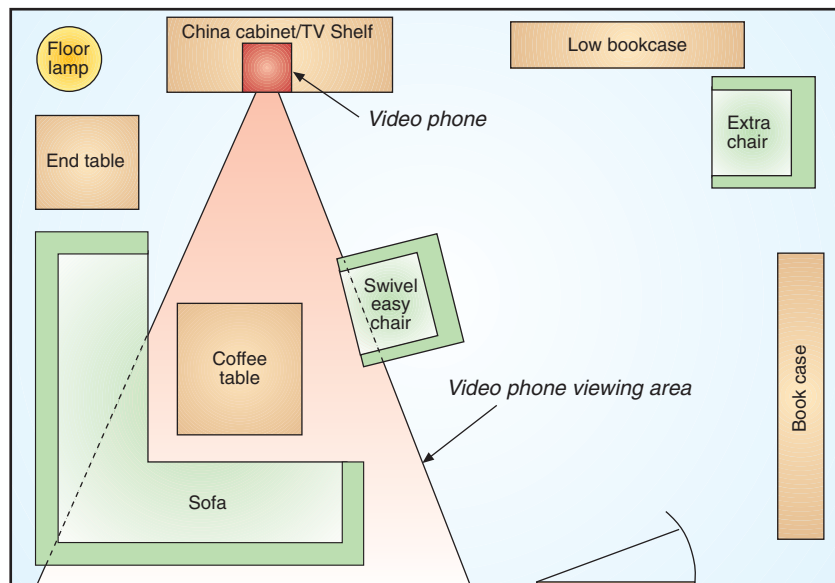*I want to say that in my younger days I lived at home and I was very*

Figure 6 Television metaphor. Respondents using this metaphor for the possible placement of a video camera were perhaps interested in the social nature of video telephony. They talked about the ability to share collective occasions with remote friends and family. In addition, they perhaps saw the video telephone as a way to display their home and their standards of interior decoration

happy that the telephone was in the entrée. I don't want your conversations in the living room. I think that [the entrée] *is a central room that one can draw back into.*

The introduction of video telephony may mean the disruption of familiar routines and rituals (Silverstone 1995, 67). It may be a case of what Stone calls technology "nuzzling" into ever more presentable portions of the domestic domain (Stone 1992) and Silverstone calls domestication (1995, 64). While the entrée or hallway is a functional location for a traditional telephone, the respondents said that a video telephone seems to be more naturally placed "where we sit together," "where you are the most" or "where we sit in the evening and relax" that is the living room. These comments point out that, in addition to being a collection point in the home, the living room is also that place where guests are entertained and the family formally presents itself to others (Gullestad 1984, 90). To use Goffmanian terms, the living room is the home's "front stage" (1959, 22 – 24, 123).

The "stage" becomes important with video telephony since, in contrast to mobile and cordless telephony, the setting is relatively fixed.[15] This evokes Goffman's idea that a setting that has

specific and concrete boundaries "tends to stay put, geographically speaking, so that those who would use a particular setting as part of their performance can not begin their act until they have come to the appropriate place and must terminate their performance when they leave it" (1959, 22).

To take this a step further, the video telephone call is a form of theater, a performance on an electronic stage where one must consider the background against which the presentation is made. As with the openings described above, the elements used to construct the stage will be drawn from familiar cultural themes. Thus, one might expect that the staging of video telephone presentations in Norway will emphasize coziness, an organizing principle for Norwegian culture and

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[14]*Secondary telephones were placed in the bedroom, in the kitchen, in the living room, etc.*

[15]*In some cases even traditional telephony can be relatively "placeless", that is carried out with no exact reference to a specific location. People who have several telephones through out the house, the use of long extension lines and more recently the use of call forwarding, are examples.*

interior decoration.[16] Placement of the device in the living room is not surprising since it is the locus of coziness in the home. Much effort is given to the selection of furniture, color, patterns, lighting, etc. in order to insure this effect (Gullestad 1984, 90-93; Silverstone, Hirsch and Morley 1992; Wilhite and Ling 1990).

The ideal type of Norwegian living room usually has a sitting area including a sofa, a coffee table and perhaps one or two easy chairs one of which is a swivel chair. In addition, it is quite common to have a TV,[17] a bookshelf, perhaps a china cabinet and other areas allowing for the display of various decoration and family artefacts. Variations to this pattern may include an additional sitting area, a desk, an eating area, a fireplace or wood stove or access to a balcony. Variations may also exist in relation to available space and in class orientation (Gullestad, 1984, 92).[18]

The integration of video telephony into the living room requires consideration of the boundary between that which is "on camera" or "front stage" and that which is "off camera" or "back stage." The fact that many of the respondents felt the desire to place a video telephone in some "front region" part of the home, i.e. the living room or the "nice sounding" library, is an indication that people recognize the possibilities for visual presentation.

Comments from the focus groups seem to indicate that the respondents had two conceptions of how one might place the device in their living room.[19] One might call these the "TV" metaphor and the "desk top" metaphor. The first of these, the TV metaphor, is seen in comments emphasizing a desire to place the device where we "sit together" or "sit and relax" (see Figure 6). With the television metaphor, the video telephone would function as a type of TV. The placement would show a large portion of the sitting area. The advantages of this approach are that it is easily integrated into the current decoration pattern. No major adjustment of the furniture would be required. The disadvantage is that it is technically difficult to carry out this approach, and that the "front stage" area is large, thus requiring constant maintenance (Dutton 1995, 98). In addition, this approach makes obvious the conflicts between video telephony and television. Several respondents com-

mented on the difficulties of integrating these two activities. "I think it would be disturbing [to have the video phone in the living room] if others are looking at TV" and that "some want to see TV." Finally, this approach does not take into account the intimate nature of telephony. It assumes the model of a group conversation similar to those one stages in their living room around the coffee table. The video telephone is, in effect, an electronic representation of another participant in the conversation.

The alternative is the desk top metaphor. Respondents saw that the design of the video telephone assumes that it will be on a table or a desk. "You have to have it in front of you. You can not sit in an easy chair. You have to have it on a table or something." If the video telephone were placed using this metaphor, one might construct a small "phone booth" area in the living room (see Figure 7).[20] The advantages of this are that it would be easier to maintain the staging area, there would be less conflict with other activities in the room and it would fit better with the technical and design features of the video telephone. In addition, this approach would maintain the intimate nature of telephone conversations.

The negative aspects of this approach are that the arrangement of furniture for the telephone would be in clear conflict with existing interior design conventions. It would also conflict with existing use patterns in the room such as group conversations and TV viewing. Finally, it would take up a large amount of floor space for what will be only an occasional activity.

Thus, one can see that the very placement of a video telephone has impacts on the routines and rituals of the household. The domestication of video telephones will mean the restructuring of living spaces, and the development of new interior decoration schemes that allow for the integration of the technology into the everyday life of the home.

4.4 Impression management and parallel activities

As noted above, the respondents noted the desire for a sense of integrity. One aspect of integrity is that both partners

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[16] In Norwegian, if one is pleasantly engrossed in an activity one is said to "kos" oneself. A hug is called a "kos" and, most relevant for the work here, a complement of one's taste in interior decorating is that the home is cozy.

[17] It is worth noting the role of the TV in an ideal type living room. The arrangement of the furniture, while allowing one to view the TV, is not necessarily completely oriented towards the screen. The placement of the sofa and the use of a swivel chair allow one to easily shift the focus of the room from "TV viewing mode" to "conversation mode." The former is a more common back stage activity while the latter is more common when entertaining guests. The placement of furniture also varies based on one's moral orientation towards TV. In homes where the device is not problematic the TV may be a large device that is, in effect, a piece of furniture with its own decoration and lighting scheme. A second approach, that reflects a greater level of moral suspicion, is to minimize the TV by choosing a smaller device that is placed in a bookshelf perhaps surrounded by books and other signs of cultural cultivation. Finally, if one has the means the TV may even be placed in a separate room that is wholly given over to the device.

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[18] One's status can be displayed through the space available in their home. One respondent noted that "I call the room [where the phone is] the library because I think it sounds so good. I have a desk there and my bookshelf." While in another's eyes the room may simply have been an extra bedroom supplied with a desk and some bookshelves, to the respondent it was a badge of his position in society.

[19] It needs to be noted that these have only a limited basis in the technical possibilities of the device. It is unrealistic to assume that the camera and the microphone in the device can faithfully communicate a group conversation that takes place several meters away. Rather, the metaphors being reported here are based on a preliminary attempt by the respondents to integrate the idea of video telephony and interior decoration.

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[20] Others with more space available might install the device in another room.

are focusing on a common issue and that they are paying attention to the conversation. In fact, one of the main activities carried out during an encounter may be to simply get through it with as much poise and grace as possible (Goffman 1967, 41). The grounding strategies described above illustrate some of the conventions for maintaining the impression of a common focus.

One of the most important aspects of an interaction is that one's conversation partner has a right to exclusive access such that "Ordinarily the status [of participating in a face engagement] does not have a 'latent phase' but obliges the incumbents to be engaged at the very moment in exercising their status" (Goffman 1963, 87). However, one can suggest that in every encounter there are a set of parallel activities that coexist with the conversation. In the case of the traditional telephone these might include washing dishes, doodling, cleaning house, caring for children, working on a PC, fiddling, etc. The successful management of activities that are parallel to a traditional telephone conversation are allowed to the degree that one's conversation partner does not get wind of their presence. As long as the fiction of undivided attention can be maintained these activities are allowed. However, when they enter into the audible sphere of the conversation they must either be ignored using some form of civil inattention (Goffman 1963), or they must be overtly recognized and clarified.

Respondents reported that "It can be irritating to talk [on the telephone] with someone who is openly doing something else." However, the fact that visual checking is not possible with audio telephony means that one has an expanded ability to get away with actions that are not in harmony with the conversation. In addition, there is a certain social tolerance for parallel activities (Ling 1995, 7).

The line is shifted with video telephony. There is a sudden and dramatic change in the boundary between the front and the back stage areas (Goffman 1959, 111 – 112). The demands for the performance become much more exacting. The washing, doodling, cleaning, caring, working and fiddling that were done with impunity using audio telephony become front stage activities and thus are in conflict with the integrity of the presentation (Goffman 1959, 135). [21]

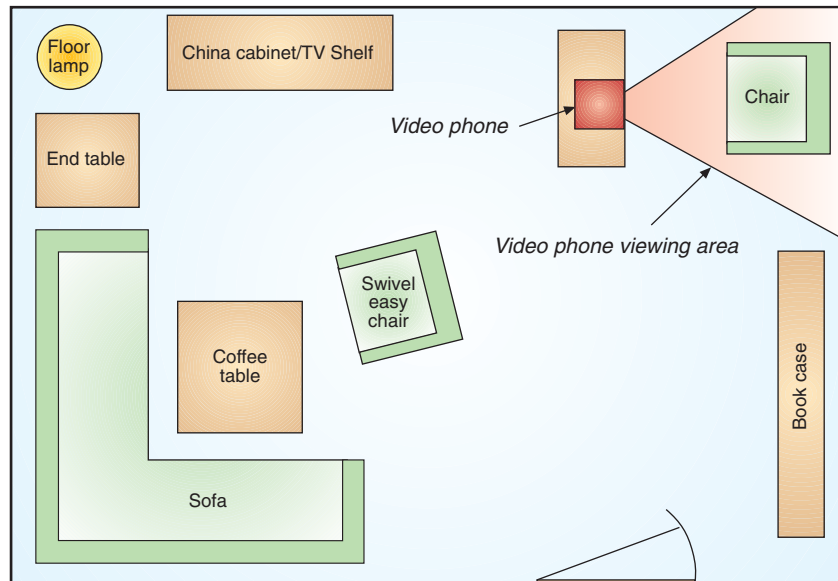It is possible that forms of video telephony will develop that allow certain

Figure 7 The desk top metaphor. Respondents who outlined this use of the picture telephone saw that the device was oriented toward personal communication

parallel activities. For example, one could imagine a video telephone mounted near the sink such that one could converse while one is washing dishes. In this way the formal nature of the conversation would be reduced and more closely resemble a kitchen conversation. None the less, with visual telephony, one's performance can be seen and demands on one's attention can be made in ways that are not possible with audio telephony.

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[21] *In Figures 6 and 7 I have presented alternative placement of video cameras in an idealized living room. In Figure 6 there is a greater threat for unauthorized parallel activities in that a much larger portion of the room is open for inspection. By contrast, the layout presented in Figure 7 allows for a more controlled presentation. Goffman notes the difficulties with electronic stage management. He notes that in broadcasting the "back region tends to be defined as all places where the camera is not focused at the moment or all places out of range of "live" microphones ... For technical reasons, then, the walls that broadcasters have to hide behind can be very treacherous, tending to fall at the flick of a switch or a turn of the camera. (Goffman 1959, 119).*

5 Conclusion

This paper has examined how respondents perceive the introduction of video telephony. It has taken as a point of departure a series of focus groups seen against the backdrop of Goffmanian dramaturgical sociology.

Results show that the respondents generally felt that the introduction of a new type of telephony, i.e. video telephony, would have a variety of impacts on their ability to communicate with others and in the way that they organize their lives. The idea of social boundaries was used to examine these issues. On the positive side, the introduction of visual telephony was seen as a way to overcome boundaries and to establish and hold a richer contact with near family and friends. It was seen as a way to piece together and embroider a common identity from common events such as births, funerals, weddings and birthdays. The ability to gain a more nuanced and insightful communication was seen as a positive development.

While many of the respondents welcomed the opportunity for greater and more nuanced contact with others, there was also a sense that it could effect one's integrity or facade. Respondents were quick to think of situations in which embarrassment was possible including the prototypical "Think if you were in the bath tub." Thus, video telephony means that one is always visually available. This

of course has meaning for the greeting sequence. The introduction of a new medium means that we will need to develop new norms for answering the telephone since the negotiation of visual access will serve to differentiate intimates from non-intimates. It was suggested that the norms governing greetings will probably draw bits and pieces of our previous experience.

The domestication of the device was also seen as a problematic issue. The placement of the video telephone in the home will impact entrenched routines and rituals. It will cause the restructuring of living spaces, and the development of new interior decoration schemes that allow for the integration of the technology into the everyday life of the home. In addition, it will mean that users will have to negotiate the use of the device vis-à-vis other activities. This can be a potentially disruptive situation until regularized routines are established.

Finally, the video telephone will mean that the type and range of activities available to conversants using traditional telephony becomes somewhat more limited. While there is need to maintain an illusion of focused conversation with traditional telephony, the device provides one with a social space that allows for certain parallel activities. The video telephone shifts the boundary. Thus, body language, the use of secondary artefacts and even the very management of one's eyes during a conversation become what Goffman calls front stage activities.

This analysis has shown that the adoption of new forms of electronic communication does not take place in a social vacuum. The new devices shift various boundaries, both physically and socially. The rapid development of new technology is happening now even as the type and style of domestication are being negotiated.

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The role of information technology in African development

BY HALVOR NAFSTAD AND AUDUN W. IVERSEN

1 Background

1.1 Civilization and the information society

The development within tele- and data communications during the last decade has influenced the social and economic environment in Norway as well as in other parts of the world. Phenomena such as Internet and the information super highway have increasingly been put on the agenda as the press has reported on increased use of Internet in private homes as well as in office environments. It is anticipated that the number of Internet subscribers will increase at high speed towards the millennium. The old public telephone and telegraph companies (PTTs) and the new entrants within the telecom and data environment are in many ways the entrepreneurs in the information society and the global village.

The Canadian professor of literature and media prophet, Marshall McLuhan (1911–1980), was one of the first to use the term the global village. With this he meant that it would be as easy to get in touch with people on the other side of the earth as it is to contact your neighbor. During the last couple of decades, telecommunication and data technology have been used to build the foundation for the global village.

The consequences of this development are wide-ranging. One can speak to anyone regardless of geographic distance. We are entering an era where it is time zones rather than geographic distances that make direct communication between people difficult. However, as this new global village arises a series of new issues confronts us: who is going to live in the village, is there room for everyone on equal terms, to what extent will we witness a development where some are more equal than others?

The focus of this article is on the last of these, to what extent will the advent of the information society create inequalities between different inhabitants of the global village, and how will these potential inequalities be manifested in the society at large? Will the information society reconfirm the current social and economic structure, or will we witness a change in the power balance between; the rich and the poor, the regions and centers, the computer literate and non-literate, the developed and developing countries of the world.

In this article we will examine access to basic telecommunications services in

To what extent will the information society create inequalities and how will these be manifested? Will we see a change in the balance between the rich and the poor, the periphery and center, the computer literate and non-literate, the developed and developing countries of the world? This issue is examined in the context of African telephony. In a continent where access to even the most basic telephone service is extremely limited, one can ask if it makes sense to speak about concepts such as the Internet and the information super highway. At the same time one can assert that without basic technological development these countries will be relegated to a second-class status.

third world countries, specifically Africa. Given the relatively underdeveloped status of these services we are prompted to ask if the discussion of information superhighways is somewhat premature in this context.

1.2 The term poverty and its implications in changing environments

Poverty has many expressions, and the dynamism in world development implies a continuous change in these expressions. In a historic context the world has gone through several periods of development, each of them with its own expression of poverty. There seems to be a "natural law" in the capitalist society that inequality is the normal state of affairs, while equality only very rarely occurs. In what we consider to be the developed world, economic exclusion became synonymous with poverty. Equality summarized the concept of political poverty, a term in the Norwegian debate following the report on the power structure in the Norwegian society finalized in the late seventies. The debate on equality was related to the fact that a large part of the population was left out of the democratic society. Given this tradition, one can ask if it is relevant to operate with terms like the

global village and the information society, without including the idea of information poverty. This discussion has not been the main item on the agenda in a period where there is a rather positive attitude and where most people are looking at the vast opportunities offered by the new technologies. However, in some arenas the new phenomenon of information poverty has been addressed and it is this debate we will take up here.

In the absence of a commonly accepted definition of information poverty one first attempt to reach such a definition might be to identify factors that are needed in order to get access to information. Such an approach would probably define a person as information poor if that person is without telephone, newspapers, TV or radio. In this way the importance of access to economic resources and political representation has been "joined" with access to information.

The development of the industrialized and democratic society has occurred through the development of citizens' and organizations' rights. In the industrial society the development of rights were associated with issues such as sick-leave, vacation and work hours. In the democratic society the development of rights is often associ-

ated with the ability to establish political parties, interest organizations and the common right to vote in elections.[1] Thus, the development of the information society implies the development of a right to universal telecommunication service.

The phenomenon of universal telecommunication service is not precisely or commonly defined, but it is based on the idea that all are entitled to a minimum set of telecommunication services at affordable prices. These telecommunication services are viewed as the entrance gate to the information society and the global village. The building bricks in the information society can not be anything other than the telecommunication network. An information society without a wide-ranging telecommunication network is as unlikely as an industrial society without industry. Universal service is therefore one of the most cited principles in telecommunication policy and regulation.

2 Africa and the information society

The main objective of this paper is to address the issues of information infrastructures and third world development by introducing some of the key issues related to a few African[2] countries. We have no ambition whatsoever of covering the whole field of information in the development process. There are, however, obviously some phenomena that have to be mentioned, two of them being the so-called information super-highway and the Internet. Information technology is often described as one of the most important building blocks for developing industrial competitiveness. However, we are aware of the fact that information technology is only one of several building blocks and that information technology alone will not solve any of the basic problems confronting the African continent in its path towards industrial development. There may be other more fundamental or structural problems that make industrialization or first world capitalism inappropriate in the African context. As mentioned, this paper has no intention to explore all the challenges that are confronting this huge continent. An important issue with regard to the implementation or introduction of the information society to the developing nations in Africa, is the cultural and societal her-

itage brought by these "new" ideas and technologies. The advent of the information society has been fostered by western cultural and societal traditions. One may well ask, to what extent is this heritage applicable in societies, countries or regions with different cultural comprehension of ethics, the environment, or the social organization of inter-human relationships.

The architects and designers of the information society have to be aware of the possibility that the "western" values that are incorporated in the current "edition" of the information society is not transplanted into developing societies in such a way that they "drown" their old cultural heritage, and alienates the new generation from their roots.

The role of telecommunication in economic development has, since the beginning of the eighties, been on the agenda several times. A number of International Telecommunication Union (ITU) commissions and reports have addressed the issue. However, there has also been some necessary scepticism to the need for making priorities. For example, in one ITU report it is noted that "there is a widespread belief that a relationship exists between investing in telecommunications and boosting the overall economic health of a country", however, there is also "considerable scepticism

about the benefits to the economy ... in comparison with other urgent needs." (ITU 1989.)

One major problem with economic development in Africa is that the needs of the continent are defined by people and organizations who are located miles away from where the problems are felt. Africa is, to a much larger extent than perhaps any other major region of the world, suffering from the often well meant advice from first world experts. What might be seen as a rather banal issue, but which is none-the-less important is the need for self determination.

Having said this, the reader should be aware of a few "axioms" on which this paper is based: Firstly, it is taken for granted that industrial development or first world economic prosperity is a goal for lesser developed countries or regions in Africa. Despite this point of departure we are, however, aware of the fact that industrial and economic development has its weaknesses especially with regard to the possibility of over-exploitation of limited natural resources, and severe problems related to waste. Given the experiences gained in the developed nations of the world, especially during the last hundred years, it is indeed relevant to be sceptical with regard to the path chosen in our part of the world. Secondly, we have taken it for granted that information technology is important, and we will not in this paper place a question mark as to whether or not this is true.

2.1 The term information infrastructure

The term information infrastructure has in recent years become a vogue term on the international political agenda especially through contributions from leading figures and organizations[3] on the

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[1] One can note, in this connection, that the idea of an informed electorate is one of the key ideas of democracy.

[2] *Being aware of the considerable differences within the countries that comprise the African continent treating them as a homogenous group of countries would be a serious mistake, so we are going to take a more detailed look at a smaller group within the category of countries often called Least Developed Countries, these are: Benin, Eritrea, Ethiopia, Mozambique, Tanzania, Togo, Uganda, and Zambia. In order to have some comparable figures from other developed and industrialized countries we have included Bangladesh, Cambodia, the Philippines and Norway in our tables. In 1971 the international community recognized the existence of a category of countries whose distinctiveness lies in the profound poverty of their people and in the weakness of their economic, institutional and human resources, often compounded by geophysical handicaps. The Least Developed Countries are defined as low-income countries that are suffering from long-term constraints to growth.*

[3] *The US government's report on "The National Information Infrastructure: agenda for action" and Al Gore's speech at the first World Telecommunication Development Conference. The EU white paper on "Growth, competitiveness and employment" and the Bangemann Commission's report on "Europe and the global information society". The Japanese Telecommunication Councils report on "Reforms toward the Intellectually Creative Society of the 21st Century – Programme for the establishment of High Performance Info-Communications Infrastructure.*

Main lines per 100 inhabitants in 1994

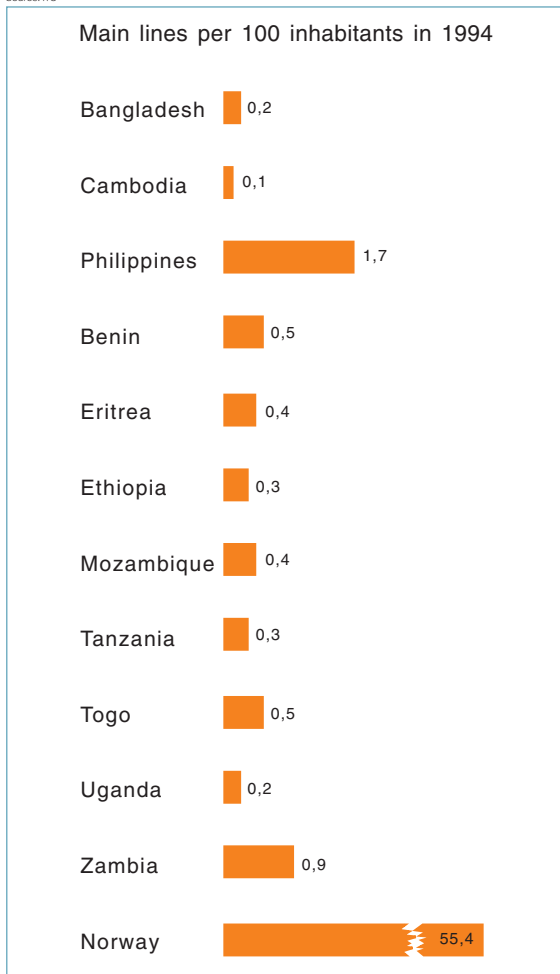| Country	
Bangladesh	0,2
Cambodia	0,1
Philippines	1,7
Benin	0,5
Eritrea	0,4
Ethiopia	0,3
Mozambique	0,4
Tanzania	0,3
Togo	0,5
Uganda	0,2
Zambia	0,9
Norway	55,4

Figure 1 Like economic and political poverty, information poverty is becoming a problem for the lesser developed countries. This table shows that developed countries have a relatively open access to telephone services while countries in the third world lag far behind

international arena. These and other policy documents together with a vast amount of papers and articles have elaborated on the concept, and several terms and definitions have surfaced. In this paper we have taken a rather broad approach to the term.

With respect to the role of information infrastructure in economic development there are at least two basic components which have to be addressed: 1) information and 2) technological infrastructure. The two components are linked together as a pair of "Siamese twins". The interdependence of the components can be compared with road-transportation. The transport "technologies" consist of highways and trucks, while "information" can be associated with the transported items,

whether it is humans or goods. It will be increasingly difficult to gain competitive advantage with only one of them present. The technological infrastructure in this paradigm contains elements such as the telecommunication network with cable, switches and network intelligence. Furthermore, it contains the existence of a wide spectrum of user equipment such as computers, telephones, modems, etc.

The second component, "information", is much more vague. Many things can be regarded as information. In our current information age it is becoming increasingly important to be able to distinguish between relevant and irrelevant information or, in short, the issue of information quality and its appropriateness. The dissemination or diffusion of information requires the existence of an appropriate technological infrastructure. Important issues with regard to the question of the development of an information superhighway in Africa will be related to the choice of appropriate technology and the ability to determine the quality of relevant information.

2.2 The advent of a new gap between the North and the South?

Poverty in the information age has at least two sides; poverty with regard to technological infrastructure and poverty with regard to access or ability to use available information. This "new" kind of poverty that we are currently observing may lead to changes with respect to competitive strength on other dimensions than we have earlier experienced. In the Norwegian context, the availability of the technological infrastructure is very advanced with a countrywide telecommunication network and relatively low prices compared to other OECD countries. The problems in Norway are more related to the information part of this poverty concept. Here, it is primarily the differences between generations and their ability to use available information that can pose a problem in the future. Professor Jon Bing has been quoted: "We are experiencing a dramatic development where to a large extent it is technology and the knowledge of and about it that has value. I do fear that we are approaching a society where the experience and knowledge gained by the older generation have no value. In coming generations many parents will not be able to match their children in this rapid development, not to mention grandparents. We have to avoid the situation where the

elderly are becoming useless without human value because they do not manage the technology." (Telecom Revy No. 19, 1995, our translation.)

On an international basis one can argue that a new "borderline" between the "north" and the "south" is emerging as a consequence of the information society. Like economic and political poverty information poverty is becoming a problem for the lesser developed countries. One can see the outlines of this problem in the statistical analysis shown in Figure 1. The developed countries with 15 % of the world's population had 71 % of the world's telephone lines in 1993 (the total number of telephone lines was 575 millions). The average telephone density in the developed world, defined as number of telephone lines per 100 inhabitants, grew from 39 to 49 from 1983 to 1993 while in the rest of the world it grew from 2 to 3.5. When it comes to the African countries shown in Figure 1 the rate is even lower.

There are, of course, a magnitude of reasons for these inequalities, and for the time being we will only address what we consider to be the main explanatory variables. Firstly, investments in the telecommunication sector in developing countries are low. According to the ITU, investments in developing countries account for only 20 % of the total investments in this sector world-wide. A main problem might be that developing countries use revenues from the telecommunication sector to finance investments in other sectors.[4] Some of the countries with the highest rate of telecommunication infrastructure investments (e.g. ASEAN[5]) have reinvested more than 50 % of the revenue in the telecommunication sector, while certain African countries reinvest less than 20 %. The jury is out, however, when it comes to deciding whether this is a sector-specific issue or a more general structural problem within

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4 *This is of course an issue of prioritization with which each country is confronted given limitations on risk capital in world markets. Often prioritizing indicates that they consider other projects to be more important than telecommunication.*

5 *ASEAN is the acronym for the Association of South East Asian Nations, an economic association comprising Malaysia, Indonesia, Singapore, Thailand, Brunei, and the Philippines.*

Figure 2 According to the International Telecommunication Union (ITU) investments in developing countries account for only a small portion of the total world-wide investments. While investments are high in ASEAN countries, many African nations reinvest less than twenty per cent of revenues in telecom development. Often LDCs are forced to use revenues from telecommunications to finance investments in other sectors

these lesser developed countries. (See Figure 2.)

Secondly, telecommunication equipment is primarily manufactured in developed countries, leaving the lesser developed countries as importers of expensive equipment. These imports put pressure on these countries' trade balance and can result in a lack of hard currency. (See Figure 3.)

This is a chicken and egg dilemma. In order to be competitive you have to offer national companies an efficient national infrastructure. At the same time you are reliant on internationally competitive companies in order to get a foreign trade surplus for further investments in infrastructure. The regional differences between South East Asia and a large part of Africa is a "proof" of the increased "competition" between developing regions of the world to get access to the limited available capital for national expansion.

Thirdly, there is apparently a large degree of inefficiency in telecommunication infrastructure development in lesser developed countries. The average cost of installing a new telephone line in developed countries is US $ 1,500 where in Sub Saharan Africa the comparable figure is US $ 5,500 per telephone line. For example, in the West African country Benin the cost of a new line was US $ 20,000 in 1992. The reason for these differences is a complex web of factors, where high import taxes, transport costs, insufficient planning, local knowledge and bad maintenance play important roles.

A fourth problem that confronts developing countries in their "fight" to join the information society is the important case of "information overload". The current emphasis on the Internet as a source of information clearly underlines the magnitude of this problem. The information age puts significant new pressure on developing countries with regard to the need for knowledge to distinguish between good and bad quality on information. Whether or not access to information "banks" such as Internet is important for countries that lack the capability to consider the quality on information is an

important issue. Inability to evaluate the quality of information might lead to confusion, and furthermore make time-usage in the developing countries more inefficient. However, it is important that choices with regard to usage of information "banks" are based on a detailed study of the local need for information together with the ongoing international development.

The important question, though, is whether access to Internet can become an important "engine" in the development of an African information infrastructure. Experience from industrialized regions of the world seems to indicate that Internet is currently considered more important as an electronic mail system than as a provider of valuable information. This discussion is, however, somewhat academic since the Internet is largely a phenomenon of the developed world. In this context Internet becomes more a question of infrastructure than content and quality of information. An analysis shows that in 1994 there were no Internet networks in Benin, Eritrea, Ethiopia, Mozambique, Tanzania, Togo, Uganda or Zambia.

Finally, when one is considering the information schism between North and South, the globalization or internationalization of manufacturing industries has resulted in a high degree of international division of labor. During the last century the manufacturing environment has moved from a structure where local markets were served by local, regional or national companies to an industrial organization where global markets are served by a small set of often vertically integrated transnational corporations. These are the companies that developed and developing countries are competing to attract, and one of the factors that influence their localization choice is the existence of an advanced telecommunication infrastructure. In order for these companies to stay competitive, efficient information exchange is essential. Thus, the developing countries are confronted with the rapid development of the information society, where telecommunication becomes an even more important factor in the social construction of the local society as a gate of entrance to the global village and a more democratic environment.

Telecom investment (US$ x 100 000) in 1993

Bangladesh	11,3
Philippines	371,8
Benin	0,3
Eritrea	1,5
Ethiopia	11,0
Tanzania	10,3
Togo	4,4
Uganda	11,8
Zambia	23,6
Norway	405,6

Imports of telecommunication equipment (US$ x 100 000) in 1990

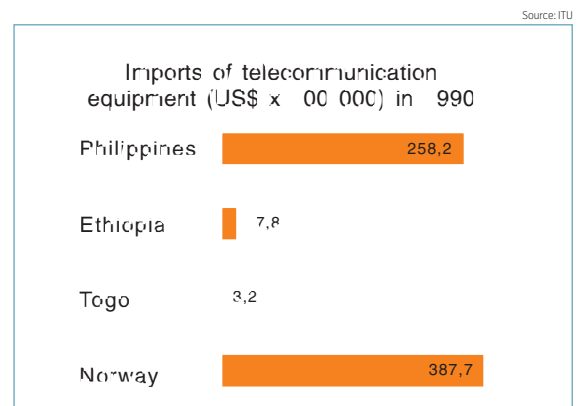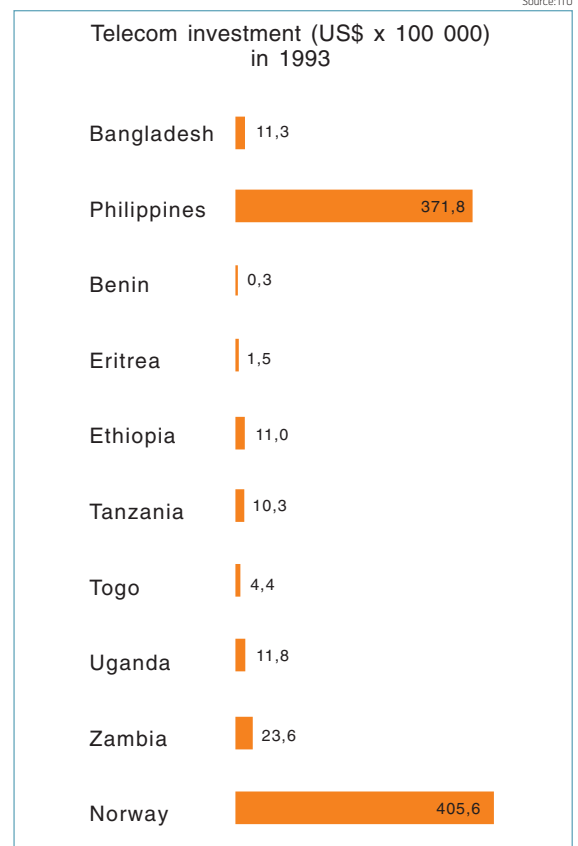|	
Philippines	258,2
Ethiopia	7,8
Togo	3,2
Norway	387,7

Figure 3 The fact that telecommunication equipment is largely manufactured in developed countries means that the lesser developed countries need to import expensive equipment and expertise. This state of affairs puts pressure on an already difficult trade balance and results in the lack of hard currency. Thus, the countries are placed in a dilemma. On the one hand the governments need to offer industry an efficient national infrastructure, the development of which increases the negative trade balance. In turn, this precarious economic situation makes it difficult to attract internationally competitive companies who would be able to help produce a surplus trade balance for further investments in infrastructure

2.3 The relevance of the information infrastructure for LDCs

As indicated in the preceding sections the role of the information infrastructure plays a crucial role in the advent of the information society. In our current environment, information infrastructure plays a key role in various contexts; 1) the information industry (covering hardware and software) is perhaps the industry experiencing the highest growth and highest profitability, 2) information technologies are considered to be generic technologies, whose applications cover all industries and services, and whose spin-off effects are tremendous, and 3) the information infrastructure is an essential infrastructure which enables individuals and firms to increase efficiency, productivity and quality of work done.

How can the LDCs take advantage of the opportunities offered through the establishment of an efficient information infrastructure. There are at least three broad areas in which information and information infrastructure can promote development (Hanna 1995, p. 36):

1 Alleviation of information poverty

- by getting access to enormous amounts of information that is available in network databases,

- by "collecting", organizing and distributing local information,

- by providing basic services (universal service) to the public in a non-discriminatory way,

- by information from the state to the citizens of public policy and thereby promoting transparency and democracy, and

- by creating unity through broad national consensus on national objectives and social learning.

2 Participation in the international division of labor and international trade

- by getting access to the rapid increase in the information content of products and services,

- by becoming able to respond rapidly to orders in a Just-In-Time manufacturing environment,

- by being able to offer Transnational Companies (TNCs) attractive investment sites,

- by getting access to IT-based innovations,

- by getting information necessary to become competitive through economies of scope and specialization, and

- by entering the markets for IT services and products.

3 Promotion of a sustainable development

- by lowering the negative environment consequence of industrialization, through usage of energy and material saving technologies, and

- by integrating environmental issues in the overall public policy.

In this connection The African Regional Symposium on Telematics for Development, organized by several international organizations in April 1995 issued the Communiqué of Addis Ababa. The Communiqué notes that unless African countries become involved in the global information infrastructure, the gap between the haves and have-nots will deepen, opening the possibility for increased marginalization of the continent. (ITU 1995c, p. 37.)

3 The development of an African information infrastructure

The least developed countries in Africa are currently far behind most other countries in the world when it comes to telecommunication infrastructure development. In general, Africa has only 2 % of the world's main telephone lines despite having 12 % of its population. 35 of the world's 49 least telecommunications-developed countries are African, so it should not come as a surprise that parts of Africa are lagging behind the rest of the world.

Factors external to the telecommunication sector explain many of the problems. Foreign debt is seriously hampering the capability for countries to import telecommunications equipment. Population growth is high so that network development never seems to catch up with demand. Civil disturbances in some countries damage the already fragile telecommunications infrastructure and create an environment which is hostile to investment confidence (Kiplagat 1994, p. 11–12). In addition to these, there are at least three important endogenous factors that will influence the development of an African information infrastructure. These

include the choice of technology, the human resource issue and finance.

3.1 The case of appropriate technology

To what extent is the "old" concept of appropriate technology from the dependency "school of thought" relevant in the current environment as an explanatory variable for the differences in development between LDCs and the more industrialized part of the world. Evidence from the development of the telecommunication sector in Norway seems to support the idea that differences do exist. This evidence indicates that individual countries or geographic regions have their own characteristics that will affect issues such as network design and telecommunications technology choices. Important factors that determine individual choices are in particular; geographic terrain, traffic flows, calling patterns and type of traffic. The case of appropriate technology is of course still an important issue, but not from the ideological point of departure as advocated by the dependency school. The debate on technology choice tends to view the general open network and the small "hand-crafted" network as two conflicting alternatives. However, there might not be an either/or situation; by taking advantage of the current technological opportunities, LDCs might be in the position to get the best of both worlds.

As noted above many developing countries are struggling with a potential conflict when it comes to infrastructure development; on the one hand, they have to satisfy the need of the private business sector and the countries' wish to attract foreign investment. In relation to infrastructure this implies a high demand for advanced telecommunications in small industrial zones, often described as export processing zones. On the other hand, there are the needs of ordinary people that are currently less technically sophisticated but more widespread and where access to information is important. These two different needs address different development objectives for LDCs. The first addresses the wish to become industrially competitive, while the other addresses a more democratic objective. To what extent is it possible to achieve both goals?

One solution might be a modular network design that uses the same standards as the international network. By using standardized equipment the network can

be scaled to the needs of individuals and organizations. In this situation the focus on standards is due to the importance of interconnection and interoperability. Without this, the large transnational companies will be unable to integrate their operations on a global scale. So interconnection is essential for the business customer, but it is also highly desirable for the individual resident. In particular, the originating and terminating facilities and special services should operate in the same manner wherever the caller or called party is located.

The use of standardized equipment also has important consequences when it comes to costs. By using equipment from leading manufacturers the LDCs are likely to enjoy lower capital cost than would have been the case with custom-specific solutions. Furthermore, the standardized equipment enjoys significant economies of scale.

There are at least two good reasons to avoid custom-specific solutions. Developed countries often design "stripped-down" versions of their standard equipment for special areas such as sparsely-populated regions. Such needs often affect the modularity of the base product. LDCs ought to seek out mass produced equipment that has appropriate modularity, thus enabling effective custom-engineering. Special country-specific solutions should only be envisaged as a last resort (Teesdale 1994, p. 178–179).

The advent of digital networks and technology has had important implications for the cost of maintenance; with the analog technology there was high reliance on the availability of large numbers of highly-skilled mechanical engineers. The electronic-based technology has changed this "landscape" and the sought after skills with respect to telecommunications are no longer electro-mechanics, but electronics. This shift in technology may constitute an advantage for countries that are establishing their first network, however these countries are dependent on being able to gain familiarity and competence in this new technology.

The emphasis on standardized mass produced equipment also has its disadvantages. Major issues relevant for local development, such as the importance of local engineering and the skills for doing repair and maintenance often escapes us in our search for the ultimate technological solution. The absence of these skills can imply important disadvantages when

it comes to attracting equipment manufacturers to the region.

There are many indications that the traditional discussion of appropriate technology is not as valid for telecommunications as it is in other industries. However, one has to be aware of the fact that country- or region-specific conditions exist which, at the very least, require local adaptations to the chosen technological solution, or may even require a custom-made "network". Furthermore, there are big differences within the range of LDCs. Some countries do have a telecommunications network up and going, while others are just starting to discuss the establishment of a network. For those already having a network with "many" subscribers connected there will be the question of how to deal with the sunken costs. For countries without a substantial amount of cable installed the issue of how to deal with "old" analog switches and other network equipment will not be an important question.

3.2 Human resources

The International Telecommunication Union has on several occasions focused on the "brain-drain" and "poaching" of highly skilled staff in the public sector in LDCs. The investments that governments have put into human resources development are evaporating as trained staff are attracted to the private sector for reasons such as prospects of a more interesting career and higher salaries. An additional problem is the reward system; in order to keep the best employees they are being promoted to management positions without having the necessary management training. Highly skilled engineers are given positions which they are not trained or qualified for. This just adds to the problems confronted by telecommunication organizations.

However, it would not be correct to blame brain-drain and poaching for the current problems related to the human resource situation in LDCs. Inadequate and poor training is another part of this picture. Productivity statistics show that on average, each telecommunication employee in LDCs supports only 16 main lines, which is 12 % of the world average for developed countries. Productivity in the LDCs grew by around 7 % per annum from 1983–1993, and less than the 12 % for developing countries as a whole. One of the LDCs that has made a major improvement is Nepal, where the number of main lines per employee rose

from 7 in 1983 to 20 in 1993. Its commitment to human resource development is manifested in an increase in its training budget of 80 % over the last five years to around 1.5 % of operating expenditures (ITU 1995, p. 12).

Experience from other industries and regions suggests that the establishment of public training centers is important in the process of upgrading individuals and the general knowledge of the specific industrial environment. However, many of the telecommunication facilities and organizations in LDCs are far to small to provide their own telecommunication training facilities, requiring staff to be sent abroad. When limited financial resources determine which projects are possible, choice becomes a question of priorities. When, for example, given the choice between developing telecommunication infrastructure and developing, for example, potable water resources, most people would naturally choose the latter. To relieve the LDCs from the cost of establishing training centers and to reduce the expense of sending staff to developed countries, telecommunication training centers have been established in several areas with the assistance of development aid. But a sustained commitment by partners to regional training has been uneven. For example, assistance to advanced level regional training centers in Africa came to an end in December 1991 as a consequence of the decision to end financing by the United Nations Development Programme. The abrupt discontinuation of the assistance has brought hardship to the LDCs as they had to take over the financing of the institutions. They have been unable to continue the full program of activities in the advanced level training that is badly needed for the development of their manpower resources (ITU 1995, p. 12–13).

The case of human resource development within the telecommunication sector in LDCs will remain an important agenda item for industrial development in Africa. Given the fact that there are limitations on financial resources, the individual countries have to make some serious decisions as to the role of this industry in their country's development. Currently, there seem to be many suggesting that it is not necessary to have in-house skills and indigenous manufacturing capabilities for telecommunications equipment to take advantage of the opportunities that they offer. However, there is also a need for competence in repair and maintenance in order to avoid

International incoming and outgoing
telephone traffic (minutes x 100 000)
in 1993

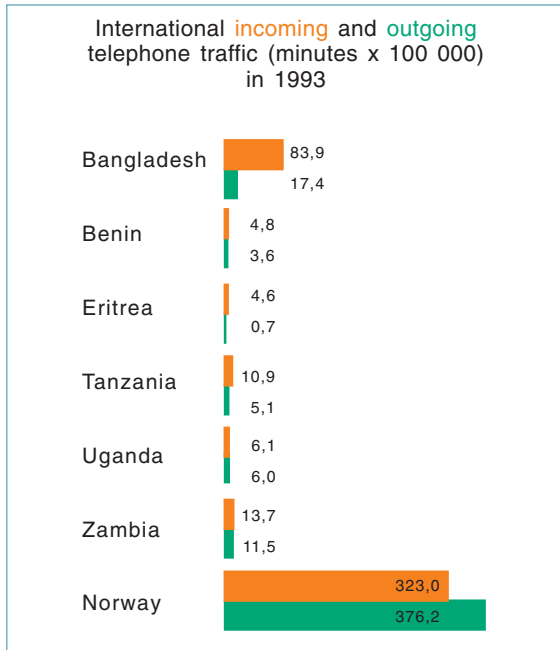| Country	incoming	outgoing
Bangladesh	83,9	17,4
Benin	4,8	3,6
Eritrea	4,6	0,7
Tanzania	10,9	5,1
Uganda	6,1	6,0
Zambia	13,7	11,5
Norway	323,0	376,2

Figure 4 In many African LDCs, international telephone service is often better than domestic services and there is also often more international than intranational traffic in these countries. Thus, international traffic is responsible for a significant portion of the telecommunication income and has been an important source of development revenue. This revenue is raised in two ways. First, international calls have been priced to help cover loss-making or break-even local service. Second, a country which receives more calls than it makes, (the situation of many LDCs) receives a fee from the country where the call originated. In some countries, these net inward settlement payments can constitute a considerable proportion of overall income, especially for LDCs which have a large number of emigrants living abroad. The development of "call-back" services which reverse the flow of the calls threatens this latter source of revenue

dependence on foreign expertise. To what extent the individual country should invest in these human resources is a policy issue that will have to be made only after careful analysis.

3.3 Financing the information infrastructure

International telephone services are often better than domestic services in African LDCs. According to ITU, evidence supporting this is provided in the statistics for international traffic. (See Figure 4.) This analysis shows that countries like Benin have more than 100 international calls per subscriber per year. This is higher than in most developed countries. As a consequence, international traffic

constitutes a high share of telecommunication revenue in the African LDCs. One of the traditional forms by which national infrastructure development has been financed has been through international telephone traffic. The procedure works in two ways (ITU 1995, p. 21).

1. By direct cross-subsidy from charges raised from local citizens making international telephone calls. Historically, international calls have been priced at such a level as to provide a healthy margin to cover loss-making or break-even local service.

2. By an indirect cross-subsidy through the accounting rate process. Because international calls are a jointly provided service offered by two national operators, the country which makes more outgoing calls than it receives from its partners will usually pay a corresponding fee in compensation, known as the accounting rate settlement payment. In some countries, these net inward settlement payments can constitute a considerable proportion of overall income especially for LDCs which have a large number of emigrants living abroad.

In general, developing countries have more incoming than outgoing international telephone traffic. Due to the international accounting system they receive a large share of the net settlement payments in the telecommunication sector. According to figures from the USA approximately 70 % of the payments by US carriers go to carriers in developing countries. In 1994, these payments totaled approximately US $ 3 billion (FCC 1996).

In the international debate, the developing countries now claim that their ability to finance network development without foreign assistance is threatened by foreign call-back operators that are trying to "cream-skim" the market. The developing countries argue that call-back has the greatest effect on the outgoing traffic which generates needed development and operating revenue. When the direction of calls is reversed by call-back operators, the operator in call-back originating countries earn revenue for those calls from settlement rates instead of collection charges. The revenue thus earned is small when compared to what could have been earned from collection rates. Thus, development of national infrastructure will be hampered by foreign private entities who operate outside their jurisdic-

tion. The developing countries respond by saying that their sovereign right is at jeopardy.

This situation has raised the question of how to finance tomorrow's telecommunication network. How can the old benefits of the accounting rate system be preserved in the current environment? The ITU has proposed an answer based on a shift away from usage-based revenue-sharing towards capacity-based interconnection agreements. This approach holds some dangers for developing countries. They will need to build up domestic revenues to replace the decline in settlement payments received in foreign exchanges. At present, some of the settlement payments received go towards investment in new infrastructure and it may take many years to achieve a transition to an alternative system. On the other hand, developing countries may benefit from the move away from 50/50 cost sharing (which assumes that their costs are the same as their calling partners) to a system in which capacity prices can be charged according to local cost (usually higher in developing countries) (ITU 1995c, p. 27).

4 Bridging the gap in the information age?

As indicated in this paper, the barriers to network development in Africa are complex. Development is constrained by factors that are exogenous to telecommunications as such, but which none-the-less have important implications for the success of network building. In addition to the exogenous factors, there are also several endogenous obstacles and/or opportunities that confront the African continent with respect to information infrastructure development. The ITU has identified several paradoxes in the African LDCs telecommunication sector.

"One paradox is that the level of international telephone traffic per subscriber in sub-Saharan Africa (213 minutes per year) is the highest of any region in the world, but the level of traffic per inhabitant (less than one minute) is the lowest in the world. This suggests that there is considerable demand but insufficient supply for telecommunications within the region.

The second paradox is that the average level of pre-tax profitability of public telecommunication operators in Africa is among the highest of any region in the world (almost 34 % of revenue in

the case of North Africa). On the other hand, the level of revenue per inhabitant is less than any other region, (just over US $ 5 per year in sub-Saharan Africa). Thus telecommunication services is indeed profitable in the region, ...

A third paradox is that, even though the average level of income in sub-Saharan Africa is the lowest of any region in the world, nevertheless the cost of installing a telephone line, a somewhat labor-intensive activity, is the highest of any region in the world. The average cost of each new line, calculated by dividing the value of investment in the public telecommunication sector by the number of new lines installed during the year, is more than US $ 5,500 per line. This compares with a developing country average of just under US $ 1,500 per year. If the sub-Saharan Africa figure was closer to the world average, the region would be adding four times as many lines per year. This would translate into almost 600,000 extra lines per year that could potentially be created through more efficient investment procurement based on best-practice from elsewhere in the world." (Minges 1994, p. 13.)

The first two elements give us an indication of the regional diffusion of telecommunication equipment, i.e. investments in telecommunications is primarily an urban phenomenon. A transfer to more advanced types of network technology would not change this picture. A focus on the gap between potential demand and insufficient supply is a rather theoretical exercise in societies where the inhabitants cannot afford the services offered. The provision of cheaper services would have some effect, but in countries or regions where people suffer from the inability to cover the more fundamental basic needs this focus on insufficient supply of telecommunications seems to be a little bit out of proportion. However, setting aside the priority issue with regard to urgent basic needs, the African societies seem to be confronted with a more fundamental political choice as to the diffusion of telecommunication infrastructure, and thereby access to information. With respect to universal service the current distribution of telecommunication infrastructure indicates a serious structural problem, since those who have telephone subscriptions are primarily the rich and the business segments in African societies. (See Figure 5.)

The third paradox indicates that there are severe problems associated with the human resources pool of qualified technicians in these countries. This may also be due to the fact that LDCs are compared with industrialized countries, the so-called best practice telecommunication economies, where there is competition in this sector, and where the issue of job-security does not have high priority. The combination of problems with human resources (the competence issue), inefficiency, lack of adequate network planning and insufficient procurement policies might give some answers to the last paradox.

5 Conclusion

In this paper we have tried to document that the LDCs are lagging far behind the rest of the world in traditional telecommunications networks. Thus, a focus on the information superhighways and the Internet seems irrelevant. However, modern telecommunications networks are as important for the LDCs as for the rest of the world: to be interconnected to the global information society, to attract foreign investment and to introduce new ways of providing health, education and government services. LDCs have even more reason than others to be concerned about international connectivity. Their international traffic per telephone line is above the world average and they are critically dependent on international traffic revenues. The limited availability of telecommunication equipment and facilities installed in the LDCs may be an advantage, since, in the process of catching up they can "leap-frog" at least one generation of telecommunication technology. They have an opportunity to install state-of-the-art information infrastructure (ITU 1995c, p. 29).

In order to succeed in their efforts to become advanced telecommunication countries, the governments of LDCs have to make up their mind as to what role they envisage for information infrastructure in their overall development policies. One thing they do have to be aware of, though, is the fact that information infrastructure is nothing but a tool which they can utilize in their development process. There is at least two broad areas which have to be addressed: 1) the role of information technology in developing democracy, and 2) the role of information technology in creating industrial competitiveness.
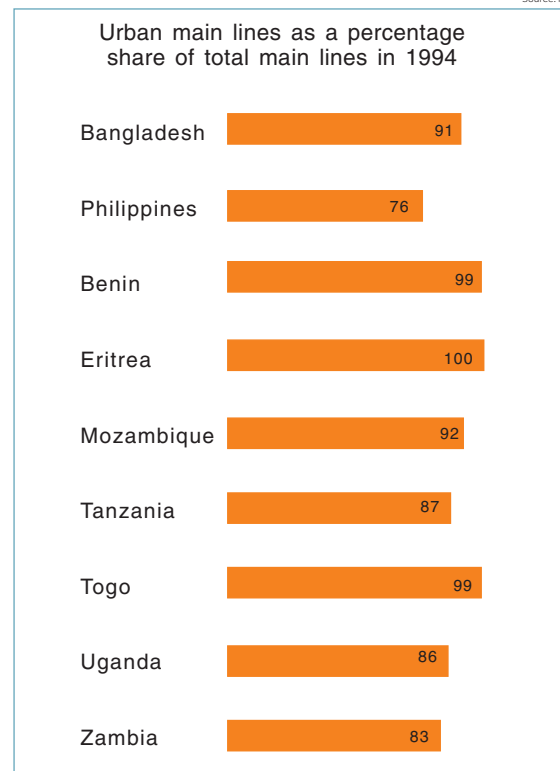
Figure 5 The concentration of telephone services in the urban areas points to the fact that in rural areas other social needs receive a higher priority than telephony. African societies seem to be confronted with a political choice regarding the diffusion of telecommunication infrastructure. With respect to universal service the current distribution of telephones indicates a serious structural problem since those who have got telephone subscriptions are primarily the rich and the business segments of the African societies

The first of these two areas often ends up as the loser in the "fight" for limited financial resources due to the long-term nature of this task, while the latter can provide faster results. Being aware of this, governments of LDCs should put more emphasis on diffusing telecommunications in rural areas to bring about easier access to telecommunications services by rural populations. Governments ought to define clear universal service objectives and specify how, within the prevailing conditions, they can be achieved (ITU 1995, p. 33).

In general, it does not seem likely that the current focus on phenomena like the information superhighway and Internet is what will lead the African LDCs out of the "shadows". These phenomena are merely a sign of times, a characteristic of

the information society. In the case of information infrastructures and African development a focus on human resource development through education and training, where the ability to distinguish between valuable and irrelevant information is much more important. However, having said that, it is important to give the Internet credit for its usefulness as an instrument for diffusing uncensored material in countries without democratic traditions.

For the time being the advent of the "information society" does not seem to have altered the "power-balance" in African societies. In general, there is still the rich, urban and educated people that are closest, or perhaps more correct not farthest from being connected to the global information society. A focus on technology alone would certainly not change this picture and bring Africa further in closing the gap to the more developed nations.

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Competition in mobile telephony

BY JOHN WILLY BAKKE

"There is a general agreement that there are few things advertising does as well as introducing new inventions to the community."
(Goodrum and Dalrymple, 1990)

Introduction

During the last few years, mobile telephony has gone through major changes. There has been a rapid technological development, and new systems and services have been introduced. Other important changes have been deregulation and the introduction of competition in this area of telecommunications, whereby new network operators have entered the market. In this course of events, mobile telephony has to an increasing extent been offered to the residential mass market, and new user groups have adopted this communication technology.

In Norway, the monopoly in mobile telephony was replaced by a duopoly, with a second network operator in the new market for GSM telephony. This introduction of competition in mobile telephony took form of an intense marketing warfare, with advertisements for mobile telephony in a large number of media, thereby making mobile telephony very visible in the public sphere. Norway has a long tradition in the field of mobile telephony, and even before the introduction of competition, Norway had one of the highest penetration levels for mobile telephony. Competition and the marketing campaigns strengthened this position, and Norway has at the time of writing the highest penetration level in the world, with approximately 1 million mobile subscriptions in a population of 4.5 million people (see Figure 1).

In this article, competition in the market for mobile telephony is studied through an analysis of advertisements in major Norwegian newspapers. This analysis demonstrates competition in mobile telephony to be rather complex. In addition to the duopoly of network operators, important market actors were manufacturers of mobile telephones, and retailers who sell telephones and subscriptions to the end users. Central themes in the analysis are the relations between the actors involved, the arguments deployed, and the images of communication presented in advertisements.

The introduction of competition in the mobile market is an interesting topic in its own right. Further, it represents an illustrating case of competition in tele-com markets, since, in several countries, the market for mobile communications has served as a test-market for competition and deregulation in the telecom sector. Mobile telephony also represents a challenge to ordinary telephony, and to the understanding of the "nature" of telephony.

Studying markets in the making

After a long period of stability, the telecom sector has now become an arena for dramatic restructurings. Major events have been the break-up of AT&T, the formulation of telecommunications strategies in the European Union, and technological developments like the convergence of telecommunications, informatics and (home) electronics (see Tunstall, 1986; Carpentier et al., 1992; Littler and Sharp, 1990; Higham 1994). Monopolies have been broken, and new entrants have arrived. In this restructuring, competition and markets have been major themes.

The decisions to introduce competition and to establish markets is motivated by the ability of these mechanisms to obtain cost reductions and the provision of better services. This, in turn, may lead to an increasing demand and a larger total market.[1] The concepts of "competition" and "market" are, however, at a high level of abstraction, and it would be misleading to assume one specific course of events following the introduction of competition. Specific markets demonstrate distinctive trajectories of development, based on the characteristics of the actors involved, and their actions and interactions, like the shaping and timing of competitive activities. The markets for telephones and other types of terminal equipment, are quite different from the market for network services, where the subscribers enter a (somewhat) long term relationship

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[1] *A formulation like "competition is introduced" is chosen, since the telecom sector in general is now developing from monopoly to competition. For a discussion of markets as mechanisms for price-making and allocation of resources, see any textbook on economics (Koutsoyiannis, 1985).*

with a network operator. When specific markets are studied as competitive arenas, not only as price-making mechanisms, one obtains a closer integration between the literature on marketing and competitive behaviour, and the theory of markets (Swedberg, 1994).

Whereas telecom networks once were considered "natural monopolies", there is now a fierce competition among network operators (Stehmann, 1995). The term deregulation is often used to describe the introduction of competition in the telecom sector, referring to the replacement of detailed sets of regulations with competition. "Deregulation" does not, however, imply the total absence of rules and regulations. There will often be some sort of authorisation required in order to be accepted as a network operator, and certain technological requirements have to be met for products, services and networks. Hence, "re-regulation" might be an equally appropriate term as "deregulation".

Since the marketing warfare to a large extent was (and still is) directed towards the general mass-market, it provided a generous amount of material for analyses of competition in mobile telephony. Traditionally, the public network operator in Norway (Telenor, formerly Televerket) has been one of the major advertisers. With the marketing warfare in mobile telephony, the amount of telecom advertisements (number and sizes) increased,
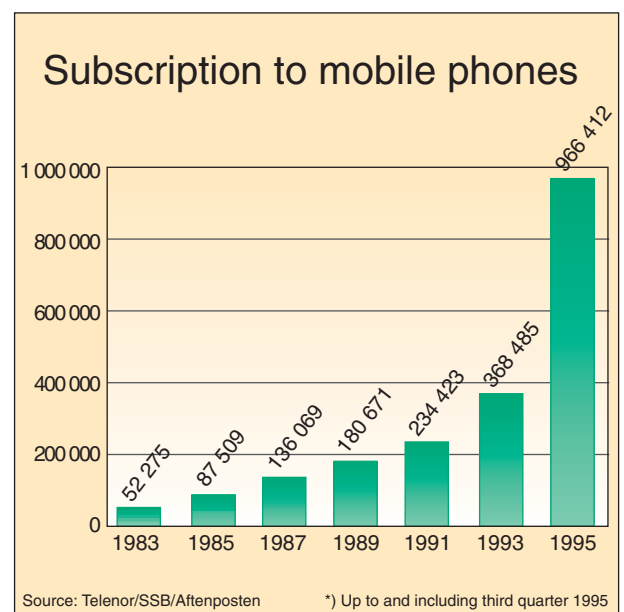

Figure 1 Subscriptions to mobile telephony in Norway

Table 1 Characteristics of the competing mobile network operators in Norway

	Telenor Mobil		NetCom
Technology	NMT (analogue)	GSM (digital)	GSM (digital)
Position in the market	established	entrant	entrant
Strategy for NMT	continue development	N/A	N/A
Strategy for GSM	N/A	gradual development	massive investment
Strategic relation between GSM and NMT	supplementary, based upon relative advantages		'new' technology replaces 'old'
Price strategy for terminals	intensive competition through subsidies to the retailers		
Price strategy for subscription fees	A matrix of subscription fees and usage rates: high subscription rates and inexpensive usage rate for the professional users, low subscription rate and more expensive usage rate for low-volume users		
Price strategy for usage rate	relatively high price, less intense competition		

and several other actors entered the scene, the most important ones being retailers and manufacturers of mobile telephones. Even though competition in mobile telephony may be described solely as a competition between network operators, the competitive arena is more complex. Competition in mobile telephony encompasses products, services, and subscriptions and subscription rates.

For this study, advertisements from two major Norwegian newspapers (Aftenposten and Dagbladet) were collected systematically for a two-year period, starting before the launching of the two GSM networks. For the second year of data collection, a third newspaper (VG) was included, since this newspaper proved to be an even more important channel for marketing, especially for retailers' advertisements. Selected other advertisements are also included in the collection. This vast source of material provides valuable knowledge about the actors involved, the timing of advertisement campaigns, and the types of arguments used. In this article, only a small fraction of the material could be presented. Other advertisement media, like TV- and radio-commercials, boards, or magazines were not included in the analysis.

The institutional setting

In Norway, mobile telecommunications has a long tradition, especially in a maritime context. After the second world war, several private land mobile networks were put in operation. In 1966, the public network operator Telegrafverket (later Televerket and Telenor) opened a

manual public radio telephone service in the Oslo area and some other densely populated parts of the country. This service was gradually replaced by automatic mobile telephone systems, as the services NMT-450 and NMT-900 were introduced in 1981 and 1986, respectively. The analogue NMT systems were soon to be challenged by the pan-European digital GSM system for mobile telephony.

Licensing of competing operators in each country was an integral part of the planning of the GSM service. To secure competition on equal terms, the operation of mobile telephony in Televerket was organised in a subsidiary, Tele-mobil AS, owned by Televerket. Tele-mobil's first year of operation was 1993. With the reorganisation of Televerket to a state-owned limited company, Telenor AS, Tele-mobil was renamed Telenor Mobil AS from January 1, 1995.[2] Telenor Mobil offers a whole range of mobile telecommunication services, including the two analogue NMT systems and the digital GSM system, paging, and mobile data communications.

NetCom AS was established in 1989 as one of the prospective operators for the GSM system, and was licensed as a GSM operator in 1991. Its first year of operation was 1993. NetCom is a limited company with both Norwegian and foreign

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[2] *The institutional history is described in Grimstveit and Myhre, 1995, St. meld. nr. 49 (1989–90), Tele-mobil annual reports. See also Meurling and Jeans, 1994.*

owners. The major stockholders are Orkla, Kinnevik, Ameritech, and Singapore Telecom. In addition to mobile communications, NetCom offers international telecommunications and a calling card service as parts of its product portfolio (NetCom annual reports). Some characteristics of the mobile operators are outlined in Table 1.

Marketing warfare in mobile telephony

The launching of GSM telephony in the autumn of 1993 also represented the beginning of a series of diverse marketing campaigns. The analysis of advertisements for mobile telephony shows clearly that in the early phase of the marketing warfare, the network operators were the major participants, with the most extensive coverage, both in terms of the number of advertisements and their size. This finding supports the original conception of competition in mobile telephony as competition between network operators. Rather soon, representatives for telephone manufacturers presented their own advertisements, some were neutral regarding the competition between the network operators, whereas others sided with one of the operators.

The majority of advertisements were from retailers. Typically, they sell telephones as well as subscriptions, and they are authorised by and allied to network operators. The typical advertisement from a retailer has the logo of the associated operator as a part of the advertisements. A few retailers were authorised by

both operators, but this number diminished rapidly, due to agreements with and subsidies from the operators. Equally interesting, alliances between operators and retailers were demonstrated when arguments, slogans and pictures developed by the operator migrated from the operators' advertisements to those of the retailers. There were also a few examples where arguments from the telephone manufacturers' advertisements were deployed by retailers in their campaigns.

From the beginning, the strategy of Tele-mobil was to strengthen the NMT system while gradually developing the GSM system. Just before the opening of Net-Com's network, Tele-mobil had a campaign for NMT, without mentioning GSM or NetCom, and when NetCom entered the market, Tele-mobil did not respond for a certain period of time. Net-Com, on the other hand, while promoting the GSM technology as the replacement for NMT, started an intense campaign, attacking the public network operator Televerket. Televerket was criticised for being rigid, bureaucratic and old fashioned, whereas NetCom portrayed itself as young and competitive. The perhaps most powerful expression was "Skje Stortingets vilje" (The will of the Parliament be done), with explicit connotations to the Holy Prayer (see Figure 2). When Tele-mobil launched its campaign for GSM, the message presented was that this technology was still in its infancy, and for a period of time, NMT would be the best offer for the majority of subscribers. It took almost a year before GSM was actively promoted by Tele-mobil (see Figure 4).

As the marketing campaigns developed, a number of arguments were deployed, often in a sort of 'dialogue' between the operators, directly and indirectly commenting each others' arguments. Central themes were the number of subscribers, number of base stations, and geographical areas covered by each operator. Not surprisingly, both operators claimed to have the best coverage and the majority of GSM subscribers.

Competitive activities may be directed towards existing or new customers. The marketing campaigns analysed in this article took place in a period when the number of subscribers skyrocketed, which in turn motivated an emphasis on new subscribers. – In the GSM market, all subscribers were new subscribers.

The perhaps most striking aspect of the marketing warfare was the accelerating

Figure 2 Advertisement from NetCom AS

competition regarding the price of the handset, achieved through subsidies from operators to the retailers. Step by step, prices dropped from a price level of several thousand Norwegian kroner (the magnitude of $ 1,000). In some instances, the retailers were actually giving away the telephone, together with a small amount of money (ca. $ 7.50). Several of the offers included a commitment to be a subscriber for a period of time, like six or twelve months.

The usage rates of the respective networks have only to a small extent been a dimension in the campaigns. One notable exception was a campaign where new subscribers for a period of three months

could telephone without charge during weekends, a campaign introduced by Tele-mobil to capture new customers and to 'steal' NetCom's subscribers. Later, NetCom inverted the campaign, asking Tele-mobil's subscribers why they did not switch to the better NetCom network, now that their period of free usage had ended. There were also periods of low usage rates during holidays, periods with a lower volume of traffic from professional users.

The analysis of advertisements demonstrates competition between operators, between telephone brands, and between retailers. Further, the analysis demonstrates the multi-level nature of competi-
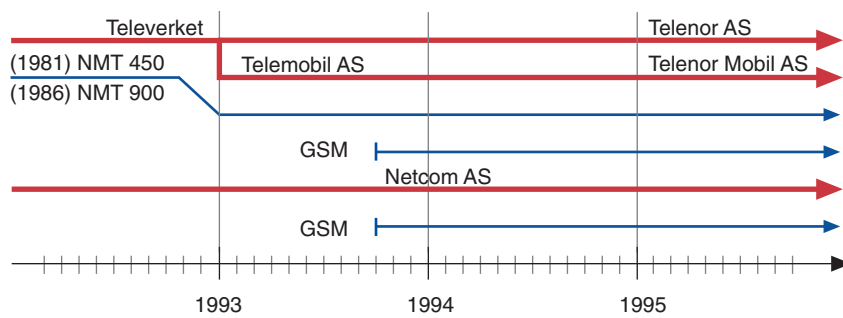
Figure 3 Network operators for mobile telephony in Norway

Figure 4 Advertisement from Telenor Mobil

tion in this market, and the several interconnections between these levels. This, in turn, demonstrates the complexity of the mobile market, and the need for a specific, detailed analysis of the competitive actions of the parties involved.

Images of communication

The advertisements provide information about market behaviour, like competition and co-operation between market actors. They do also provide information about how market actors view prospective users and usage situations through the images of communication presented in the marketing campaigns. (A more thorough content analysis, like detailed studies of selected advertisements, would go beyond the scope of this article.)

One dimension which was introduced at the very beginning of the marketing campaigns, was the dichotomy between city and countryside, similar to, but not identical to the dichotomy between work and leisure. These dichotomies were central in a number of advertisements, often associated with the competition between the NMT- and GSM systems, since the dissemination of base stations for the GSM system started in major cities and along the main roads, whereas the more established NMT systems also had a good coverage in rural areas. Other allusions to usage situations may also be found in the advertisements. For instance, in the promotion of the GSM technology, quality of sound reproduction, and security against eavesdropping were frequently used as arguments. This, in turn, indicate concern for the feeling of presence, and for confidentiality and personal integrity for the communicating parties.

There is solid evidence that usage of the ordinary telephone is gendered. Evidence for the gendering of telephony may be found in usage statistics, in interviews with telephone subscribers, and in analyses of advertisements (Rakow, 1988; Lupton, 1993). The present analysis shows a gendering of mobile telephony both through the number of men and women portrayed (the majority being men), and through differences in the ways men and women are depicted in advertisements. One illustrative example is a campaign from one of the network operators. The campaign had two main messages: that prices had dropped, and that the mobile telephone could be instrumental for solving unexpected incidents during the day. The persons depicted in

the price-related advertisements were mainly men, whereas all the persons depicted in the usage-oriented advertisements were women.

Gendered images are also found in texts describing the small size of the mobile phones. A common phrase is "fits into the shirt pocket", whereas the argument "fits into the purse" has not yet been used. One may also argue that the matt black finish, so common for mobile telephones, represents a masculine design. This argument is strengthened by a number of advertisements for coloured telephones, to a large degree developed for the youth, and for the female market (Bakke, 1996a,b; Lord, 1995).

Several advertisements present mobile telephony as some sort of a 'social glue', helping people associate throughout the day – which is not particularly surprising in advertisements for communications technologies. A more interesting case was found before Christmas 1995, where family relations were mirrored in various mobile technologies. Under the header "Christmas presents for the whole family", the advertisement established this year's present for Mother to be a mobile telephone – a sophisticated model. The inexpensive models were proposed as presents for Grandmother and Grandfather, whereas pagers were the presents for "Sister and Brother". The present for the Father of the family, however, was not a mobile telephone at all, but accessories to his phone. Obviously, it was taken for granted that "Father" already had his own telephone. This advertisement also demonstrates how mobile technologies challenge the conceptions of residential telephony as family-anchored, by suggesting one piece of telecommunications technology per family member.

Several advertisements argue that mobile telephony is an offer for all people, not only for business executives. There are, however, differences in the way "all people" are portrayed. The general impression from NetCom advertisements, is that "all people", or at least the majority of them, are young, urban professionals, whereas Telenor Mobil presents a broader picture of potential and actual users, including residential users and elderly people. In a similar way, it seems like NetCom's vision of "all places" is more urban than Telenor Mobil's (with the exception of the Easter campaigns, when both operators publish

coverage lists for the popular tourist goals). These differences might be explained by their different marketing strategies, by their different technologies for mobile telephony, by different target goals for the advertisement, or perhaps by different advertisement agencies. Every interpretation of advertisements must take into account the genre which is analysed. Marketing campaigns do not intend to present statistically representative portraits of the population. The objective of this genre is to sell the products and services in question. Bearing this in mind, it becomes less surprising that the advertisements present skewed pictures of the universe of mobile communications. The campaign discussed earlier, wherein pictures of women are deployed to argue that the mobile telephone can be instrumental for solving the unexpected incidents during the day, presents a skewed picture. This campaign does not necessarily imply that men never encounter unexpected incidents. Equally plausible interpretations are that a) the female market is not fully developed, and b) this type of argument will be more persuasive than, for instance, the more technology-centred advertisements. Articles in professional magazines, like "What is the secret to attracting women?" (Lord, 1995) support this instrumental interpretation of the gendering of advertisements.

Images of users and usage situations are primarily found in the advertisements from network operators, and from manufacturers of mobile telephones. The majority of the advertisements, thanks to the large number of advertisements from the retailers, had no indication of users or usage situations at all. Pictures of telephones, product codes, technical specifications, price information, and the name of the associated network operator, dominated these advertisements, hence, one may argue that the dominant image of mobile telephony does not refer to usage or users at all. This may, however, also be taken as an indication of how mobile telephony gradually is becoming a more mundane object, with less need for an explication of how mobile telephony is to be deployed. This interpretation is supported by changes in distribution channels. Mobile telephones are now found between vacuum cleaners and radios – mobile telephony has become an everyday technology.

Implications for further research

The discussion demonstrates the complexity of telecommunication markets, as the decision to deregulate and introduce competition in mobile communication introduced changes far beyond the network operators. Further, it documents the multitude of ways other corporate actors may act and respond. Thereby, this discussion demonstrates the importance of approaching questions of competition and deregulation or re-regulation through empirical studies of what actually happens in specific settings. The particular course of events does, however, depend on the competitive and regulatory "environment" of that sector. One further implication is that lessons learned from one market are not directly transferable to other markets. – Competition, deregulation and re-regulation have to be approached through studies of the specific market relations and regulatory environment in question.

This case study demonstrates the centrality of images of users and usage situations in the marketing campaigns, and how mobile telephony, in turn, challenges general conceptions of telephony. Whereas ordinary telephony is anchored in a spatial context, in offices, homes, restaurants or telephone booths, mobile telephony is de-contextualised, as the localisation of the mobile subscriber may not be taken for granted. One implication seems to be that the distinction between public and private space is getting blurred. Further, telephony, as represented by the telephone number, changes from being office- or family-anchored, to becoming ever more individualised, at least for incoming calls, since the terminal typically is deployed by specific individual users.

A more general implication is that changes in one market or one sector of telecommunications may lead to repercussions in other markets: Markets do not develop in isolation. This, in turn, means that no sectors of telecommunications reach stability – communication technologies may always be challenged and reinterpreted (Silverstone and Hirsh, 1992; Bakke, 1996a).

Acknowledgements

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Status

International research and
standardization activities
in telecommunication

Editor: Endre Skolt

Introduction

BY ENDRE SKOLT

Standardisation of systems and networks is undoubtedly one of the main reasons for the success of the globalisation of telecommunications services. The extensive standard-setting activities of the ITU (CCITT) and other regional standardisation bodies like ETSI have created world-wide compatibility of systems and networks and provided global interconnectivity and interoperability. The standards have promoted greater competition among manufacturers, causing a wider choice of equipment among customers such as Telenor. Larger production volumes have made advanced electronics available at affordable prices. Without standards, the wide access to telecommunications would not have been possible to achieve.

However, in the past few years, the large effort in world-wide standardisation has been questioned. The dilemma facing the standardisation community is to develop new and ever more complex standards in ever shorter time periods. The rapid pace of technological change has shortened the innovation and product life cycle. This year, ITU reports that it will produce more than 10,000 pages of recommendations and standards – ten times the annual production just twenty years ago. In spite of this effect the results achieved may not be in accordance with user expectations.

To illustrate the problems facing standards work today, I will make a short comparison of two important standardisation activities executed in the near past. In 1992 the first standard on IN was agreed after 3–4 years of work. Between 1989 and 1992, a lot of good work was done. However, the great complexity of IN, time constraints, conflicting interests from Europe, America and Japan, made work very difficult. Consequently, it was not possible to agree on a common unambiguous solution. Nevertheless, it was clearly very important to finalise a standard. Today, there are many different interpretations of the first IN-standard, causing many problems to the network operators trying to interconnect equipment from different vendors.

The standardisation of GSM is a different story. When GSM work started in the early 80's, the political and economic climate made it possible to spend sufficient time in order to agree on the technical details. The first GSM standard was finalised after approximately 10 years work. Interfaces between switches and databases and between databases were distinctly specified. Today, the general opinion is that the GSM system represents one of few technological successes originating from Europe.

According to Dr. Theodor Irmer, Director of the ITU's Telecommunication Standardization Bureau, ITU must take on the following challenges if it is to succeed:

- Standards have to be produced in time.

- Only those standards that are needed should be produced.

- Flexible decision making structures have to be established to respond to technological change and changing priorities.

- Standards should be developed in cooperation by global and regional standards making bodies.

- Standardisation should shift from a technology-driven approach to a market-driven approach.

I fully agree that the first three items are of great importance. With the comments made above, I am less convinced that standards need to be globally defined. Regional standards will very often be tested by the market. If successful, they will eventually become global standards.

In this issue of the Status section, we have three contributions, all reports from initiatives that hopefully will contribute to the globalisation of telecom services.

In the first paper, Arve Meisingset presents ongoing activities in order to standardise a Global Information Infrastructure. The objective of GII is that each citizen may eventually gain access to the information society by interoperability of networks, information processing systems and applications. Core principles include that it should promote fair competition, encourage private investment, define an adaptable regulatory framework and provide open access to networks. The G7 countries have asked the ITU to undertake world wide co-ordination, and Study Group 13 has the lead in this co-ordination.

In the second paper, Dag Fredrik Bjørnland gives an outline of the ITU standardisation of the Future Land Mobile Telecommunication Systems (FPLMTS), which is often referred to as the next generation mobile standard. The paper addresses service aspects, radio access, spectrum and network considerations, and lastly, describes the relationship between the European initiative, Universal Mobile Telecommunications System and FPLMTS.

The last paper gives a comprehensive description of the Inmarsat mobility management system, which will be implemented as part of Inmarsat mini-M, available from this year. The mini-M system will support terminals with the size and weight of a briefcase, it builds on the M system and is prepared for provision of value added services. Personal subscription will be handled with smart cards.
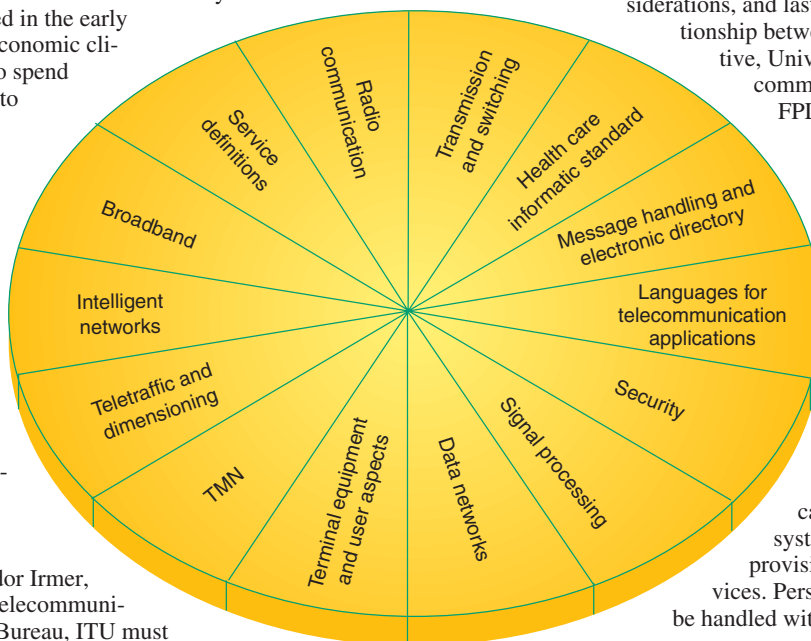

Figure 1 Telecommunication areas

Global Information Infrastructure

BY ARVE MEISINGSET

The Global Information Infrastructure, GII, is the new buzzword for Al Gore's Information Superhighway. The G7 countries have asked the International Telecommunication Union, ITU, to undertake world-wide co-ordination of standardisation in the area of GII. Study Group 13 of the Standardization Sector, ITU-T, has the lead role in this co-ordination. GII is currently affecting the work programme of most SGs of ITU-T. Also, ITU-T has established a Joint Rapporteur Group on GII, which will have participation from IEC and ISO from June 1996.

Parallel work

Similar regional initiatives to GII are found in most industrial regions of the globe:

- National Information Infrastructure, NNI, in USA
- European Information Infrastructure, EII, in Europe
- Japanese Information Infrastructure, JII, in Japan
- Canadian Information Infrastructure, CII, in Canada
- Korean Information Infrastructure, KII, in Korea.

As a curiosity I will mention that Telenor R&D in 1996 plan to start a long term research project entitled Telenor Information Infrastructure, TII. This project will study the integration of Intelligent Networks (IN), Telecommunications Management Network (TMN) and Administrative Data Processing (ADP) into one common framework. The scope of the TII project is different from that of the previously mentioned projects; however, the term infrastructure is used in the same sense. The term 'infrastructure' denotes a set of common resources and frameworks which are provided to several applications or application areas.

The European Information Infrastructure

EII is co-ordinated by the European Telecommunication Standardisation Institute, ETSI, and is carried on into several EU projects. The ETSI Strategic Resource Committee number six, SRC6, seems to have defined the most precise recommendations on II. The SRC6 work is based on the Bangemann report of the EU Commission. SRC6 provides the following definition of EII:

- Enable people securely to use a set of communication services supporting an open multitude of applications and embracing all modes of information, any time and anywhere, at acceptable cost and acceptable quality

- Is based upon a seamless federation of interconnected, interoperable communication networks, information processing equipment, databases and terminals

- Accommodates competition within the information industry

- Takes into account that Europe is a multicultural entity.

SRC6 lists the following set of services to be provided by EII:

- interactive speech
- real-time image transfer
- electronic mail
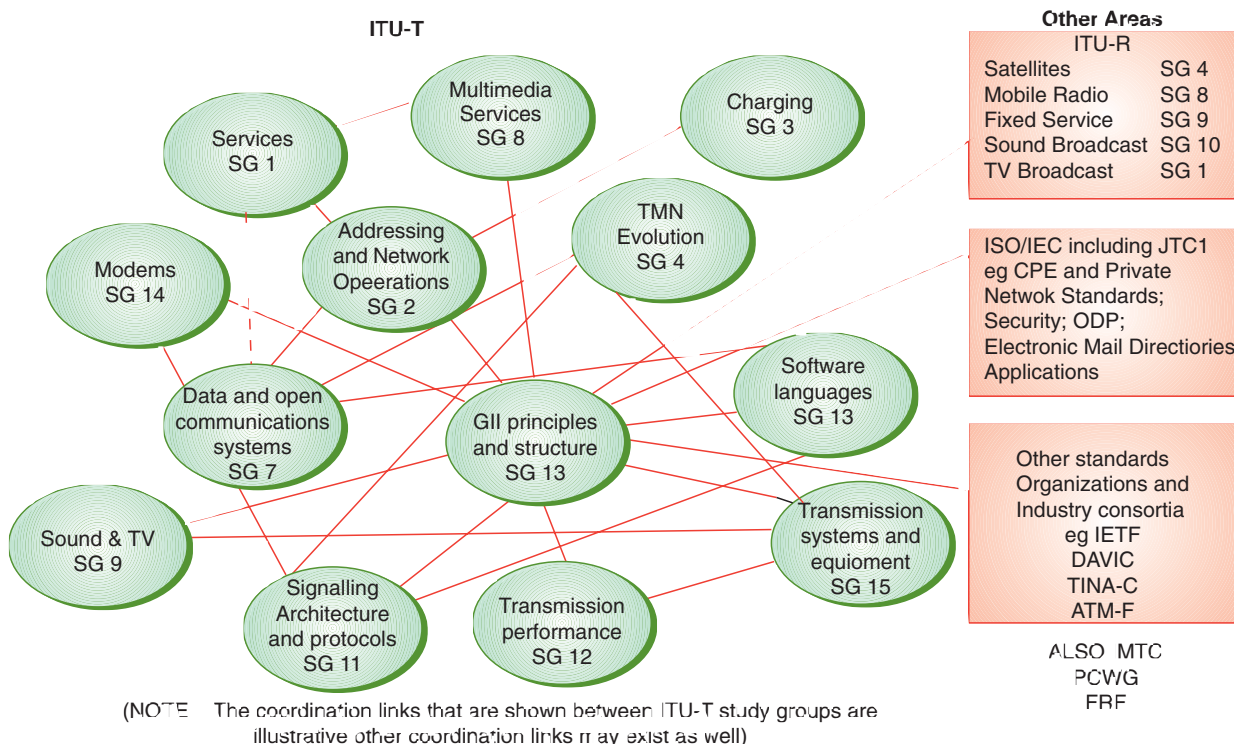- multimedia document retrieval

Figure 1 GII co-operation between ITU-T Study Groups and other organisations

- video on demand
- interactive video services
- computer-supported co-operative working
- broadcast TV / radio / data distribution
- distributed processing
- real-time multipoint retrieval.

This list provides a good indication of the intentions of the EII effort. However, there is no minimum set of defining criteria which an offer has to satisfy in order to classify as EII. Even a plain telephone service, be it digital or analogue, automatic or manual, can be called EII. This situation is reflected in the ITU Joint Rapporteur Group (JRG) on GII report: 'GII already exists and includes such facilities as telecommunication networks, the Internet, computer capabilities, cable and broadcast TV.' Therefore, an evolutionary approach to GII standardisation is taken. See the subsequent section on Evolution of GII, as well.

The European broadband backbone network (EBTN) can be used to implement EII. EBTN comprises interconnection of ATM switching networks, use of SDH transport network and the METRAN management network, application of the future B-ISDN standards, focus on interconnection services, and the study of the use of E.164 and Internet addressing. However, ETSI does not consider Internet to be an appropriate alternative, because Internet in USA will use private lines for broadband services, and ETSI consider ATM to be the appropriate provider of transport services for GII. Internet can use ATM; however, ATM cannot use Internet.

The EU projects, called the EPII SG projects, cover the following application areas:

- *Networks:* access network for the private market, telecommunication interfaces for the private market, internetwork communication, the European backbone network, naming and addressing, IN and TMN for EII, application programming interfaces (APIs) for ATM

- *Middleware:* electronic commerce, middleware for multimedia, search engines, system administration software, security, basic distribution services, basic processing services, middleware for user interfaces

- *Applications:* telemedicine, library services, electronic museums, road transport information services

- *Support for object orientation:* Set Top Boxes, European requirements on middleware, software support environment for application development.

Objective and principles of the GII

The objective of the GII is to ensure that each citizen may eventually gain access to the information society. This can be enabled by the interoperability of networks, information processing systems and applications. These objectives will be served by the following core principles of the GII:

- Promote fair competition
- Encourage private investment

- Define an adaptable regulatory framework
- Provide open access to networks.

While

- ensuring universal provision of and access to services

- promoting equality of opportunity to the citizen

- promoting diversity of content, including cultural and linguistic diversity

- recognising the necessity of world-wide co-operation with particular attention to less developed countries.

These principles will apply to the GII by means of

- promotion of interconnectivity and interoperability

- developing global markets and networks, services and applications

- ensuring privacy and data security

- protecting intellectual property rights

- co-operating in R&D and in the development of applications

- monitoring of the social and societal implications of the information society.

Evolution of GII

ITU-T takes an evolutionary approach to GII. The work is organised in three phases, similar to those of ETSI:

- Common definition phase for Programmes 1 and 2

- Standardisation Programme 1: GII based on existing narrowband services and capabilities (PSTN, mobile N-ISDN, IN, CATV, private networks, etc.). This programme should focus on the specification of interfaces between the CATV networks and telecom networks and on the contribution of the information and storage platform to GII.
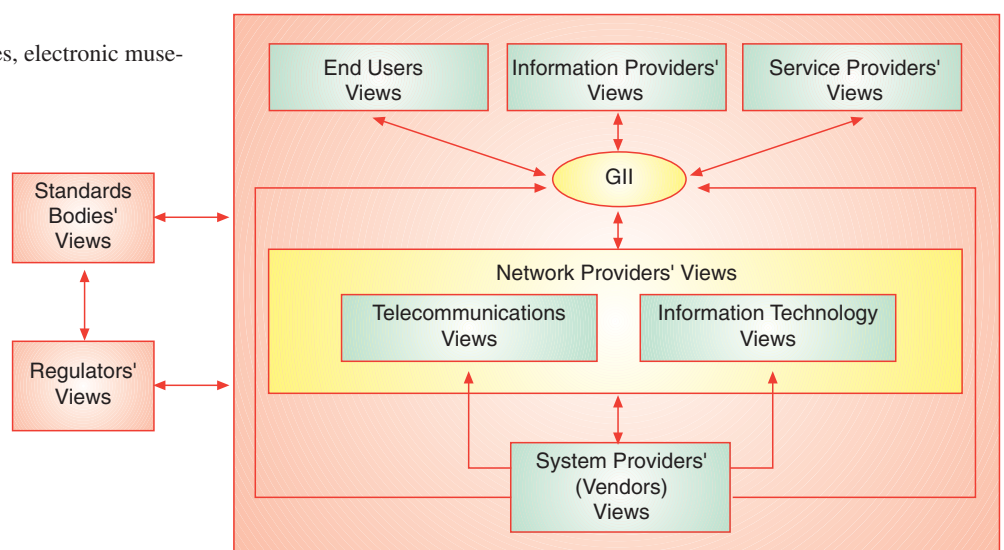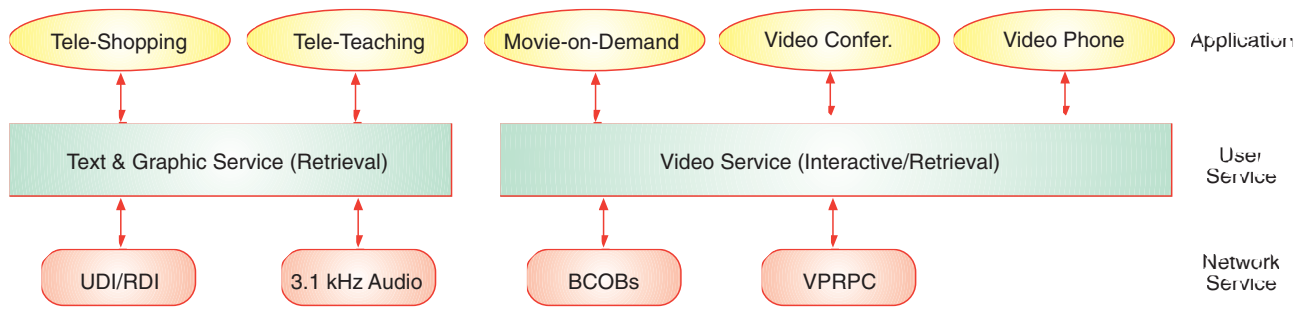

Figure 2 Viewpoints towards the GII

Figure 3 A proposed Reference Model Architecture for GII

- Standardisation Programme 2: GII including broadband services and capabilities (in particular ATM transport capabilities and Distributed Processing Environment while interworking with GII based on standardisation programme 1). This should include enhancement of the current IN concept for supporting the provision of GII services in a flexible way as well as development of video and high speed data applications within the context of GII.

The two programmes will proceed in parallel.

Organisation of work on GII

ITU-T SG 13 has taken the role as the lead Study Group on GII. The work in different SGs, other standardisation bodies and consortia is co-ordinated by the Joint Rapporteur Group on GII.

The relationships between the different bodies are shown in Figure 1.

The JRG on GII has developed a nine page table of projects and assigns responsibilities for these projects.

GII technical aspects

It is agreed to develop a draft ITU-T Recommendation on Principles and Framework Architecture of the GII. Different actors' viewpoints towards the GII are shown in Figure 2.

Also, Enterprise Models for GII are identified. I do not have access to the source document of this model, but I think it contains an Enterprise Viewpoint definition according to the Open Distributed Processing framework, ODP.
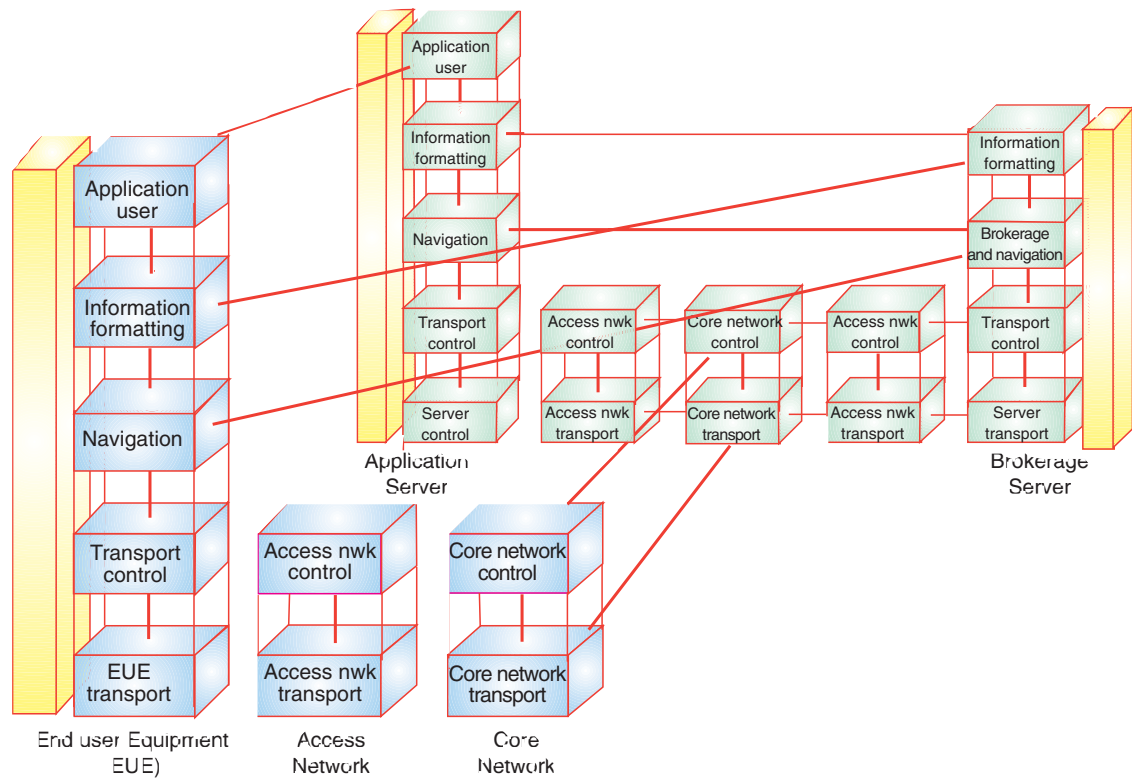

Figure 4 Example relationships between services and applications

SG13 has adopted a Reference Model Architecture (RMA) for GII from ETSI SRC6. This RMA is shown in Figure 3.

However, JRG has repeatedly agreed that it is not feasible to identify a single model, architecture, or definition of the GII. Two methods are proposed to examine the functionality of the GII:

- *By Level of Abstraction:* This method is decomposing the functionality of the GII in progressively less abstract terms. Since the GII is focused on the user, the user's perspective is chosen as the starting point for this abstraction. The decomposition is then progressed through the following stages: Functional Structure, Functional Groupings, Functional Models, and Example Configurations. All stages, except the last, may be represented in a two-dimensional table.

- *By Horizontal/Vertical Perspective:* The functionality is decomposed horizontally into different network types and vertically into media types. Hence, the network infrastructure part of the functional structure is used for this method.

JRG has adopted the computer industry terminology of applications and services:

- *Application:* the capability seen by the end user and achieved by invoking services as required.

- *Service:* network services provide the connection and transfer of information between connection equipment; user/terminal services transfer the call and user information between session equipment (terminal or service system).

The term application corresponds to the term teleservice of the telecommunication community. This dichotomy between the information/computer and telecommunication industry terminologies has caused and probably will continue to cause confusion.

The GII will support a wide range of applications and services and network delivery technologies. A specific combination of elements, arranged in a certain way and with a specific set of associated interface arrangements represents a specific interworking or interconnection scenario. JRG is developing a method and a set of conventions – a graphical notation – for the production of scenarios. Figure 5 shows an example scenario.

Perspective

Over the last years, about 400 consortia have been established to develop 'standards' within the area of telecommunication and information processing. These consortia may develop common agreements between dominating vendors. However, they do not have the authority to issue globally recognised international standards. Also, user interests are purely represented.

Increased travelling and international commerce both require globally compatible telecommunication and information services. Their needs are not met by current regional standards. As an example, Europe, USA and Japan all use different standards for mobile communication, and therefore, you cannot use the same handset when travelling between these regions.

Also, developing countries are dissatisfied at having to choose between the dominating regional standards. Therefore, liberalisation and globalisation both require development of global standards. To provide this is the objective of GII, and this may provide a sufficiently strong motivation to ensure success.

References

1   ITU-T JRG on GII. *Report of the meeting of the Joint Rapporteur Group on Global Information Infrastructures (JRG GII).* Geneva, 26–28 March 1996, TD 184, JCG-TMN5.

2   ITU-T Chairman of Study Group 13. *ITU-T studies in the area of information infrastructures.* Geneva, 6–14 September 1995, SG10 TD PL/10-39.

3   ITU-T Chairman of JCG-TMN. *Report of the first meeting of the Global TMN co-ordination group.* Geneva, 26–28 March 1996, TD 195, JCG-TMN5.

4   ETSI SRC6 Chairman. *SRC6 Final report on European information infrastructure : part A summary and recommendations.* Brest, 4–8 September 1995, STC-NA4, TD No. 59.
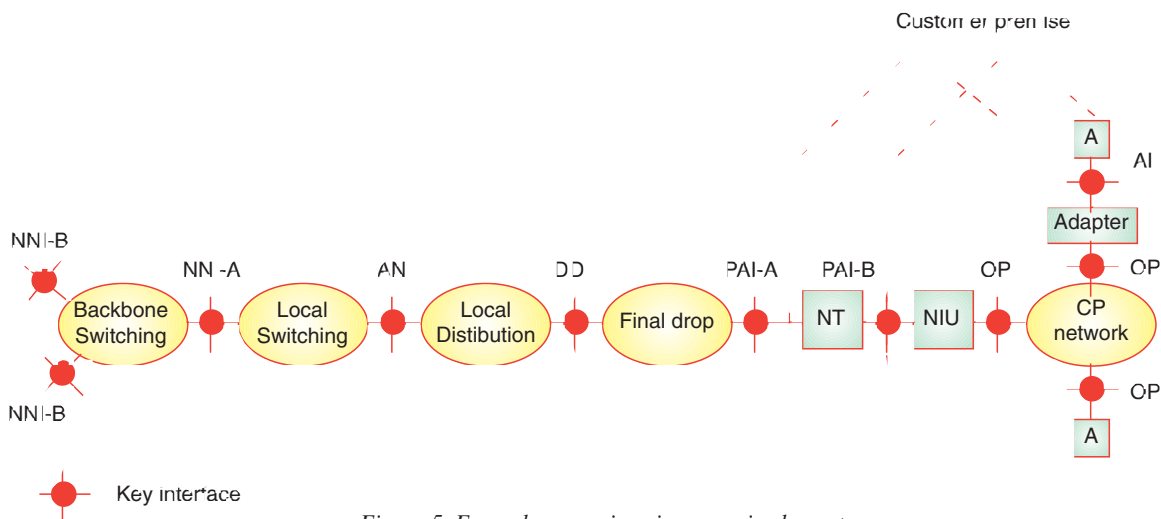
Figure 5 Example scenario using generic elements

FPLMTS – IMT2000: Communication anywhere, anytime

BY DAG FREDRIK BJØRNLAND

1 Introduction

This article reports on the status of the *Future Public Land Mobile Telecommunication Systems (FPLMTS)[1]*, the third generation mobile communication systems under development by the International Telecommunication Union (ITU) since 1985. The standardisation work on FPLMTS has been closely followed by Telenor R&D.

2 Background

During the last decade wireless communication has become one of the largest areas of growth within the telecommunications industry. Numerous proprietary, national and regional systems have been developed and put in operation all over the world, attracting a large number of users. Examples of such systems include mobile communications systems, wireless access systems, paging systems and mobile satellite systems.

In general, most existing systems for wireless communication were designed to meet the needs and services associated with specific application areas, e.g. vehicular mobile telephony, national or regional paging, cordless access to a public or private fixed infrastructure, or satellite access from maritime or remote areas. The systems were mostly incompatible, and there was little or no co-ordination of frequency band usage. Against this background of rapid growth and little or no co-ordination, con-

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[1] *ITU proposed in 1995 to replace the name FPLMTS by International Mobile Telecommunication 2000 (IMT2000). The number 2000 was meant to symbolise both the frequency band and the planned introduction date. However, for the purpose of this article, the old name FPLMTS has been used throughout.*

cerns were raised within the ITU over the need for collaboration in the development of harmonised standards for future systems. This resulted in the formation in 1985 of Interim Working Party 8/13 (IWP 8/13) by Decision 69, to study *Future Public Land Mobile Telecommunication Systems – FPLMTS*.

In response to Questions CCIR 39/8 [1] and CCIR 77/8 [2], IWP 8/13 investigated the overall objectives for FPLMTS and the resulting spectrum requirements and suitable frequency bands as parts of the CCIR input to the World Administrative Radio Conference in February 1992 (WARC-92). The outcome of this study lead to the identification by the WARC-92 of the bands 1885 – 2025 and 2110 – 2200 MHz on a global basis for FPLMTS, including the bands 1980 – 2010 and 2170 – 2200 MHz for the satellite component of FPLMTS.

Following the reorganisation of the ITU, ITU-R (ITU Radio-communication sector) Study Group 8 set up Task Group 8/1 to continue the work on FPLMTS. In addition to the continuing ITU-R activities, related FPLMTS studies are being undertaken in the ITU-T (ITU Telecommunication Standardisation sector), particularly in the areas of:

- FPLMTS service definitions (Study Group 1)

- FPLMTS numbering and addressing and teletraffic engineering (Study Group 2)

- FPLMTS charging and accounting (Study Group 3)

- FPLMTS management (Study Group 4)

- FPLMTS security methods and procedures (Study Group 11)

- FPLMTS network and signalling matters (Study Group 11 and Study Group 13)

- FPLMTS speech and video coding (Study Group 15).

3 Key features and objectives

In [4], Future Public Land Mobile Telecommunication Systems (FPLMTS), are defined as systems scheduled to start service around the year 2000 in the 2 GHz bands identified by the WARC-92, which will provide access by means of one or more radio links to a wide range of telecommunication services supported by the fixed telecommunication networks (e.g. PSTN/ ISDN), and to other services which are specific to mobile users. Access will be provided across operating environments and using a range of terminal types including terminals intended for mobile and fixed use, linking to terrestrial or satellite based networks.

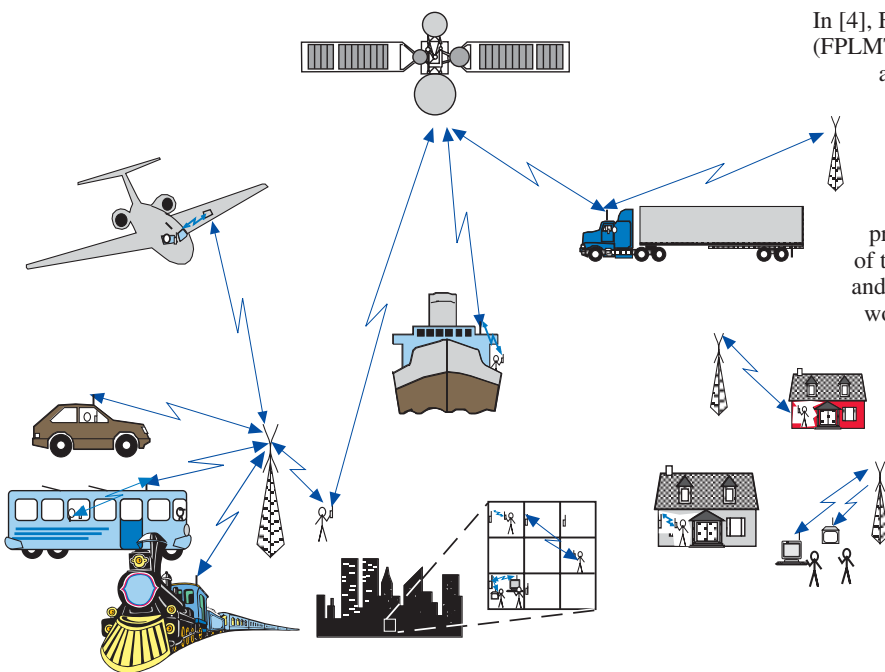Key features and objectives of FPLMTS, include inter alia:

Figure 1 IMT2000: communication anywhere, anytime with a single terminal

- *The convergence of current mobile and fixed network services to unify the diverse systems of today into a radio infrastructure capable of offering a wide range of services across operating environments*

- *Compatibility of services within FPLMTS and with the fixed networks*

- *Global terminal mobility with a single pocket-sized terminal*

- *Satellite and terrestrial based coverage*

- *Services requiring a wide range of bit rates, including high bitrate data and multimedia services.*

The key objectives of FPLMTS are summarised in Figure 1.

4 Services

The service objectives and principles for FPLMTS are defined in Recommendation F.115 [8]. One important service objective identified here is the support of FPLMTS user mobility (cf. SIM-card roaming in GSM) in addition to UPT. FPLMTS user mobility enables FPLMTS users to move between FPLMTS terminals, to register for different services on different terminals, as well as multiple FPLMTS users sharing one single terminal. The distinction between FPLMTS user mobility and UPT, and the mechanisms needed to support these services has until recently been the source of much discussion in ITU-T. However, with the decision by the January '96 meeting of ITU-T SG11 to move FPLMTS user mobility studies to the ITU group studying UPT (Question 7/11), a closer harmonisation of the two services may be expected in the future.

An additional objective identified in [8] is that although each FPLMTS provider should be free to determine which services should be offered to users in a particular area, a minimum set of services should be offered in all areas. The minimum set of services identified is:

- voice communication with other users of fixed or mobile terminals (telephone service) connected to private or public networks, and

- data communications with other fixed or mobile terminals.

More detailed service recommendations are under development in ITU-T SG1, scheduled to be finalised towards the end of 1996.

5 Radio access considerations

Initially, it was proposed by the ITU to standardise only one radio interface for FPLMTS. It has now been realised, however, that to satisfy the requirements on FPLMTS, multiple radio interfaces are required. Work on these interfaces follows two streams:

1 A study on how best to integrate the various interfaces in one terminal (i.e. multi-mode terminals), focusing on the identification of functionality independent of the radio access technology which can be made common across radio interfaces.
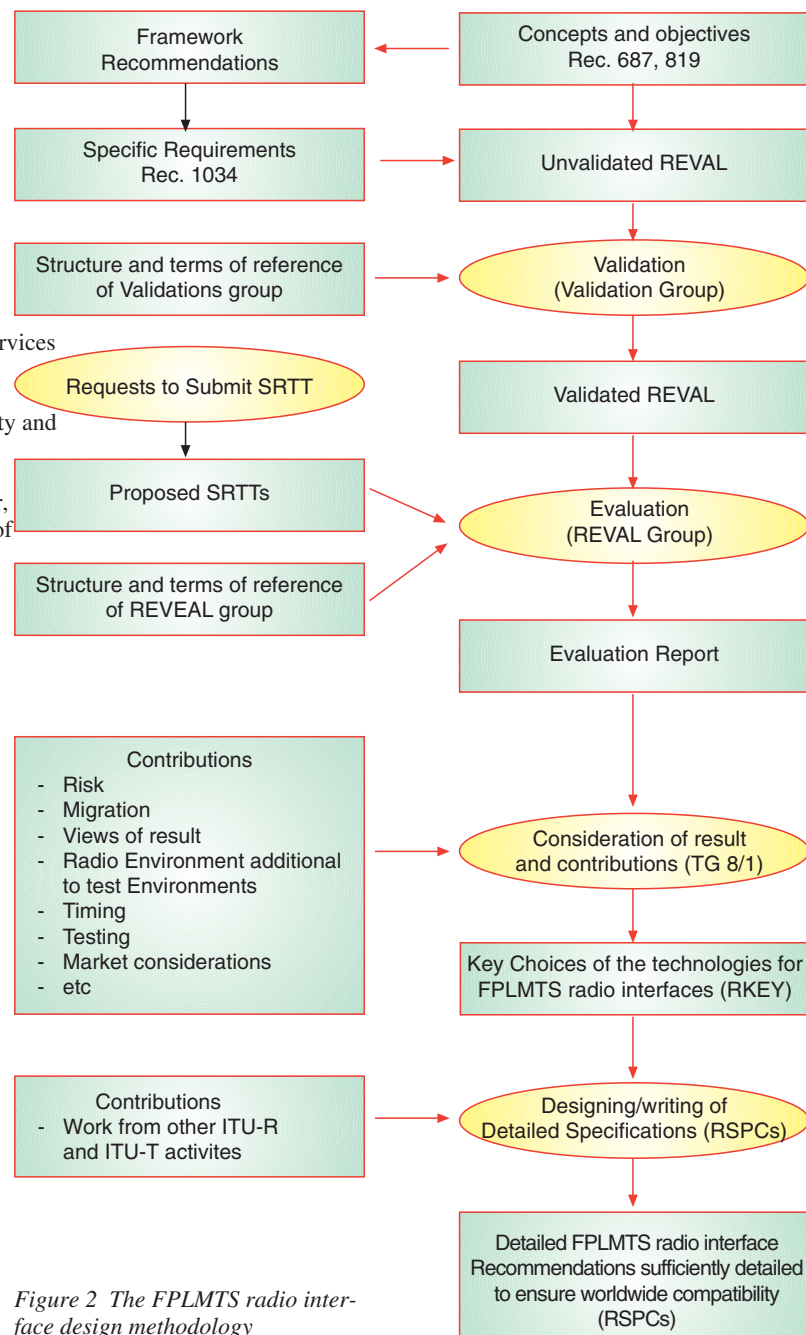

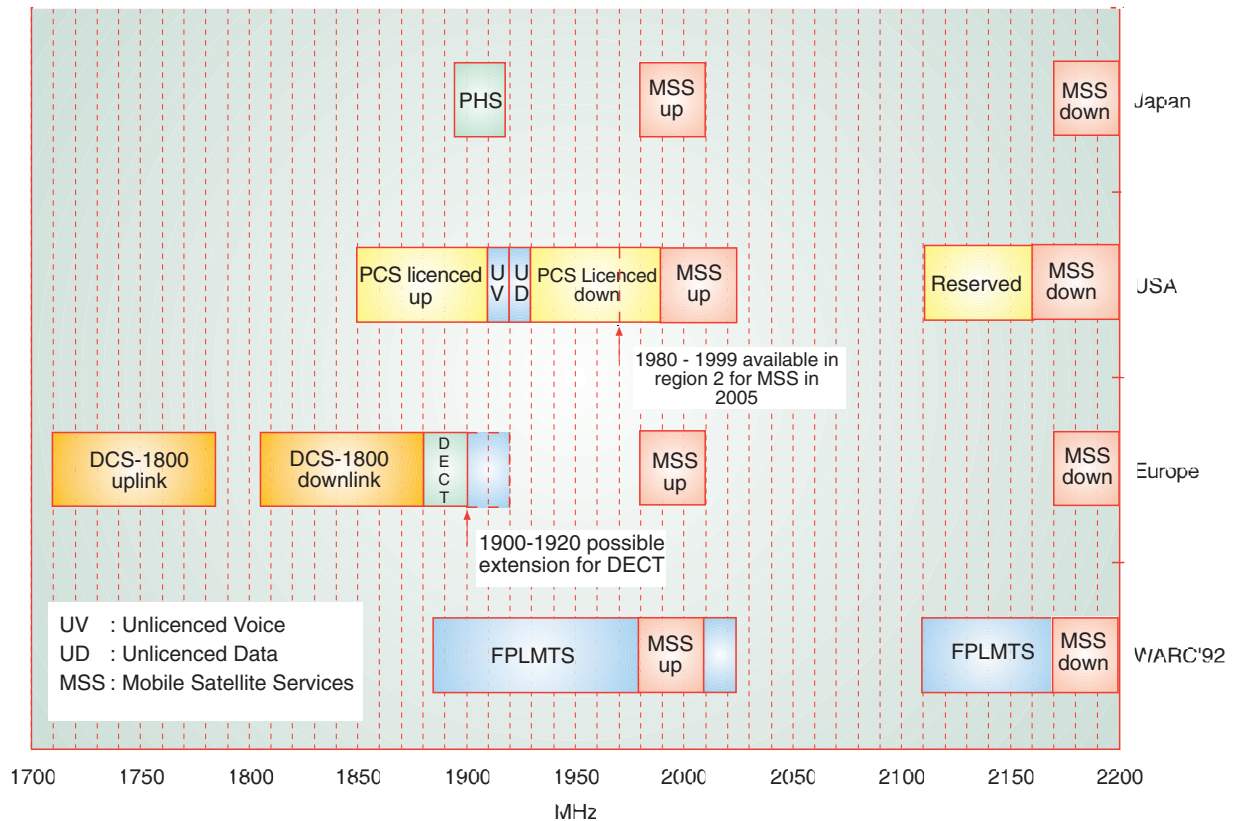*Figure 2 The FPLMTS radio interface design methodology*

Figure 3 Status of the FPLMTS frequency band after WRC'95

2 The development of a methodology for the standardisation of the FPLMTS radio interfaces, enabling all interested parties the possibility to influence the radio interface design.

The methodology for standardising the FPLMTS radio interfaces is illustrated in Figure 2. The key part of this methodology is the development of the Recommendation *"Procedure for Evaluation of Radio Transmission Technologies for FPLMTS (FPLMTS.REVAL)"*. FPLMTS.REVAL details a procedure for evaluating different candidate Sets of Radio Transmission Technologies (SRTTs). The evaluation procedure contains a list of pre-selection criteria all candidate SRTT must satisfy and a more comprehensive procedure, including an extensive set of evaluation criteria and a numerical scoring methodology.

Once the REVAL recommendation has been completed, the recommendation will be applied to sample technologies, which may include existing mobile telecommunication technologies, in order to validate the procedure and criteria. After the validation, candidate SRTTs submitted by interested third parties will be evaluated using REVAL. The output of this process, along with other contributions such as market and second generation migration/evolution considerations will be used to define a set of key choices of technologies for the radio interfaces of FPLMTS, documented in Recommendation FPLMTS.RKEY. RKEY will be used as input to the final stage of the process, the

detailed FPLMTS radio interface specification in the FPLMTS.RSPC series of Recommendations.

According to a workplan proposed at the September '96 meeting of TG8/1, the validation of REVAL is due to be finalised before TG8/1's meeting in April 1996, so that final discussions on this document can take place during the meeting. The evaluation of submitted SRTTs will commence in April 1997, leading to a stable FPLMTS.RKEY in February 1998. The detailed radio interface specifications (FPLMTS.RSPC) should then be ready for approval towards the end of 1998. However, at the time of writing a number of issues still remain to be resolved, and some delays can be expected.

6 Spectrum considerations

Although WARC-92 identified 1885 – 2025 and 2110 – 2200 MHz as being available on a world-wide basis for use by FPLMTS, there are a number of spectrum considerations that may affect the availability of FPLMTS. Particular considerations identified in [7] are that the FPLMTS bands are shared with other radio communication systems and services already in use, that these bands are used differently in different countries and that FPLMTS will need initially only portions of these bands and that the use will grow in time. Figure 3 gives an

overview of the status of the FPLMTS bands after the 1995 World Radio Conference (WRC'95).

7 Network considerations

An important part of FPLMTS is *the convergence of fixed and mobile services*. Consequently, the work on FPLMTS network standards are to a large extent influenced by ongoing work in the fixed telecommunication scene. In particular, FPLMTS network studies incorporate a number of key fixed network concepts, including:

Intelligent Networks (IN): It is expected that IN Capability Set 3 (CS-3) will include the management of mobile and radio access as a natural part of the protocols, including location registration/updating, certain types of hand-over between radio cells and paging. Already, a Functional Model (FM) and Information Flows (IFs) for FPLMTS mobility and radio management has been proposed for inclusion in Recommendation Q.1224: *Distributed Functional Plane for Intelligent Network Capability Set 2,* planned for approval towards the end of 1996.

B-ISDN and ATM: The number of different service environments, the services themselves, and the importance of making the best use of the limited radio spectrum available call for a flexible radio interface and flexible interworking with the transmission technology used in the core networks (e.g. resource on demand). Broadband ISDN (B-ISDN) access and interworking and the flexibility of the Asynchronous Transfer Mode (ATM) transmission technology are therefore taken into account and efficient interworking with ATM will be defined. To further promote the close relationship with B-ISDN and ATM, ITU-T SG11 agreed at its January 1996 meeting that for the next study period, the relevant parts of the work on FPLMTS protocols should be developed by the groups already working on B-ISDN matters. In particular, the FPLMTS UNI specifications should be developed by Question 15/11 (currently studying DSS.1 and DSS.2) and the NNI specifications should be developed by Question 21/11 and Question 22/11 (studying ISUP and B-ISUP).

TMN: To achieve cost-efficient operation of FPLMTS in a multi-vendor environment, FPLMTS will make use of the Telecommunications Management Network (TMN) standards being studied by the ITU-T. A number of recommendations are under development or in planning by the ITU-T SG4 to cater for this, the first one (Recommendation M3200: *Prose description of FPLMTS as a managed area*) is planned for appearance as a stable document in the middle of 1995.

The main part of the work on FPLMTS network aspects are currently carried out in ITU-T SG11's Question 8/11 (Q8/11). Q8/11 currently develops two Recommendations: Recommendation Q.FNA: *FPLMTS Functional Network Architecture* and Recommendation Q.FIF: *FPLMTS Functional Information Flows*, both describing at a functional level the requirements for FPLMTS switching and signalling. The recommendations are both approaching completion, and are scheduled to be proposed for Resolution No. 1 towards the end of 1997. A third recommendation, Recommendation Q.FASR: *FPLMTS Access Signalling and Radio Interface* is to be started at the June '96 meeting of Q8/11, and is scheduled to be proposed for Resolution No. 1 in the middle of 1998.

8 Relationship with existing and evolving networks

Terms of reference for a study by the TG8/1 on the relationship between FPLMTS and existing and evolving networks were identified in October 1994, after one year of discussions. The 1995 September meeting of TG8/1 saw the outcome of this study, a *Report on Evolution and Migration to FPLMTS/IMT-2000.*

One key aspect of this study was the relative merits of revolution versus evolution. Should FPLMTS be developed as a completely new system or be the result of a continuous evolution of pre-FPLMTS systems? The solution proposed by the migration report is an evolution through revolution, i.e. a managed, timely sequence of small necessary revolutionary steps ultimately evolving a pre-FPLMTS system towards full FPLMTS capabilities. To achieve this goal the series of Recommendations/Standards for FPLMTS should be defined both as a standard system specification in its own right, but also as a target or common goal for existing systems to evolve to. The series of Recommendations/Standards for FPLMTS should also clearly identify the elements or system components of existing systems that are candidates for evolution or revolution. Those that should be revolutionary for a pre-FPLMTS system to achieve the necessary added capability should be defined accordingly, to provide a common goal for all systems.

A good analogy to the proposed approach is the traditional telephone system, where a continuum of enhanced capabilities in the network have been developed over time, without the need for a complete system replacement. Similarly, it is hoped that the individual system elements constituting a second generation system (e.g. speech coding, radio interface protocol, modulation, error correction, encryption etc.) may undergo evolutionary or revolutionary changes as appropriate in a timely and orderly fashion. As different operators will prioritise the required changes differently, a consequence of this is the emergence of a continuum of enhanced capabilities, blurring the borders between second generation, third generation and future mobile systems.

In order to achieve efficient *evolution by revolution*, the migration report also identifies some possible *evolution facilitators*. These include:

- *the standardisation of a Radio Bearer Adaptation Functionality (RBAF),* decoupling the wireless access network from the core network

- *software-defined radios,* employing the use of digital signal processors to liberate the radio from a dependence on inflexible, hard-wired and frequency-dependent components. This will also facilitate multi-mode terminals

- *the standardisation of a User Identity Module (UIM),* providing a common UIM (c.f. GSM's SIM card) for all systems to evolve to

- *the standardisation of a Virtual Home Environment (VHE),* providing a user access to his/her own services across network and system borders

- *the support for inter-system numbering plans,* facilitating interoperation with systems using other numbering plans for the International Mobile Subscriber Identity than FPLMTS.

9 Relationship between FPLMTS and UMTS

In Europe, activities on third generation mobile systems was initiated in 1991 under the name *Universal Mobile Telecommunications System – UMTS*. Although both FPLMTS and UMTS are third generation mobile systems targeted at the same frequency bands in the same timeframe, it is not currently clear what the relationship between UMTS and FPLMTS will be. Some of the issues that will need to be resolved before this relationship can be better understood are:

- The development of existing regional mobile systems (in particular GSM), and their influence on UMTS and FPLMTS

- The scope of FPLMTS standardisation, i.e. will FPLMTS be a framework for regional standards or will it be a set of standards to which a system can be designed and manufactured?

- The target introduction dates for FPLMTS and UMTS.

10 Future Work

In the immediate future, considerable interest and activity can be expected both inside and outside of the TG8/1 for the planned approval and application of FPLMTS.REVAL. Until this has been achieved, further work on the FPLMTS radio interface cannot be expected. The approval of this recommendation can also be seen to be linked to the discussion on the introduction dates for FPLMTS. This discussion will have a significant impact on the scope of FPLMTS standardisation, and can therefore be expected to occupy TG8/1 for some time.

On the ITU-T side, the planned stabilisation of Recommendation Q.FNA and Q.FIF towards the end of 1996 can be expected to attract some attention, providing the first insight into the functionality supported by the FPLMTS access network and infrastructure in its first phase.

11 References

1   ITU. *Future Public Land Mobile Telecommunication Systems*. Geneva, 1982. (Question ITU-R 39/8.)

2   ITU. *Adaptation of Mobile Radio communication Technology to the Needs of the Developing Countries.* Geneva, 1986. (Question ITU-R 77/8.)

3   ITU. *Future Public Land Mobile Telecommunication Systems (FPLMTS)*. Geneva, 1990. (Recommendation ITU-R M.687.)

4   ITU. *Framework for Services Supported on Future Public Land Mobile Telecommunications Systems (FPLMTS).* Geneva, 1992. (Recommendation ITU-R M.816.)

5   ITU. *Future Public Land Mobile Telecommunications Systems (FPLMTS) for Developing Countries.* Geneva, 1992. (Recommendation ITU-R M.819.)

6   ITU. *Requirements for the Radio Interface(s) for FPLMTS*. Geneva, 1994. (Recommendation ITU-R M.1034.)

7   ITU. *Spectrum Considerations for Implementation of Future Public Land Mobile Telecommunications Systems (FPLMTS) in the bands 1,885-2,025 and 2,110-2,200 MHz.* Geneva, 1994. (Recommendation ITU-R M.1036.)

8   ITU. *Service Objectives and Principles for Future Public Land Mobile Telecommunication Systems.* Geneva, 1995. (Recommendation F.115.)

The Inmarsat Mobility Management System

BY ARVID BERTHEAU JOHANNESSEN AND ARILD FLYSTVEIT

1 Introduction

The Inmarsat[1] mobile satellite communication systems have offered reliable communication to maritime users since the introduction of Inmarsat-A in 1982. Gradually, Inmarsat has introduced new global systems and services, addressing not only the maritime community, but also aeronautical and land mobile users with special needs for communication services. Inmarsat-M, introduced in 1993, was the first communication system to provide telephony, fax and data services anywhere in the world from a briefcase terminal.

The capability of addressing Inmarsat *Mobile Earth Stations (MESs)* by the use of one *Single Network Access Code (SNAC)* has been a long term objective for a number of years. To achieve such *terminal mobility, mobility management* functions are required. The Inmarsat-M/B MESs have been prepared for mobility management operation by the inclusion of an ocean region registration capability. However, the Inmarsat network infrastructure required to handle mobility management was not part of the Inmarsat-M/B specification.

Inmarsat mini-M is a new system to be introduced in 1996. This system has evolved from Inmarsat-M, offering the same basic services and in addition, also a number of value added services via small, portable terminals. The main market addressed by mini-M is land-mobile users. Inmarsat mini-M will also provide

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[1] *The International Mobile Satellite Organization*

the same services to personal users identified by *smart cards*. Providing *personal mobility* means that a mobility management system is no longer an option, it has become a requirement in order for personal users to register on any mini-M MES. A mobility management system has therefore been specified and is about to be implemented. This mobility management platform will also provide the necessary functionality to offer terminal mobility for Inmarsat-M/B.

Telenor Research and Development has played a major role in the development of the mobility management functions and has been actively involved in the specification work. This work has been performed through participation in the Inmarsat Mobman Group and directly on contract basis for Inmarsat.
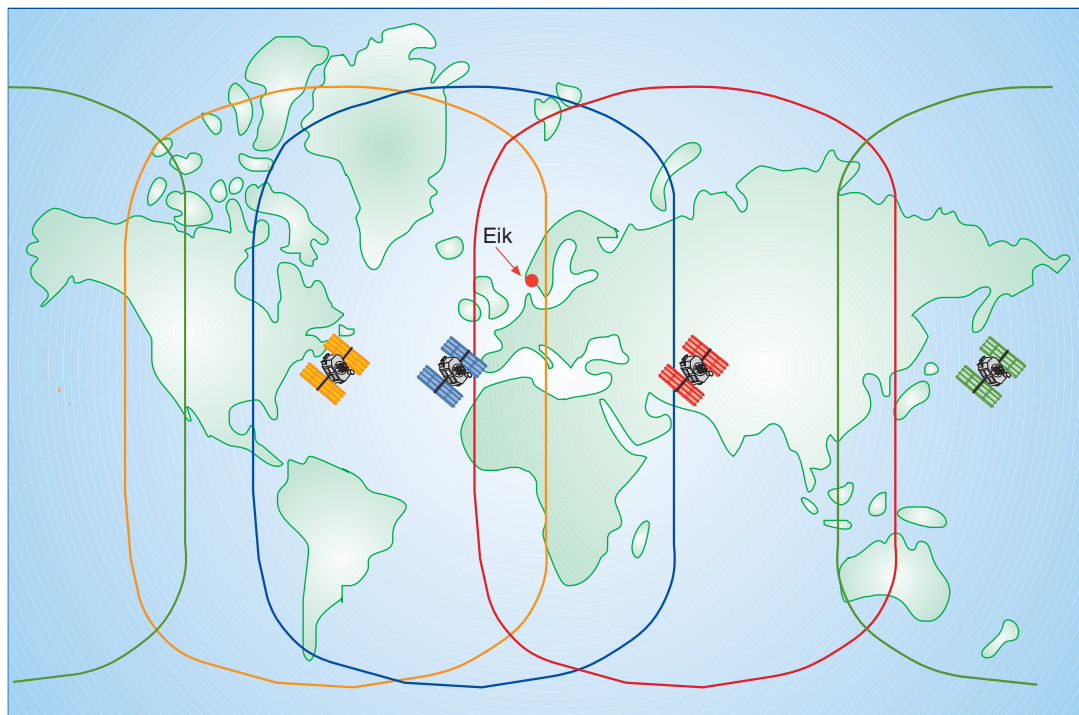
2 Evolution towards Inmarsat SNAC

2.1 Background

Inmarsat was founded in 1979 to offer reliable communications at sea. Today, Inmarsat comprises five satellite communication systems: -A, -B, -C, -M and -Aero.

The Inmarsat systems are operated through four satellite ocean regions, as illustrated in Figure 1, each accessed via its own unique country code:

AOR-W (874)
AOR-E (871)
IOR (873)
POR (872)

Figure 1 The Inmarsat satellite ocean region configuration

- 871: Atlantic Ocean Region – East (AOR-E)

- 872: Pacific Ocean Region (POR)

- 873: Indian Ocean Region (IOR)

- 874: Atlantic Ocean Region – West (AOR-W)

Currently, a terrestrial network subscriber wishing to make a call to an Inmarsat subscriber needs to have some knowledge of the MES location (i.e. ocean region) in order to dial the correct country code.

The demand for allocation of E.164 codes increases continuously as new plans for global systems and applications (e.g. S-PCN systems, UPT) are launched. The ITU[2] has therefore proposed that the Inmarsat systems, in the long term, should operate with only one access code, thereby possibly easing the increasing pressure on the E.164 codes.

2.2 Co-operation between Inmarsat and ITU

During the previous ITU study period Inmarsat modified its satellite configuration from a three ocean region to four ocean region configuration and, in order to implement this mode of operation, in October 1990 requested the assignment of a fourth E.164 code (874) for this purpose. The assignment of the fourth code was made on a temporary basis with the long term objective of allocating a new single E.164 code which would apply irrespective of the location of the destination MES.

During March 1991 Inmarsat formally confirmed to the ITU the commitment to study the SNAC issue. However, Inmarsat expressed concern in respect of attempting any changes to the analogue Inmarsat-A system. Inmarsat-A is still the system carrying the highest portion of the traffic and plays a major role providing safety on sea.

In August 1992 Inmarsat sent a second formal response to the ITU on SNAC related issues and the likely time frame for the results of the associated studies. Inmarsat also confirmed that they would not attempt to implement SNAC on the Inmarsat-A system and repeated the previous view that a fifth E.164 code would be required to facilitate a seamless transition to SNAC operation.

In 1995 Telenor supported a proposed migration strategy towards SNAC. As an indirect consequence of the proposal Inmarsat requested the permanent assignment of the 870 code from 1st October 1995 with a proposed commitment to return the 871–874 codes by the year 2015 at the latest. This has been endorsed by the ITU, and means that network SNAC must be implemented in the terrestrial network within that time. The proposal included a special treatment of Inmarsat-A subscribers. It is expected that Inmarsat-B, the digital successor of Inmarsat-A, will undertake most of the current and potentially new Inmarsat-A subscribers within year 2015. Land-to-mobile calls (i.e. mobile terminating) to remaining Inmarsat-A subscribers may be solved by broadcasting the call announcements in all ocean regions.

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[2] *The International Telecommunications Union*

An operational mobility management system for Inmarsat-M, -B and mini-M using the 870 country code is planned for operation in 3Q 1997. This system will provide user SNAC. The distinction between user and network SNAC will be explained in the subsequent sections. The overall system configuration is described in chapter 4.

2.3 Single Network Access Code – SNAC

The ITU has asked Inmarsat to use the term *user SNAC* when referring to a solution where SNAC applies from the users' viewpoint only, and not in the network itself. For explanatory reasons we will use the term *network SNAC* when referring to the ultimate SNAC solution.

SNAC will offer potential service advantages for land-to-mobile calls whereas mobile-to-land calls (i.e. mobile originating) will be unaffected. However, Inmarsat subscribers will acquire improved availability. Also, the provision of SNAC will increase the potential for implementing value added services on a global basis and for reaching a higher degree of compatibility with the services offered in fixed and cellular networks.

2.3.1 Network SNAC

In Inmarsat context, network SNAC is the capability of completing a land-to-mobile call, including routing, using a single *Inmarsat mobile international number* independently of the actual location of the MES. Inmarsat has committed to implement network SNAC within the year 2015.

In 1993 Norwegian Telecom Research (now Telenor R&D) was awarded a contract from Inmarsat to develop possible scenarios for implementation of cellular interworking including SNAC, in Inmarsat-M. The results of this work can be found in [1]. To illustrate one possible concept of network SNAC, Figure 2 shows the most general SNAC scenario presented in [1].

The network SNAC scenario in Figure 2 is based on

- a location database storing MES location and subscriber data; and

- Inmarsat *roaming numbers* used to route the call from the interrogation node to the destination *Land Earth Station (LES)*. The idea is to let all *Mobile Satellite Switching Centres (MSSCs)* manage a pool of Inmarsat roaming numbers which will be temporary assigned for routing purposes. These roaming numbers could be part of each LES country's national numbering plan.

The location database is interrogated from an interrogation node in the PSTN during call set-up. Based on location information, Inmarsat standard and country of origin, the location database will request the correct MSSC/LES to provide a roaming number. The call will be routed to the destination MSSC/LES based on this Inmarsat roaming number while subscriber data are downloaded to the MSSC/LES.

To achieve network SNAC, enhanced terrestrial network signalling capabilities for mobility management as well as extensive investigations on operational and regulatory aspects are required.

2.3.2 User SNAC

In Inmarsat context, user SNAC is the possibility of calling an Inmarsat subscriber using a single Inmarsat mobile international number independently of the actual location of the MES.

User SNAC can easily be accomplished if the MES location is known to the network. As in the network SNAC scenario a location database is used, but instead of providing a roaming number the database translates the SNAC country code into one of the existing Inmarsat country codes for routing purposes. This scenario will not release any E.164 country codes, but it will be an important step towards network SNAC operation.

The operational Inmarsat-M/B and mini-M mobility management system will provide user SNAC and form the basis platform for future evolution towards network SNAC.

2.4 Mobility functions in Inmarsat-M/B

SNAC was already on the agenda when the Inmarsat-M/B systems were specified. In order for SNAC to be brought into operation in future, these systems have the capability to register MES locations via an *ocean region registration process* which can be activated in the Inmarsat systems using their respective bulletin boards (a network control information broadcast facility). The MESs transmit registration messages on power up or antenna re-pointing. However, no common registration capabilities were defined or implemented in the network itself, and Inmarsat-M/B currently operates without mobility management.

3 Inmarsat mini–M

3.1 General description

The current Inmarsat-M system is designed for operation with Inmarsat's first, second and third generation space segment, thus operating in both global and spot beams. However, an evolved Inmarsat-M system operating only through spot beams (Inmarsat-3 satellites) opens up the opportunity to reduce the MES size, weight and EIRP. This evolved spot beam Inmarsat-M system is referred to as *mini-M*.

The first Inmarsat-3 satellite was successfully launched in April 1996, and all four satellites are planned operational by mid 1997. The Inmarsat mini-M system is planned to be in operation by 3Q 1996, aiming at full global operation approximately one year later.

The range of communication services offered by the mini-M system is the same as for Inmarsat-M, i.e. telephony, CCITT Group-3 facsimile and 2.4 kbit/s full-duplex data. The voice codec rate for the mini-M system has been reduced to only 4.8 kbit/s including error detection and correction. The main market is expected to be land-mobile users, although it is expected that small fishing vessels and leisure boats will represent a potential market as well.

3.2 Definitions

To help readers not familiar with the Inmarsat system, this section is devoted to relevant definitions of Inmarsat specific terminology.
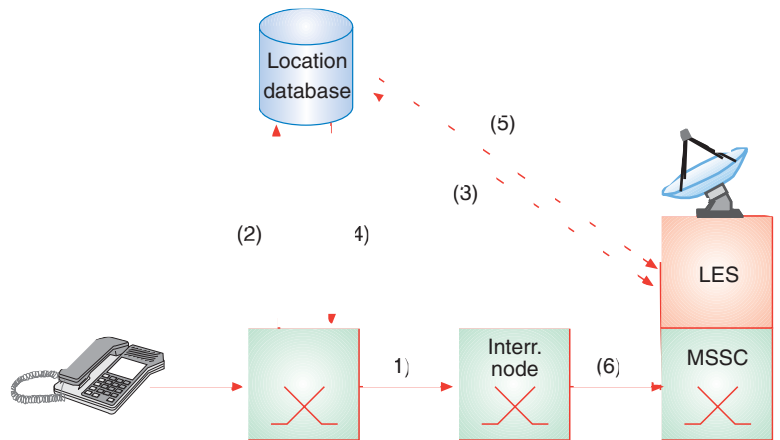
1) Route the 870 call to the interrogation node
(2) Request roaming number
(3) Retrieve roaming number
(4) Return roaming number
(5) Provide LES with subscriber data
(6) Route the call to an LES based on the roaming number

Figure 2 Network SNAC scenario with interrogation node in the terrestrial network

- The *MES ID* is an identity associated with the mobile station. The MES ID is permanently stored in the MES and loaded into the MES ID Record when the MES is turned on.

- The *PID (Personal Identity)* is an identity associated with a personal user. The PID is permanently stored in the user smart card and loaded into the MES ID Record when the MES is turned on or the smart card is inserted.

- An *SU (Signalling Unit)* is a message entity used to transmit information on the radio interface.

3.3 Numbering

The Inmarsat mobile international number which enables a user in the fixed network to address a specific MES or PID, consists of a three digit country code (871–874) and a nine digit *Inmarsat Mobile Number (IMN)*. In existing systems the IMN is highly structured and therefore somewhat inefficient regarding utilisation of numbering capacity.

Due to the need for increased flexibility, the mini-M system uses a new numbering plan for land-to-mobile calls. The IMN structure for mini-M is:

$$T_1 T_2 X_1 X_2 X_3 X_4 X_5 X_6 X_7$$

where:

- $T_1 T_2$ is the *double T-digit* which uniquely identifies the system. For mini-M, $T_1 = 7$ and $T_2 = 6$.

- $X_1\, X_2\, X_3\, X_4\, X_5\, X_6\, X_7$ is a free-form seven decimal digit number used to identify the MES, terminal equipment and service type or a personal user and service type.

Different IMNs are used to address different services and different terminal extensions on the same MES or different service types related to a personal user. A user subscribing to telephony, facsimile and data services need three different IMNs.

3.4 The ocean region registration process

The Inmarsat-M/B ocean region registration process defined in section 2.4 has been further enhanced in the mini-M system to be more robust and flexible.

For the provision of personal mobility, a mobility management system for storage and distribution of the ocean region registration information has become a requirement.

3.4.1 Signalling units

In order for the MESs to be actively involved in the ocean region registration process, an *Ocean Region Registration SU* has been defined. This SU is defined for transmission from the MES and it includes the MES ID and PID (if applicable), together indicating the correct mapping between the two IDs as well as a log-on/log-off indicator reflecting the purpose of the SU.

Other ocean region registration specific SUs are the *ORR Randomisation Advice SU* used to broadcast control information in the bulletin board, *the Registration Acknowledge SU* used to acknowledge Ocean Region Registration SUs and *the Query SU* used to poll an MES for registration. The ORR Randomisation Advice and Query SUs are transmitted by the *Network Control Station (NCS)*, whereas the Registration Acknowledge SU is to be transmitted by the mobility management system.

The use of ocean region registration specific SUs is illustrated in Figure 3.

3.4.2 Ocean region registration and de-registration

The mini-M ocean region registration process consists of several sub-processes.

The *initial ocean region registration process* is initiated as a result of

- MES initialisation (power-on)

- change of ocean region (antenna re-pointing)

- change of PID status (a smart card is inserted or removed)

- activation of the ocean region registration process via the bulletin board; or

- failure of a previous initial ocean region registration process.

In each case the MES will transmit an Ocean Region Registration SU.

The credibility of the mobility management system is dependent on reliable MES location information in the location databases, which requires regular updating of location information. Therefore, *an ocean region registration update process* has been defined for the mini-M system. The MESs will send the Ocean Region Registration SU at periodic intervals if the ocean region registration update process is activated. In order to adjust the total system signalling load, the interval between these periodic updates is programmable via the bulletin board.

An *ocean region de-registration process* has also been introduced in the mini-M system to achieve more efficient use of system capacity and network resources due to possible early stage termination of land-to-mobile calls. If the ocean region de-registration process is activated, the MES will send an Ocean Region Registration SU with the log-on / log-off indicator set to log-off when the MES power is down. Unfortunately, the reliability of the log-off capability is expected to be low, since a successful log-off requires no re-pointing of the antenna until the MES has been switched off.
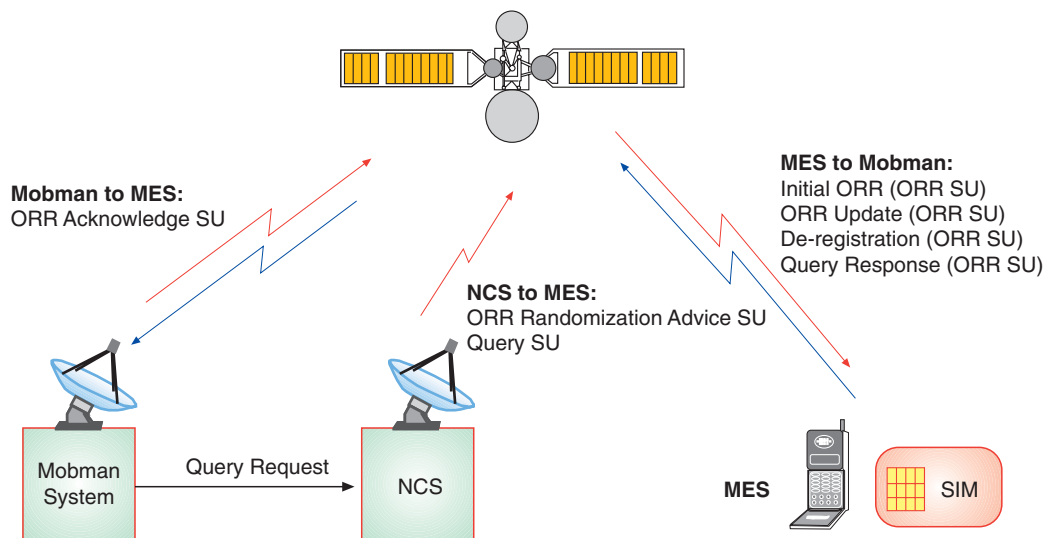

Mobman to MES:
ORR Acknowledge SU

NCS to MES:
ORR Randomization Advice SU
Query SU

MES to Mobman:
Initial ORR (ORR SU)
ORR Update (ORR SU)
De-registration (ORR SU)
Query Response (ORR SU)

Mobman System

Query Request

NCS

MES

SIM

Figure 3 Signalling Units (SUs) used in the ocean region registration process

In the *registration acknowledge function*, the Registration Acknowledge SU is used to acknowledge Ocean Region Registration SUs. The process can be activated or deactivated via the bulletin board. However, de-registrations are never acknowledged.

The *ocean region registration query process* is used if a particular MES registered as logged-on has been silent for a long period of time (i.e. no call activity and no registration updates received). The mobility management system has the opportunity to request the NCS to send a Query SU to the MES. If the MES receives the query, an Ocean Region Registration SU will be sent to the NCS. The NCS will inform the mobility management system whether the query was replied or not or the Ocean Region Registration SU will be received directly by the mobility management system.

The Ocean Region Registration process is controlled via the ORR Randomisation Advice SU in the bulletin board. This broadcast information instructs the MESs

- whether the Ocean Region Registration SU shall or shall not be transmitted

- whether the NCS or LES will or will not acknowledge receipt of an Ocean Region Registration SU by the transmission of a Registration Acknowledge SU; and

- which of the processes initial ocean region registration, ocean region registration update and ocean region de-registration, have been activated by the network.

3.5 Personal mobility

Terminal mobility means that a user in the fixed network may dial one single number, where the network will route the call to an MES irrespective of the location of this MES.

Personal mobility is the ability to offer call routing and billing facilities to a *user* and not to the MES hardware. The user has a smart card with its own unique PID and will be allocated different personal IMNs for each service subscribed to. For example a
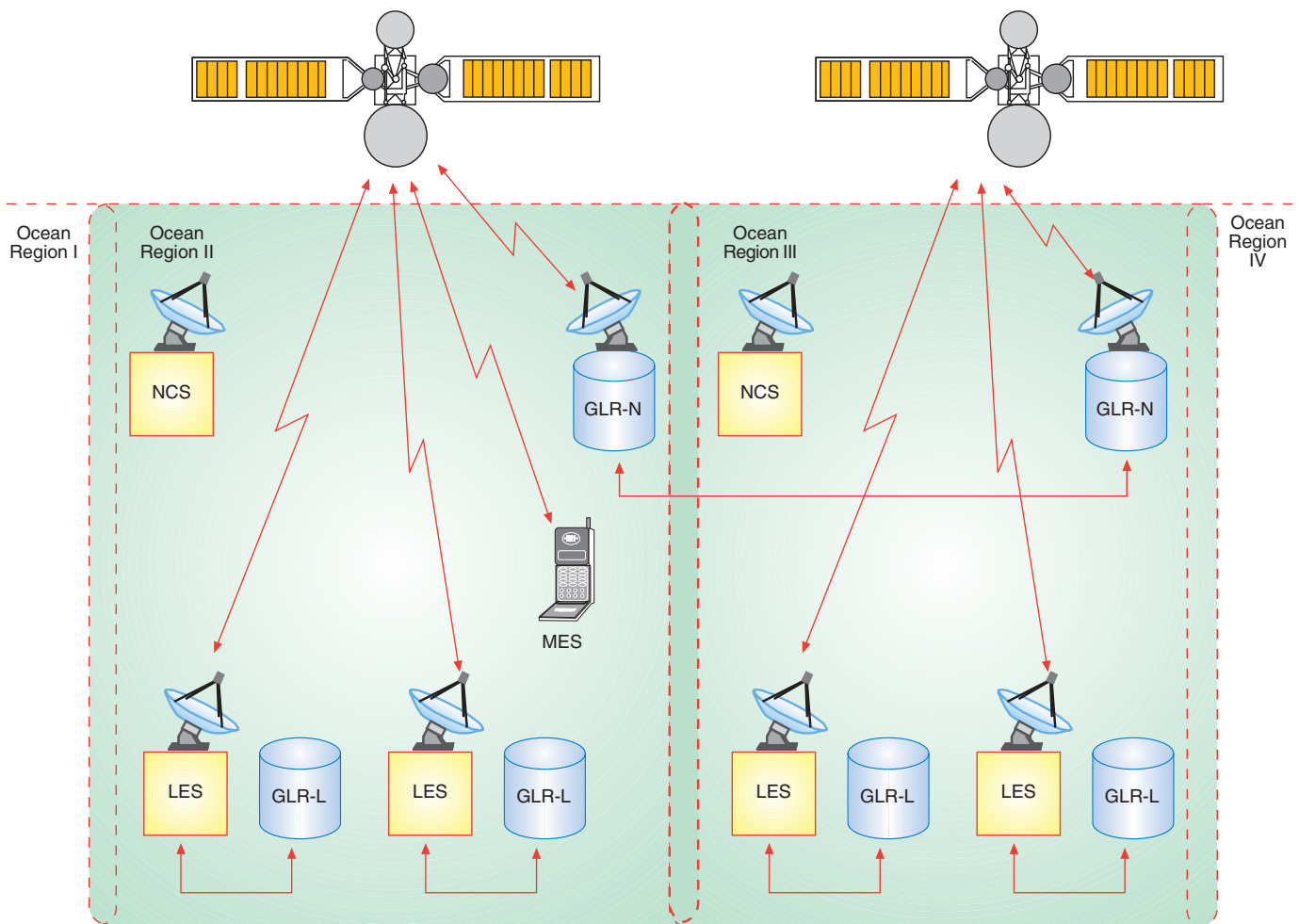

Figure 4 The Inmarsat mobility management system architecture

user subscribing to voice and facsimile services will have one PID but will be allocated two IMNs, one for voice and a second IMN for facsimile. The personal IMN will be used by the terrestrial network to route fixed-originated calls to the user. The PID will identify the user independent from the MES equipment.

Personal mobility is only possible due to the mapping between the PID and the MES hardware ID in the Ocean Region Registration SU. This dynamic mapping is used to direct the call to the MES, where the PID is currently logged on.

3.6 Authentication

As smart cards will be introduced in the mini-M system, the demand for safety aspects to prevent fraud has increased drastically. It has been of great importance to design the smart cards in such a way that fraudulent cloning of cards is precluded. The built in microprocessor has made it possible to perform authentication algorithms for PID users. Authentication is not a service, rather a safety function to verify subscriber identity.

4 The mobility management (Mobman) system

The overall objective with mobility management operation is to manage

- location information necessary for the provision of terminal mobility; and

- PID to MES ID mapping information necessary for provision of personal mobility in mini-M.

Also, the Mobman system keeps the status of each MES and PID. This status may be used by the LES operator for early termination of land-to-mobile calls. The possible status values are *On, InDoubt1, InDoubt2* and *Off*, where *InDoubt1* and *InDoubt2* are set based on expiry of programmable timers in the absence of MES/PID activity.

4.1 Baseline Mobman system architecture

Figure 4 illustrates the Mobman system architecture. For simplicity, only two ocean regions are shown.
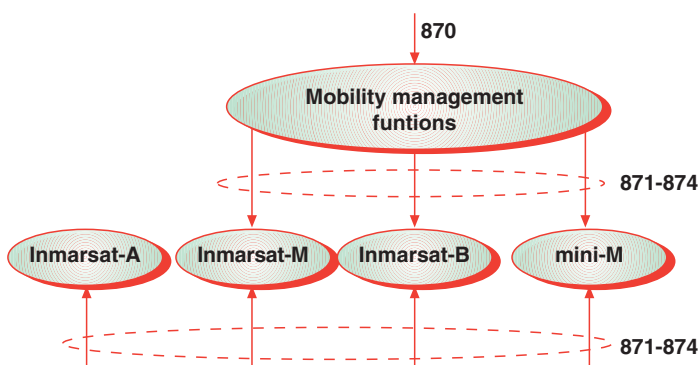

Figure 5 Mobility management is a service improvement offered in the Inmarsat-M/B and mini-M systems

There is one *Global Location Register – Network (GLR-N)* database in each ocean region containing location information for all MESs and PIDs in *all* ocean regions. An advantage of maintaining multiple GLR-N replicas centrally is that it provides redundancy at network level. The GLR-Ns are interconnected via terrestrial leased lines in order to disseminate location and status information. The GLR-Ns are not involved in the call set-up procedures.

A *Global Location Register – Local (GLR-L)* database is located at the LES operator site and provides a local image replica of the GLR-N location and status information. This information is broadcast by the GLR-Ns on a satellite broadcast channel in each ocean region. The GLR-L is interrogated at call set-up for routing purposes.

Telenor Research and Development has contributed to the specification of the mandatory technical performance requirements for the GLR-Ns and the GLR-Ls and this work has formed the basis for the Inmarsat-M/B and mini-M Mobility Management System Definition Manual (SDM) [2]. However, the detailed GLR-L implementation is at the discretion of the LES operators, and it is not precluded that the GLR-L may serve more purposes than those specified in the mandatory requirements given by Inmarsat.

4.2 Mobility management functionality

The Mobman system functionality comprises two main aspects, the *service aspect* and the *management aspect*. The former aspect includes location data interrogation for routing purposes, while the latter comprises location data management, MES registration functionality included.

Mobility management can be looked upon as a service improvement offered for land-to-mobile calls, since the existing mobile-to-land access method will remain unaffected. Figure 5 illustrates land-to-mobile access to the Inmarsat services as a layered architecture. The separation between existing services and the mobility management functions makes it possible to use the existing access methods as a fallback solution. Figure 6 gives an example of land-to-mobile routing of a call with mobility management as seen from a service aspect point of view. Steps 1–3 are part of the mobility management functions. A detailed description of the service aspect is given in [3].

The management aspect is illustrated on a high level in Figure 7, showing the signalling flow caused by an MES transmitting an Ocean Region Registration SU.

4.3 Mobman system elements

This section describes the functions of the different system elements involved in the Mobman system as illustrated in Figure 4.

4.3.1 The GLR-N

The GLR-N is the main network element of the Mobman system. The main tasks to be performed by the GLR-N are:

- Receive mobility management information from the MESs, LESs, NCS and other GLR-Ns for maintenance of the GLR-N database

- Replicate received information to the other GLR-Ns, including restoration procedures

- Broadcast information to all GLR-Ls in the same ocean region

- Provide the GLR-Ls with restoration data after failure using terrestrial dial-up lines

- Perform network initiated sign-off including transmission of query requests to the NCS.

4.3.2 The GLR-L

The main tasks to be performed by the GLR-L are to provide the LES operator with

- location information as received from the GLR-N for the provision of terminal mobility

- status information concerning the activity level of the MES and PID

- PID to MES ID mapping as received from the GLR-N for the provision of personal mobility.

4.3.3 The LES

The GLR-L will be integrated with the LES on channel unit level. This means that the return Mobman channels will share capacity on the existing LES TDM channels. However, the Mobman broadcast channel will be received on a separate TDM channel. It is up to the LES operator to implement the GLR-L as an integrated part of the LES *Access Control and Signalling Equipment (ACSE)* or on a separate platform.

Call set-up routines at the LES may detect discrepancies between data received from the MES and data stored in the GLR-L tables, such as

- MES location differs from the registered ocean region
- incorrect registered PID to MES ID mapping.

The LES/GLR-L must have the capability and is obliged to inform the Mobman system via a *Call Based Update SU* if such discrepancies are detected.

Transmission of a Call Based Update SU will result in a broadcast from the GLR-N. All corrections based on detected discrepancies are to be sent from the GLR-N, as local corrections made in GLR-Ls without informing the Mobman system will result in inconsistent databases.

(1) Route the 870 call to the interrogation node
(2) Request routing information
(3) Provide routing address based on the existing Inmarsat country codes
(4) Route the call to an LES based on the routing address

Figure 6 Land-to-mobile routing with mobility management functionality

4.3.4 The NCS

All calls, mobile originating and mobile terminating, are assigned SCPC traffic channels by the NCS via a *Channel Assignment SU* transmitted to the LES and to the MES. The Channel Assignment SU transmitted to the LES is monitored by the Mobman system. This monitoring of call activity is seen as an additional source for maintaining correct location information of the MESs. Especially for Inmarsat-M/B this is useful as these systems have a less "aggressive" and adjustable log-on function compared to mini-M.

The NCS is also responsible for transmission of the Query SU upon request from the GLR-N.
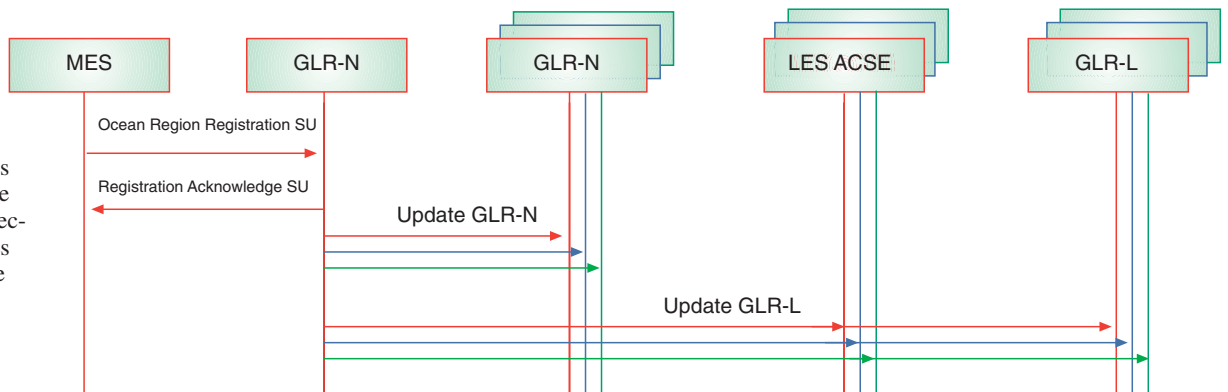

Figure 7 The MES registration procedure. The GLR-N replicates the registration update to all GLR-Ns and broadcasts the update to all GLR-Ls in the same ocean region using a point-to-multipoint HDLC protocol
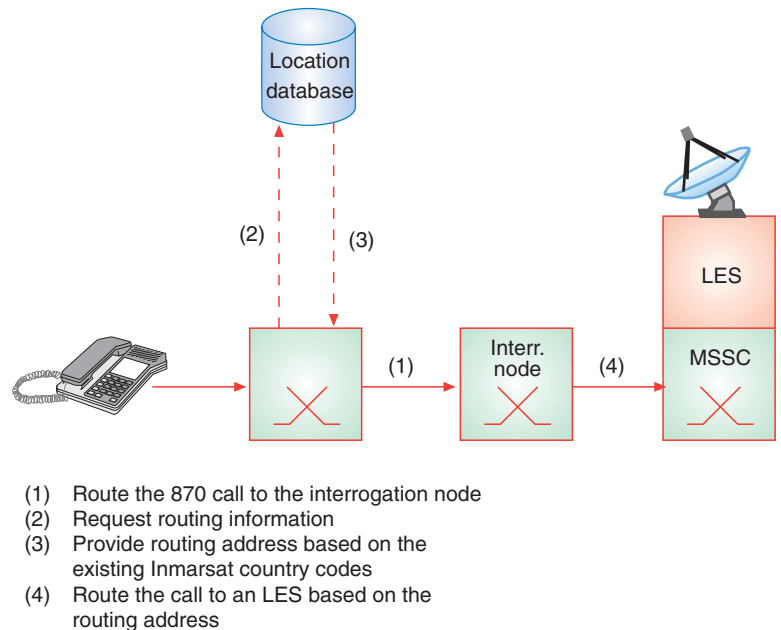
Conclusions

The capability of addressing Inmarsat MESs by the use of one Single Network Access Code (SNAC) has been a long term objective for a number of years. The Inmarsat-M/B MESs are prepared for mobility management operation as an ocean region registration capability is included, but no network infrastructure has been specified or implemented by Inmarsat and its signatories to handle this until recently.

The Inmarsat mini-M system will be introduced in 1996. This system builds on the Inmarsat-M system and provides the same basic services via terminals with reduced size and weight, mainly addressing the land-mobile market. In addition, mini-M is prepared for the provision of value added services, and will also be addressing personal subscribers identified by smart cards.

For the provision of personal mobility in mini-M, a mobility management platform has become a requirement in order for personal users to register on any mini-M MES and for the distribution of the related mapping information to the LES operators.

The Inmarsat-M/B and mini-M mobility management system has been specified by Inmarsat in co-operation with Telenor Research and Development and is about to be implemented. In addition to the support of personal mobility in mini-M, this system will provide a platform for SNAC operation as well as being the necessary underlying infrastructure for the global offering of value added services in the Inmarsat-M/B and mini-M systems.

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5 Inmarsat. *Inmarsat mini-M system definition manual.* London, 1996. Version 1.2.

Abbreviations

ACSE	Access Control and Signalling Equipment
AOR/E	Atlantic Ocean Region East
AOR/W	Atlantic Ocean Region West
CCITT	International Telegraph and Telephone Consultative Committee
GLR-L	Global Location Register – Local
GLR-N	Global Location Register – Network
ID	Identity
IMN	Inmarsat Mobile Number
IOR	Indian Ocean Region
LES	Land Earth Station
MES	Mobile Earth Station
MSSC	Mobile Satellite Switching Centre
NCS	Network Control Station
ORR	Ocean Region Registration
PID	Personal Identity
POR	Pacific Ocean Region
PSTN	Public Switched Telephone Network
SCPC	Single Channel Per Carrier
SDM	System Definition Manual
SIM	Subscriber Identity Module
SNAC	Single Network Access Code
S-PCN	Satellite Personal Communication Network
SU	Signalling Unit
TDM	Time Division Multiplexing
UPT	Universal Personal Telecommunications