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## New telecommunications services and their social implications

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The various forms of message (alpha-numeric, audio, or audio-visual) and the various numbers of people receiving a single message produce a matrix of possible telecommunications services. The two main groups of existing service (wireless broadcasting and wired switched telecommunications) at present occupy separate parts of this matrix. Both groups of service will grow, and are likely to extend into new forms of message and audience size. In an increasingly information-based society, these developments in telecommunications seem likely to have profound social effects at the individual, organizational, national, and global levels. Any novelty contains powers for good or ill. The good or ill is in the usage not in the device. The providers of telecommunications do so within the mores of the society of the day and take note of those mores. It can be argued that those mores are influenced most by the climate of ideas and analysis that is created by writers, publishers, broadcasters, academics and politicians, and only secondarily by the devices and novelties of the telecommunications engineer.

This paper argues that the new telecommunications services in prospect over the next 25 years will have profound social effects, and that these present opportunities and dangers of potential concern to all those involved in the provision or use of telecommunications.

## NEW TELECOMMUNICATIONS SERVICES

New telecommunications services include computer communications, facsimile, mobile telephone and paging, videotelephone, conference television, Viewdata, cable television, remote metering, surveillance, and alarm services. To understand the general trends underlying these innovations, it is necessary to see them in the wider context of on the one hand the existing telephone service, and on the other hand the broadcasting services of radio, television and teletext. Two important dimensions of classification are the form of the message and the number of people who receive the same message. The form of the message may be audio-visual (e.g. television), audio (e.g. telephone), or alpha-numeric or graphic (as is the case with any written or printed material). The number of people receiving the same message may be anything from one to many millions.

Existing and prospective electronic communication services are laid out in terms of these two dimensions in figure 1 (dealing with wired services) and figure 2 (dealing with wireless services). In each figure the existing services have been boxed in a heavy line, the new or prospective services being boxed in a light line. In some cases the prospect is of a completely new service; in most cases the new service does already exist on a small scale, but still awaits the breakthrough from isolated specialized use to general use.

Although the wired and wireless services are today rather separate in terms of their technology, their institutional responsibility, and the nature of the service they provide, this

distinction is a vanishing one. 'Already the point-to-point services such as telephony use the ether for terrestrial microwave transmission, for satellite communication, and for mobile services such as radiophone and radio-paging. Conversely the wireless broadcast services use cables for the relay of programmes from studio to transmitter, and may also use cables for the final delivery of cable television to the home. In terms of the nature of service provided, we shall see below the convergence that is occurring between the hitherto separate telecommunications and broadcasting systems.

		NUMBER OF RECIPIENTS							
		1	1 - 10	10 - 10 <sup>2</sup>	10 <sup>2</sup> - 10 <sup>3</sup>	10 <sup>3</sup> - 10 <sup>4</sup>	10 <sup>4</sup> - 10 <sup>5</sup>	10 <sup>5</sup> - 10 <sup>6</sup>	10 <sup>6</sup> - 10 <sup>7</sup>
ALPHA-NUMERIC & GRAPHIC	TELEX, DATA, FAX.		WORD PROC. AND COMPUTER CONFERENCE	VIEWDATA					
AUDIO	TPH.		AUDIO CONFERENCE	AUDIO INFORMATION SERVICES					
AUDIO-VISUAL	VPH.		VIDEO CONFERENCE	CABLE TV.					

FIGURE 1. Wired electronic communication services.

		NUMBER OF RECIPIENTS							
		1	1 - 10	10 - 10 <sup>2</sup>	10 <sup>2</sup> - 10 <sup>3</sup>	10 <sup>3</sup> - 10 <sup>4</sup>	10 <sup>4</sup> - 10 <sup>5</sup>	10 <sup>5</sup> - 10 <sup>6</sup>	10 <sup>6</sup> - 10 <sup>7</sup>
ALPHA-NUMERIC & GRAPHIC				BROADCAST CEEFAX/ORACLE					
AUDIO			CITIZENS' BAND RADIO	BROADCAST SOUND					
AUDIO-VISUAL					BROADCAST TV.				

FIGURE 2. Wireless electronic communication services.

In the case of the wireless services (figure 2) there is the immediate prospect of expansion into the third form of message (alpha-numeric and graphic) with Ceefax and Oracle. With the increase in local radio, and the prospect of local television, there is a trend for the existing broadcast services to extend down the audience size range – even into the 10–100 range with citizens' band radio of the type which has been growing rapidly in the U.S.A. (Anon. 1975).

In the case of the wired services (figure 1) there is firstly scope for both expansion and improvement in the existing telex, data, and telephone services. This will arise from the use of microelectronics, digital systems, and stored program control, providing more flexible and reliable services with advanced customer facilities. Both the established groups of wired services will extend to serve groups of up to around 100 recipients with the same message – through word processing, computer conferencing (Vallee *et al.* 1974) and multi-party telephone calls. There are also the beginnings of services for both one-to-one and group purposes which provide a visual channel in addition to the audio one (Bell Telephone Laboratories 1969; Collins 1974).

In the area of messages with more than 100 recipients, wired services are emerging to provide all three forms of message. The experimental Post Office Viewdata service will provide business and residential customers with easy and relatively low cost access to data banks of alphanumeric and graphic information (Fedida 1975/6). The recorded information services provided over the telephone (such as time, weather, sports results, financial news) already receive hundreds of millions of calls per annum in the U.K., and seem capable of considerable improvement and expansion. In the case of television, cable distribution provides the technical means of access to dozens or even hundreds of television programmes (Baer 1971; Sloan Commission 1971; Short 1974).

In their practical application many of these new electronic communication services will be closely linked with the electronic *storage* and electronic *processing* of information. A good example of this linkage is the communicating word processing typewriter, which is used to edit text, to store it, and to transmit it electronically. However, the main concern of this paper is with the trends in the electronic *communication* services, as shown in figures 1 and 2.

This brief review shows the variety of new and improved telecommunications services which are in prospect. The factor which lends real significance to these developments is that of cost. For the real costs of telecommunications have fallen enormously over the last 50 years. They will continue to fall for as far ahead as we can see, the prospects for cost reduction being greatest in long distance transmission, and in visual services. This distinguishes telecommunications sharply from its conventional competitors: travel, postal services, newspapers, magazines and books.

#### THE SCOPE FOR TELECOMMUNICATIONS DEVELOPMENT

There is already a high level of dependence, both economic and social, on the basic telephone and broadcasting services. The proposition that telecommunications development will have further profound effects on the social structure can be supported both *a priori*, and by examination of the rôle of telecommunications in the futures which have been predicted by social forecasters. An *a priori* approach could start with Anthony Oettinger's triangle shown in figure 3 (Oettinger 1975). In terms of this diagram, human activities involve the application of energy to achieve the movement and organization of both materials and information, a quartet of activities shown in table 1. Historically, each of these four activities has been a powerful agent of change. Looking to the future, the movement and organization of materials face resource and environmental constraints: constraints on the extraction of materials arising from the increasing cost and environmental damage incurred by working less accessible deposits; constraints on the movement of materials arising from the energy costs, environmental damage and physical risks associated with moving larger quantities of material at higher speeds; constraints on the organization and processing of materials arising from the physical limitations of the

materials themselves and from the difficulty of disposing of waste products. This is not to suggest that the movement and organization of material will decrease or even stabilize: it is simply to suggest that the information-related activities, which do not face these constraints, are likely to play an increasingly dominant rôle as the agents of change in society.

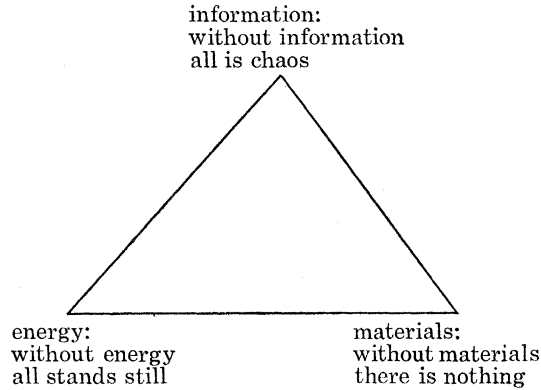


FIGURE 3

TABLE 1

	materials	information
movement	extraction transport	post newspapers books broadcasting telecommunications
organization (i.e. storage and processing)	refining processing manufacture	writing printing computing recording

One social effect of telecommunications is therefore that of pressing forward, in partnership with computers, a pace of change which is largely indifferent to physical resource and environmental constraints. It is in partnership with transportation that telecommunications has its other main social effect: as a force for increasing cohesion and interdependence at both the national and global level. For the movement of materials and information, accompanied by the economic specialization which this implies, cannot but make each individual, and each country, the more dependent upon another.

As Teilhard de Chardin puts it in *The phenomenon of Man* (1955):

Originally and for centuries there was no serious obstacle to the human waves expanding over the surface of the globe; probably this is one of the reasons explaining the slowness of their social evolution. Then, from the Neolithic age onwards, these waves began, as we have seen, to recoil upon themselves. All available space being occupied, the occupiers had to pack in tighter. That is how, step by step, through the simple multiplying effect of generations, we have come to constitute, as we do at present, an almost solid mass of hominized substance. . . .

And as though dilated upon themselves, they each extended little by little the radius of their influence upon this earth which, by the same token, shrank steadily. What in fact do we see happening in the modern paroxysm? It has been stated over and over again. Through

the discovery yesterday of the railway, the motor car and the aeroplane, the physical influence of each man, formerly restricted to a few miles, now extends to hundreds of leagues or more. Better still: thanks to the prodigious biological event represented by the discovery of electro-magnetic waves, each individual finds himself henceforth (actively and passively) simultaneously present, over land and sea, in every corner of the earth.

Or, as he argues in *The future of Man* (1959):

No one can deny that a network (a world network) of economic and psychic affiliations is being woven at ever increasing speed which envelops and constantly penetrates more deeply within each of us. With every day that passes it becomes a little more impossible for us to act or think otherwise than collectively.

This, then, is the *a priori* case for the proposition that telecommunications improvement will have profound social effects. Support for the same proposition can be produced by examining the rôle of telecommunications in concrete futures predicted by social forecasters. For example, the five components of Daniel Bell's 'post industrial society' (1974) are:

(1) Economic sector: the change from a goods-producing to a service economy. ('The United States today is the only nation in the world in which the service sector accounts for more than half the total employment and more than half the Gross National Product. It is the first service economy, the first nation, in which the major portion of the population is engaged in neither agrarian nor industrial pursuits.')

(2) Occupational distribution: the pre-eminence of the professional and technical class. ('The expansion of the service economy, with its emphasis on office work, education, and government, has naturally brought about a shift to white-collar occupations. But the most startling change has been the growth of professional and technical employment – jobs that usually require some college education – at a rate twice that of the average.')

(3) Axial principle: the centrality of theoretical knowledge as the source of innovation and of policy formulation for the society. ('In effect, theoretical knowledge increasingly becomes the strategic resource, the axial principle, of a society. And the university, research organizations, and intellectual institutions, where theoretical knowledge is codified and enriched, become the axial structures of the emergent society.')

(4) Future orientation: the control of technology and technological assessment. ('The development of new forecasting and "mapping techniques" makes possible a novel phase in economic history – the conscious, planned advance of technological change, and therefore the reduction of indeterminacy about the economic future.')

(5) Decision-making: the creation of a new 'intellectual technology'. ('What is distinctive about the new intellectual technology is its effort to define rational action and to identify the means of achieving it. All situations involve constraints (costs, for example) and contrasting alternatives. And all action takes place under conditions of certainty, risk, or uncertainty.')

There is wide support for the proposition that we are moving toward a knowledge-based society of this kind. It appears in Hermann Kahn's 'long term multi-fold trend of Western culture' (in *Things to come*, Kahn & Bruce-Briggs 1972) which includes among its features:

- bourgeois, bureaucratic, and meritocratic élites;
- accumulation of scientific and technical knowledge;
- institutionalization of technological change, especially research, development, innovation, and diffusion;

westernization, modernization, and industrialization;  
 decreasing importance of primary and secondary and tertiary occupations; increasing importance of tertiary and quaternary occupations;  
 increasing literacy and education and the 'knowledge industry' and increasing rôle of intellectuals.

It is a trend which lies at the heart of Richard Meier's *Communications theory of urban growth* (1962):

The commodities and securities markets, where communications are highly integrated and minutes or seconds may make a difference, support thousands of individuals who collate records and files with the incoming price quotations and news events, and these must be compressed into a small area. Another such complex exists in government, where the slightest hint of policy change should evoke both reaction and adjustment. An administrative agency that is not on the trunk or main branches of the grapevine soon finds itself with a shrinking budget . . . The need for direct face-to-face contact offers perhaps the best explanation for the strong attraction retained by the urban centre. *Ad hoc* organizations can be freely formed and dissolved in an environment containing tens or hundreds of thousands of alert, ambitious individuals.

It is a trend which has been documented over the years in statistical studies by Gottman (1961), Machlup (1962), Parker (1976), Porat (1976), and Lavey (1974). If we are indeed moving toward an international knowledge-based society, there can be little doubt that telecommunications is a key factor in the process.

#### THE SOCIAL SIGNIFICANCE OF TELECOMMUNICATIONS DEVELOPMENT

At the level of the individual and the family, telecommunications development seems likely to have the paradoxical effect of increasing choice while decreasing variety. Already the television viewer can summon into his home a kaleidoscopic choice of information and entertainment, be it sermons or show-jumping. With the advent of advanced cable television, this choice would increase many-fold, producing, in the phrase of the Sloan Commission, a 'television of abundance'. But the very extension of this choice robs what it touches of its true variety. The processes of finance, of production, and of presentation in a standard range of colours on a television screen of standard dimensions, impose a certain sameness as between sermons and show jumping, or as between science fiction and news. In another context, the improvement of telecommunications will make it more practicable for the individual to work from his home, be it in town or country (Glover 1974; Nilles, Carlson, Gray & Hammeman 1976; Short 1975). However, this increase in choice too may be countered by a decrease in variety, since with such a development the home will be less of a home and more like an office, and indeed socially the country will be more like the town, being occupied by many people carrying out urban rather than rural jobs.

At the level of the organization, the possible effects are equally paradoxical. In one sense, telecommunications will facilitate the growth of the great multinational corporations. In another sense, however, they will allow small and specialized organizations to flourish – offering their services, via telecommunications, to a diverse clientele.

The duality persists at the national level. Telecommunications seems likely to stimulate the dispersal of office work from London to regional and rural centres. This process has amenity

benefits for the workers who disperse, and perhaps economic benefits for the receiving areas, but it runs the risk of undermining the economy of the cities which are left behind (Thorngren 1970; Goddard 1973).

It is at the global level that the duality is most acute. In the long term, we must surely accept that telecommunications development will lead to increased interpenetration, increased interdependence, tending towards McLuhan's 'global village', towards Teilhard de Chardin's planetary 'common brain'. The social effects of this tendency are double-edged. It can be seen as a process of humanization, in which people act increasingly as part of an organic whole, or one of dehumanization, as people become cogs in a great machine. Those of an optimistic turn of mind can join Teilhard de Chardin in a joyous celebration of evolutionary climax:

The last blank spaces have vanished from the map of mankind. There is contact everywhere, and how close it has become! Today, embedded in the economic and psychic network which I have described, two great human blocks alone remain confronting one another. Is it not inevitable that in one way or another these two will eventually coalesce? Preceded by a tremor, a wave of 'shared impulse' extending to the very depths of the social and ethnic masses in the need and claim to participate, without distinction of class or colour, in the onward march of human affairs, the final act is already visibly preparing . . . Who can say whither, coiled back upon our own organism, our combined knowledge of the atom, of hormones, of the cell and the laws of heredity will take us? Who can say what forces may be released, what radiations, what new arrangements never hitherto attempted by Nature, what formidable powers we may henceforth be able to use, for the first time in the history of the world? This is Life setting out upon a second adventure from the springboard it established when it created humankind.

For those of a pessimistic turn of mind, there lurk the dangers of inefficiency, of dehumanization, and of totalitarian manipulation. The first two dangers are illustrated in E. M. Forster's short story *The Machine stops*, written before World War I:

Imagine, if you can, a small room, hexagonal in shape like the cell of a bee. It is lighted neither by window nor by lamp, yet it is filled with a soft radiance. There are no apertures for ventilation, yet the air is fresh. There are no musical instruments, and yet, at the moment that my meditation opens, this room is throbbing with melodious sounds. An armchair is in the centre, by its side a reading desk – that is all the furniture. And in the armchair there sits a swaddled lump of flesh – a woman, about five feet high, with a face as white as a fungus. It is to her that the little room belongs . . .

There were buttons and switches everywhere – buttons to call for food, for music, for clothing. There was the hot-bath button, by pressure of which a basin of (imitation) marble rose out of the floor, filled to the brim with a warm deodorized liquid. There was the cold-bath button. There was the button that produced literature. And there were of course the buttons by which she communicated with her friends . . .

The clumsy system of public gatherings had been long since abandoned; neither Vashti nor her audience stirred from their rooms. Seated in her armchair she spoke, while they in their armchairs heard her, fairly well, and saw her, fairly well . . .

Toward the end of the story, however, some defects begin to appear:

Time passed, and they resented the defects no longer. The defects had not been remedied, but the human tissues in that latter day had become so subservient that they readily adapted



themselves to every caprice of the Machine. The sigh at the crisis of the Brisbane symphony no longer irritated Vashti; she accepted it as part of the melody. The jarring noise, whether in the head or in the wall, was no longer resented by her friend. And so with the mouldy artificial fruit, so with the bath water that began to stink, so with the defective rhymes that the poetry machine had taken to emit . . .

But there came a day when, without the slightest warning, without any previous hint of feebleness, the entire communication system broke down, all over the world, and the world, as they understood it, ended.

The last two dangers – of dehumanization and totalitarian manipulation – are illustrated, in a terrifying way, in George Orwell's *Nineteen eighty-four*:

Behind Winston's back the voice from the telescreen was still babbling away about pig-iron and the overfulfilment of the Ninth Three-Year Plan. The telescreen received and transmitted simultaneously. Any sound that Winston made, above the level of a very low whisper, would be picked up by it; moreover, so long as he remained within the field of vision which the metal plaque commanded, he could be seen as well as heard. There was of course no way of knowing whether you were being watched at any given moment. How often, or on what system, the Thought Police plugged in on any individual wire was guesswork. It was even conceivable that they watched everybody all the time. But at any rate they could plug in your wire whenever they wanted to. You had to live – did live, from habit that became instinct – in the assumption that every sound you made was overheard, and, except in darkness, every movement scrutinized.

#### ACTION IMPLICATIONS

As with other technologies, the social impact of telecommunications development seems double edged. Can we then dismiss questions of social impact, and get on with the job of providing new and improved telecommunications services? Surely not. To accept that the social impacts may cut both ways is not to accept that we are helpless to influence their direction. The development of telecommunications affects or is affected by the individual consumer, the business firm, the telecommunications industry (including the telecommunications administration), the Government as purchaser of telecommunications for social purposes, the Government as regulator of the economy and society, and the body of journalists, authors, and academics writing in this field. Each of these parties can, through their vigilance, help to reap the benefits of efficient telecommunications while avoiding the worst social dangers.

The individual should develop an awareness of what telecommunications can do for him now and in the future – and with this a healthy grasp of its limitations. He should value the old media for their distinctive characteristics, and he should see the bland and standardized electronic image as the gateway to the richer sensations of direct experience.

Business firms and other institutional users of telecommunications should educate themselves about the use of computers and telecommunications, seeing these as increasingly useful tools in the conduct of their affairs. As educated and powerful consumers of telecommunications, impatient with inefficiency and alive to international comparisons, they can be a powerful force for improvement. The new telecommunications services will create opportunities for the diversification of existing businesses, and the creation of wholly new businesses.

The telecommunications industry and the telecommunications administration should seek to provide as efficiently as possible, and at prices which are in some rational relation to costs, all those telecommunications services for which there is demand. They should alert the other parties to future possibilities, and their social impacts. To quote Anthony Newstead, who was until recently head of National Telecommunications Planning in Australia, the telecommunications administration 'must advise Government and it must also help the communities it serves in developing and articulating their own views to Government. It can only do that through conscious interaction with society – an opening up of the information exchange and planning processes, the involvement of communities through action research and field trials of new telecommunication forms, and the acceptance that goal-oriented planning is inappropriate for the problems we face and must be replaced by a much more flexible and sensitive process that will emerge through the development of a wide, ongoing rapport with society.' While fully accepting this, I suggest that it would be inappropriate and inefficient to go further and to burden the telecommunications industry and the telecommunications administration with the essentially political task of intervening in the market process to avoid social dangers and secure social benefits.

The Government as purchaser of telecommunications for social purposes should be an informed and rational buyer, whose strategies are based on clear definition of ends and careful assessment of alternative means. Indiscriminate or historical cross-subsidies between telecommunications services are no way to achieve this objective.

It is to the Government as regulator of the economy and of society that the central rôle of guiding the social impact of telecommunications falls. At a relatively mundane level, the Government must be alive to the external costs and benefits produced by telecommunications, particularly where these are of a diffused kind which cannot be caught within the market mechanism, or are concerned with a scarce resource (such as radio frequency spectrum) for which the market is an inappropriate means of allocation. In such cases the Government must be ready through taxes, subsidies, or regulation, to bring these external costs and benefits to account.

When we turn to the sweeping long term changes which telecommunications may produce at the national and global level, we are in a realm of high politics. Yet it is in facing fundamental and long term questions that the political mechanism (with its understandable electoral pre-occupation) seems weakest. Although these questions are political it is perhaps asking too much to expect politicians to provide the intellectual leadership in their analysis. This brings us to the crucial rôle of journalists, authors and academics, in raising and analysing questions concerning the social impact of telecommunications. Unless these questions are common currency and widely understood, unless there is a lively generation of strategies for their solution, unless all this is underpinned with a sound theoretical understanding of the processes at work, there is little hope of our responding wisely to these challenging opportunities and dangers.

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