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REPORT ON THE KIRUNA SEMINAR ON THE REGIONAL IMPACT OF ADVANCED TELECOMMUNICATIONS SERVICES

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Prefatory note

This report summarises the key findings and implications of a Seminar on the Regional Impact of Advanced Telecommunications Services, which was held on 19-21 June 1990 at Kiruna, Sweden. Jointly organised by the Government of Sweden and the OECD Industry Committee's Working Party on Regional Development Policies and Committee for Information, Computer and Communications Policies (ICCP), it was attended by 110 government, industry and academic participants from 20 countries. The report has been written by the Seminar Rapporteur, Dr. Kevin Morgan, University of Wales, Cardiff.

The Seminar was aimed at assessing the benefits and potential impact on lesser developed regions of advanced telecommunications technologies and services. It gave rise to exchanges of experiences on the basis of case studies of companies' and public and social services needs. It followed on that held in Athens in December 1987, jointly organised by the Government of Greece and the OECD, on "Information and Telecommunications Policies for Regional Development".

In writing this final report the Rapporteur wishes to express his appreciation for the comments and suggestions of a number of people at the Seminar, principally John Goddard and Andy Gillespie (CURDS, University of Newcastle), Jean-Paul Gaudemar (DATAR), Marino Benedetti (TISP) and Dimitri Ypsilanti and Hans-Peter Gassmann (ICCP Division, OECD). He would also like to thank Dr. Robin Mansell (SPRU, University of Sussex) for the comments and suggestions which she made.

The report has been structured in such a way that each section mirrors the session titles of the seminar. It may be useful to bear this in mind because some of the issues, inter-related as they inevitably are, surfaced in more than one session. Every effort has been made to minimise any unnecessary overlap and duplication.

The conclusions reached at the Seminar constitute Section VII of the report.

The report has been made public on the responsibility of the Secretary-General of the OECD.

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I

INTRODUCTION

In the course of the last 150 years successive innovations in the modes of transport and communications have had a revolutionary impact on our conception of time and space. At the risk of being banal it is still worth saying that it is not so much the distance between London and Lagos or Tokyo and Toronto that matters, but the time it takes to deliver goods, to transmit information, to receive data, etc. Unlike any technology that has been developed hitherto, computer communications enables firms, governments and individuals to annihilate space with time. More concretely, the diffusion of advanced telecommunications networks and services holds out the possibility -- no more than the possibility, because many other complementary assets are required -- of overcoming the problem of peripherality, a major ingredient of the regional problem in many OECD countries.

The reasons why telecommunications has thrust itself to the top of the policy-making agenda in recent years are twofold. First, the spread of digitalisation has induced a growing convergence between the hitherto distinct sectors of telecommunications and computing, and this new information and communication technology (ICT) sector has untold potential for reshaping the competitive parameters of firms and industries on the one hand and cities and regions on the other.

Second, the liberalisation of the telecommunications sector (e.g. deregulation and privatisation, etc.) is well underway and this process has already produced new rules of the game, especially in the US and the UK, the countries which have been in the vanguard of liberalisation. The new, pro-competitive regulatory paradigm that is emerging will eventually push prices closer to costs, thereby undermining the complex system of cross-subsidies in which heavily used traffic routes (urban areas) have subsidised less heavily used routes (rural areas). As we shall see later, a number of peripheral regions in the OECD are voicing grave concerns about being further marginalised under the new rules of the game.

Policy-makers in the regional development field are now more inclined than ever before to address themselves to the problems and possibilities of telecommunications. Regional policies in OECD countries have been trying to redress the imbalance between lagging and developed regions for many years, largely through re-distributional means (i.e. encouraging inter-regional transfers of industry from strong to weak regions). While these policies have helped to contain the imbalances, they have signally failed to narrow the developmental gap in most cases.

Because of the poor dividends associated with traditional forms of regional policy, oriented as they were towards re-distributing rather than generating economic activity, a new regional policy emphasis begun to emerge in

OECD countries in the 1980s. The novelty of this new regional policy lay in the emphasis given to raising the innovative capacity of indigenous resources within less-favoured regions. Critical to the success of this new regional innovation strategy is the quality of the regional infrastructure.

Time was when "infrastructure" was simply associated with canals, roads and railways. Nowadays, however, any region which operates with such a narrow conception will be selling itself short in the global race to promote its indigenous firms and attract inward investment. Indeed, development agencies throughout the OECD now subscribe to a definition of "infrastructure" which embraces telecommunications and related ICT facilities. Clearly it is not a matter of choosing between roads, railways and the new "digital highways". Each is important in its own way, and together they can complement each other because the complementarities appear to be greater than the substitution effect (e.g. many firms will tend to use videoconferencing facilities and the direct face-to-face meeting).

For a variety of reasons, some of which have already been noted, two very different policy communities -- one based in and around telecommunications, the other in regional development -- have recently been introduced to each other. The relationship is still novel, not to say tenuous, as each has to learn about the idiosyncracies of the other. Even so, if the potential of telecommunications as a force for regional development is to be realised and, conversely, if untapped markets in the regions are to be opened up for telecommunications equipment and services, then these two policy communities will have to commit themselves more wholeheartedly to the relationship in the future.

Some of the key issues in this new relationship were addressed in the Opening Session of the seminar, and these will be examined further in section six. For example, in his opening remarks J-P de Gaudemar offered two very important insights. First, he argued that the major problem was not so much the supply of new telecommunications infrastructure to less-favoured regions (LFRs), but the demand, or use, of that infrastructure. In other words, the low level of demand in LFRs had to be addressed as the key problem and this, in turn, was associated with a lack of awareness as to the potential of telecommunications on the one hand and with inadequate provision for ICT-related skills on the other.

His second, and related, point concerned poor policy design. For example, policy towards telecommunications tended to be spatially blind and, where spatially-specific support programmes did exist, they had little if any connection with education and training programmes. Unless support programmes embraced both demand-side and supply-side factors they were unlikely to be successful.

In relation to public aid programmes Marino Benedetti’s opening remarks touched upon an issue which resonated in many of the ensuing sessions, namely, the sensitive issue of subsidies. Although cross-subsidisation has always been part and parcel of PTO tariffication policies, the question of who was subsidising whom was never fully clear. In the newly liberalised telecom environment such subsidies would be less tenable, hence there was a need for a clear and transparent system of subsidies. Most participants seemed to agree that (transparent) public subsidies to promote telecommunications usage in LFRs was both legitimate and essential.

II

PROVISION OF VOICE COMMUNICATION SERVICES TO RURAL AND REMOTE REGIONS

Given all the hyperbole about the "information-age" and the wide array of smart services that is now available this session was a sobering reminder of the fact that large swathes of people are still without access to basic voice telephony.

This point was graphically illustrated in the presentation of the current situation in Turkey (Bilgen, 1990). Telephone density (defined as circuits per 100 population) is relatively low in Turkey as a whole, and lower still in rural Turkey. In 1987, for example, the number of circuits per 100 population varied from 10.8 in settlements of less than 10 000 people to 22 in settlements with a population above 500 000. In spite of heavy investment in the 1980s the official waiting list for basic voice service has been increasing, with the result that 2.1 million people were waiting to be connected in 1987.

Bilgen identified three barriers to wider voice provision in Turkey: technical barriers (e.g. deciding upon the most appropriate and cost-effective technologies), operational barriers (e.g. lack of maintenance personnel) and strategic barriers (e.g. the low priority accorded to rural penetration). Of these, the third barrier was said to be the most intractable. The problem was succinctly stated in the sixth five-year development plan, which argued that priority should be given to "localities with high inxcome potential, tourism, industry, commerce and foreign economic relations". In Bilgen's view this political priority did not augur well for the provision of voice communications in the rural areas.

A very different picture of the situation with regard to voice provision was given by Hall (1990) on the Swedish case. With one of the highest levels of telephone penetration in the OECD, Sweden is in the forefront of efforts to provide voice telephony to rural and remote regions. Radio technology is the preferred medium and this offers several solutions in low density areas, e.g. point-to-point, point-to-multipoint and mobile systems for fixed-base subscribers.

The main problems in this advanced national context were said to be associated with the liberalised regulatory environment. In the past Televerket's income from the most profitable network services was used to subsidise the more expensive network parts in low density areas. In a competitive market this will no longer be possible. Although radio links are an economically effective technical solution, few residents in rural and remote regions would be able to afford basic service if these links had to be provided at prices which reflected their true costs.

Equally impressive is the record of Telecom Finland, which was outlined in a presentation by Liisa Kirves. The most remote areas of Finland are Lapland, with a mere four inhabitants per square kilometre, few roads and a mountainous topography, and the large archipelago stretching along the south coast over Aland all the way to Sweden, which covers thousands of islands and where the problem is compounded by summer cottages which swells the population to a peak in the summer months.

To cope with this inhospitable terrain Telecom Finland makes great use of the Nordic Mobile Telephone system, which is now nearly ten years old. The NMT network reached national coverage in 1988, with base stations evenly spread all over Lapland and this same network provides good, though not faultless, coverage in the coastal waters of the archipelago. It was stressed that customers in remote areas are deemed to be as "equal" as those in the capital city when it comes to basic voice provision, a sharp contrast to the situation in Turkey. No longer was it necessary to draw expensive telephone lines to remote areas at high costs. The mobile network was widely perceived to have been a major success because it had provided "equitable and high-quality service where the need is, be it high on a mountain or on an isolated island" (Kirves, 1990).

In the final presentation of this session Kerry Mort described the situation in Australia, where some 4.96 million people (out of a total national population of 15.5 million) were classified as living in rural and remote areas. By far the most important programme for extending basic service was the Rural and Remote Area Programme, which began in 1984. By 1992 most rural and remote areas will have been provided with basic service. So much so that Telecom Australia is now consulted by other PTOs on how best to tackle these issues (Mort, 1990).

III

PROVISION AND USE OF ADVANCED TELECOMMUNICATIONS SERVICES FOR SMALL AND MEDIUM SIZED ENTERPRISES

Small and medium sized enterprises (SMEs) are often thought to be either unable or unwilling to exploit advanced telecommunications services, partly because they have neither the resources nor the requisite skills to do so. Consequently, specific measures need to be taken if SMEs are to overcome their resistance to the new information and communication technologies. This session was devoted to these issues.

One of the most sophisticated public initiatives in this field is the Demotel programme in Sweden, which is run by the Swedish PTO to demonstrate advanced telecommunication applications in both private and public sector organisations. Some 35 projects are underway, covering a very broad spectrum of applications, and these are evenly distributed over the whole country. To qualify as a demonstration project the following criteria have to be met: (1) the projects must have at least one external participant together with the Swedish PTO (2) the costs are shared between the participants, though the PTO contributes up to 50 per cent of the total project cost (3) the projects must contain applications of general interest, so as to diffuse the benefits beyond the immediate participants (4) the projects must be based on international standards and (5) a high priority is accorded, wherever possible, to rural locations and SMEs (Carlson, 1990).

One of the projects involved the Municipality of Kalmar, which was designing a new telecommunications strategy for local government in cooperation with the Swedish PTO. The aim is twofold: to increase administrative efficiency and to promote the decentralisation of local government by allowing ordinary residents to have direct access to the information databases of the municipality.

A very different example, this time drawn from the private sector, involved the Association of Electronics and Data in Varmland, in the western part of Sweden. This project aims to promote new communication links between large and small firms so as to exploit such activities as Computer-Aided Design, Computer-Aided Manufacturing and Just-in-Time delivery systems. The main emphasis of the whole Demotel programme was to provide real-life demonstrations of what was possible, in the hope that this would provide inspiration to a wider population of users.

One of the boldest initiatives, based on the aim of creating an electronic marketplace in Ireland, was described by Healy (1990). With the backing of the EC's STAR programme, the Minitel Ireland project aims to develop a narrowband videotex service for both small business users and the general public. The service approach that has been chosen centres on transferring and adapting the key features of the French Teletel service, the most successful

videotex project in the world. To tap existing expertise a consortium of four parties has been formed to implement the service, comprising Telecom Eireann (30 per cent), Intelmatique (30 per cent), AIB Bank (20 per cent) and Credit Lyonnais (20 per cent). The service is scheduled to be launched in October 1990, and the aim is to have 150 000 users (12 per cent of telephone lines) and 300 service providers in the next seven to ten years. This will be a major test of the extent to which the French experience can be replicated in a less developed national context.

An even more daunting challenge was presented by Robalo de Almeida (1990), who outlined the struggle to develop advanced telecommunications services in Portugal. Here the telephone density is low, with 20 main lines per 100 inhabitants, as compared to a European average of 38 main lines. Animated by the need to cut the telecommunications gap with the rest of Europe the Portuguese government has launched a new programme, which is supplemented by STAR funds, to promote both the supply and the use of advanced telecommunications services. The Portuguese case illustrates the enormous variations that currently exist in the European Community.

Using telecommunications as an integral part of a strategy for regional innovation appears to have reached an advanced stage in the case of Norway, where the government has consciously sought to unite supply-side and demand-side initiatives (Hetland, 1990). On the supply-side one of the most significant initiatives was the creation of 14 information technology centres, known as FUNN centres. FUNN is a co-operative programme which involves the Ministry of Industry, the Ministry of Local Government, the Regional Development Fund, the Norwegian PTO, the National Council for Scientific and Industrial Research and Norsk Data. Unlike most other centres of excellence in Norway and abroad, the FUNN centres are located in peripheral areas of the country, the aim being to build up IT-related expertise in less-favoured regions. SMEs are the main target group for the FUNN centres, and the latter are now trying to develop joint research projects with groups of SMEs in particular sectors.

On the demand-side the main effort has been expended on the creation of telematic centres, which were partly inspired by the Swedish experience with telecottages. Instead of linking individual households to the network, the idea here is to concentrate IT facilities in different neighbourhoods so as to provide SMEs and the community at large with access to advanced telecommunications services. On the experience gained so far it seems that when SMEs have mastered the art of using these facilities, they are more disposed to invest in their own equipment. A number of lessons can be drawn from the Norwegian experience, especially as regards policy design, but this and other lessons will be examined later in section six.

By far the most ambitious initiative discussed at the seminar was that of Scottish Highlands and Islands Development Board (HIDB), hence this merits some special attention. Although the Highlands and Islands of Scotland make up 16 per cent of the land area of the UK, they account for only 0.6 per cent of the total UK population. The HIDB’s greatest problem was said to be the area’s remoteness, regardless of whether this was real or perceived. A particular effort had been made to encourage firms whose products are small, light and high value (e.g. electronics). However, distance from suppliers, customers and information sources remains a serious problem.

Three years ago the HIDB became aware of British Telecom's plans for an Integrated Services Digital Network (ISDN), which would revolutionise the speed, the cost and the capability of the telecommunications network. In BT's original plan the Highlands and Islands would have been the last to see the benefits of this new network because of the lack of business volume in the area. After much debate the HIDB decided to make the biggest single investment in its career: it paid £5 million out of its normal budget to gain early access to the ISDN, the total cost of which has been estimated at £16 million. By 1993 some 75 per cent of the business population in the area will be covered and the rest will have had a greatly improved service. As a result the Highlands and Islands will have a five year advantage over most other parts of the UK so far as access to ISDN is concerned.

Among the new services that will be provided are electronic mail, computer conferencing, gateways to facsimile and telex and a wide range of information databases. There will also be a "host" facility which will allow local companies and organisations to develop on-line services and applications without the need to invest in hardware and software. The HIDB strategy is very much predicated on the belief that:

-- the ability to transfer vast quantities of data accurately and cheaply opens up the opportunity for major companies to relocate "back-office" data processing from the expensive South-East of England to the Highlands and Islands, where they also gain access to cheap land costs, a stable and educated labour force and a high quality of life;

-- local companies will be able to offer on-line typing and computer services to customers in the South;

-- on-line computer-aided design and manufacture will increase the efficiency of existing engineering companies in the area;

-- quick access to international databases will provide a valuable marketing tool for local companies;

-- tele-cottaging, tele-working and tele-commuting can now become a reality;

-- the barriers to distance learning and training can be reduced substantially (Hamilton-Grierson, 1990).

As we shall see later, however, telecommunications alone will not be sufficient to overcome the developmental barriers in rural and remote regions. For its part, however, the HIDB appears to be fully alive to the need xfor complementary initiatives, as is evident from the following statement: "we have got to educate the local businesses on how to use the equipment; we have to educate the distant businesses on the new opportunity to relocate their work in areas which are much cheaper and where labour is more plentiful; and we have to train the local people on how to operate the new equipment... The Board does not see IT or the new ISDN as being a panacea which solves all economic problems. Rather, we see up to date telecommunications as a necessary facility which will enable new activities to be undertaken economically, but not as sufficient on their own" (Hamilton-Grierson, 1990).

Whatever else may be achieved, the HIDB experience will be an interesting testbed for the debate as to which comes first, development or telecommunications? It may also demonstrate whether less favoured regions are capable of attracting anything more than routine "back-office" type of activities, a fate that seems to have befallen the Shannon region in the Irish Republic and South Wales in the UK (Morgan, 1990).

IV

PROVISION AND USE OF ADVANCED TELECOMMUNICATIONS SERVICES FOR PUBLIC AND SOCIAL SERVICES

The focus on telecommunications usage in the public service sector is extremely important, not least because services such as health and education are often the Cinderellas at the IT ball. Because of financial constraints, skill shortages and other problems, such services are often the last to benefit from advanced telecommunications, even though they represent a potentially huge market for both IT hardware and software applications. However, as the presentations in this session showed, cost-effective and imaginative IT solutions are being developed in the public service sector to meet social needs that might otherwise go unmet.

Nymo and Engum (1990) presented a case-study of telemedicine in Norway, where the government has prioritised the health sector as one of the main areas for its national plan for information technology. Telemedicine means "organising and integrating IT in such a way that resources outside the local organisation can be used systematically in the activities of the health service". This is particularly important in Norway, where the health service faces two particular problems, namely, long distances between health service institutions and difficulties in recruiting specialised personnel to the more remote locations.

The main partners in the IT project are the university and the hospital in the city of Tromso, Northern Norway. The main aims of the project are to use telecommunications in the fields of diagnosis, treatment and administration. In the case of telediagnosis, for example, the staff at the Tromso hospital are able to access expert knowledge, the only alternative to which would be to move the patient to the specialist. Telemedicine thus disseminates spatially-specific competence from specialists to general practioners. More generally, it allows the general goals of the health service to be met, especially the goal of offering equal health services to all citizens regardless of place of residence. In other words, telemedicine has enabled the Norwegian health authorities to overcome the problem of "professional solitude", perhaps the major reason why it is so difficult to recruit professional personnel to the health service in rural and remote regions.

Canada presents a similar challenge to public service provision on account of its large size, severe climatic conditions and its widely dispersed population. With respect to the provision of health care and education, House (1990) raised the very important issue of appropriate technology. His primary recommendation was that for applications in medicine and distance education, the least expensive, most effective technical systems should be used. He described a province-wide telephone technology-based system linking 80

communities, which is used by a large consortium of health, education and government groups. Uses include distance education for health professionals, administrative applications and the transmission of medical data (electroencephalograms, electrocardiograms, X-rays and other pictures by slow scan television). This major system is financed fully by user fees.

Given the proven value of one-way television and two-way audio in telemedicine and distance education, this would be a desirable option if it were cost effective. In the last few years, with the digitization of telephone networks, it has been shown that effective live television can be transmitted using only part of the full live television bandwidth. This requires the use of codecs (encoder decoder). House concluded by saying that while newer technologies are continuously being developed, policy-makers should continue to look for the most cost-effective telecommunications solutions to the delivery of health care and education. The focus should be on the most appropriate and not necessarily the newest technology.

In view of the current interest in telecottages, Arman (1990) gave a very useful overview of the experience in Sweden, where there are now 40 telecottages in existence. The basic concept of the telecottage is very simple: it should provide opportunities for people and firms in remote areas to develop various IT applications, thus making them less physically bound to existing commercial and cultural centres. Although telecottages are seen as being self-supporting activities the Swedish government has officially supported their formation since 1987.

Telecottages have different profiles and their services vary depending on the needs of the local economy -- indeed, the local market is often the most important market despite the fact that many telecottages are engaged in distance-working. Recently, the telecottages formed a national association, called Tele-Cottages Sweden (TC-S), through which they co-operate, share experiences and compete on the national market with larger computer services companies. Among the projects which TC-S have won are a contract with the National Tax Board, which is developing a new register of 9 million records. TC-S is also engaged in computerising the administration of the Church of Sweden.

Through their mutual co-operation and their common conceptual basis, telecottages are now perceived to be a new form of enterprise, offering opportunities that were hitherto unavailable in rural and remote areas, especially for women and young people, who seem to be particularly attracted to the telecottage concept.

In keeping with its well-earned reputation for innovation in the provision of telecommunications services France is once again among the leaders in devising telecommunication-based strategies for remote and rural regions. In her presentation Bensaid (1990) argued that physical planning faced a new challenge: how to equip rural and remote regions with the information resources that are today vital if an attractive and competitive environment is to be created?

Five years ago DATAR, the French regional development authority, began to devise new communication techniques (NCTs) for these types of region. Today, there exists a sufficient number of widely-used NCT services, networks

and multimedia facilities to service small and rural communities. The latter are thus able to receive in real time, like large centres and sometimes even before them, all that they need in terms of telecommunications, videocommunication and computerised information.

One example of DATAR's bold strategy is the concept of the Multimedia Centre, a sophisticated public facility in which a wide array of NCT services is offered to rural users. For example, the commune of Vic-en-Bigorre (Hautes-Pyrenees), has constructed a Multimedia Centre, which includes a cinema, a computer centre and distance learning aids, and this is associated with the local tourist sector, SMEs, vocational training agencies and cultural associations. It is also connected by cable to 20 or so other quasi-public facilities, so that retirement homes, town halls, schools, sports halls, etc. have an interactive link with the Centre.

Anita Bensaid suggested that such centres formed a new concept of regional development, and many local authorities throughout France were now studying the concept because access to high-quality information services had become a priority for small communities which wanted to attract new activities, economic as well as cultural. One of the most important points about this presentation was that NCT facilities were not just a means of receiving/importing information; they were also a means of transmitting/exporting information, which was very important for the local tourist industry and, far more significantly, for the preservation of local cultural identity. An equally ambitious project was presented by Masao Hirai (1990), who outlined Japan's Teletopia Project, which was conceived by the Ministry of Posts and Telecommunications (MPT) in clear recognition of the critically important role which communications can play in promoting regional development. The Teletopia Project aims to promote the development of economy and society at the regional level by introducing a host of new media in designated model cities. In March 1985 20 communities were designated, since then the total has increased to 70 and efforts are now underway to transform them into wider regional information belts. To promote information exchange within these regional information belts MPT is looking at the potential of differential pricing policies, e.g. applying the base rate for inner city calls over the wider regional territory.

In the final presentation of this session Binelli (1990) gave a graphic account of the potential of satellite-based communication systems for civil protection concerning the Mediterranean Basin. This included a case-study of the ARGO system, which was designed by Telespazio for the use of the Dipartimento della Protezione Civile, Italy's civil protection service. ARGO is the first non-military satellite network devoted to civil protection and territorial monitoring purposes. As a satellite system ARGO represented an ideal solution for applications in the fields of emergency communications and data sensing.

To have effective territorial control it is necessary to monitor a wide range of data, including seismical activity, river levels and meteorological trends. The effectiveness of forecasting and/or preventing natural disasters was said to be directly related to the integrity of a centralised data collection and processing site. In general, the use of a satellite channel as

a transmission medium dramatically improves the prospects for alleviating civil damage, and it could become the unique choice for those networks characterised by a large population of peripheral data collection points scattered over a wide geographical area.

Overall, this session covered a wide range of public service applications, in health, education, physical planning, local administration and civil protection. These may not be the most "glamorous" sectors from the point of view of telecommunications usage -- indeed, the business literature, dominated as it is by discussions of competitive advantage, rarely mentions these kind of sectors -- but, in their own way, each is vitally important in maintaining the social fabric of civilised societies, especially in rural and remote regions. Taken together, these public service sectors also represent a major market for telecommunications services, something worth noting if the benefits of information technology are to become more widely diffused.

V

GENERAL ISSUES IN THE PROVISION AND USE OF TELECOMMUNICATION SERVICES IN LESSER DEVELOPED REGIONS

The final session of the seminar focused on the wider issues of telecommunications and less developed regions. Because a number of very important issues were raised in this session more space will be devoted to these presentations, though, once again, txhe main implications will be drawn out later, in section six.

Much interest was generated in the subject of telecommunications and regional development in the UK (Nonhebel, 1990). One of the main reasons for this interest is obviously the fact that the UK has become a very significant "policy laboratory" in the field of telecommunications, having pioneered liberalisation on the one hand and privatisation (of British Telecom) on the other.

Although telephone penetration in the UK increased from 73 per cent to 82 per cent of households between 1980 and 1986, this overall figure conceals some marked regional contrasts: in 1986, for example, the regional profile was 88 per cent in the South East, 80 per cent in Scotland, 75 per cent in Wales and 72 per cent in Northern Ireland (see appendix 1 for a more comprehensive picture).

As regards the business market Nonhebel presented evidence from a survey of four different regions (South East, North West, North East and the West Midlands) which showed that, in the case of advanced services, the South East had more machines and also made more intensive use of this equipment than any of the other regions. The South East also made greatest use of computer data transmission facilities, far ahead of any of the other regions. Interestingly, however, telecommunications expenditure as a percentage of total operating costs was approximately the same between all four regions.

Less developed regions frequently argue that the current tariff structure is unfavourable to them. What underlies this complaint is the fact that the tariff on frequently used trunk call routes (tariff rate b1) is at a lower rate than on normal routes (tariff rate b). London has very many of these b1 routes compared to northern and western regions, with the result that a subscriber in London will pay less than one in a northern city, who will in turn pay less than one in a rural area.

What further reinforces the comparative advantage of London and the South East is the fact that their local call areas cover a much larger share of the UK market than do the local call areas in the north and the west, and this places higher call charges on companies in the less developed regions compared to equivalent operations in London and the South East.

As to the future, Nonhebel argued that technological change and market liberalisation could have important implications for UK regional development, though in different ways. On the whole technological change was said to offer major benefits for the less favoured regions, and telecommuting was given as the major example. It has been estimated that as much as 20 per cent of the UK workforce could be working from home by 2010, and a number of initiatives had been launched (e.g. Project Frontline) to use telecommuting techniques to transfer IT-related jobs from the South East to less developed areas in the north.

The spatial implications of liberalisation seemed to be less benign. Although the full benefits of liberalisation had yet to be felt, the major benefits had thus far only been visible in the South East, where BT's rival, Mercury, had concentrated its main efforts. Given the prospect of further liberalisation, competing suppliers would still tend to target the most profitable sectors of the market, with the result that the major beneficiaries, both business and residential, were likely to be those located in and around the major cities. In short, Nonhebel argued, there would be "little incentive to provide services to areas which will yield little or no profit (for example many rural areas)".

The overall spatial effect of the UK's policy experiment was still unclear. On the one hand there is the tension between the objective of increased liberalisation and the obligation to provide a universal service, such that "liberalisation might result in outlying regions being placed at some disadvantage relative to more central ones". However, technological change and competition were said to be able to compensate for these disadvantages. These are truly unchartered waters, at least in Europe, hence the interest in the UK "policy laboratory".

Australia, too, is charting a new course in telecommunications policy. Costanzo (1990) provided a graphic account of the problems and prospects for sustaining equitable and affordable telecommunications services in the rural and remote areas of Australia in the new context of liberalisation. As a result of a major public inquiry which started in 1981, the Davidson report recommended a radical restructuring of service provision along the lines of "the user pays", i.e. prices should reflect true costs. The report was not implemented, partly because of its potentially detrimental effects on rural areas. With the advent of a new government in 1983 the principle of universal service at affordable prices was reaffirmed.

However, the problem of sustaining universal service will not go away, and the problem can be simply stated: the cost of providing each new service averages about A$1 200 in metropolitan areas, as compared with A$2 500, while the maximum price charged is A$240 in the former and A$1 440 in the latter areas. To overcome the harsh economics Telecom has been empowered to fulfill its community service obligations (CSOs) by means of internal cross-subsidy. In sharp contrast to the UK, Australia's new policy has allowed Telecom to retain its monopoly over the basic network to enable it to fund its CSOs through cross-subsidies.

In what appears to be the first attempt of its kind, the government decided to estimate the true costs of CSOs, the latter being defined as "a government requirement to provide products and services to community groups at a cost less than the cost of supplying them". This exercise came to the conclusion that the value of Telecom's CSOs in 1987/88 was A$240 million if based on a return on assets of 13.6 per cent, Telecom's actual return on all assets that year.

Telecom must meet the funding of its CSOs within a price-cap arrangement, i.e. it must keep averaged price increases for certain standard services at least 4 per cent below the rate of inflation. In addition to this Telecom is required to divulge the on-going cost of its CSOs in its annual report to parliament. Taken together, these measures provide more visibility to the questions of CSO delivery, equity and affordability than is common in any other OECD country. Not surprisingly, many participants found a number of instructive lessons in this Australian experience.

Given the theme of the seminar intense interest was generated in the paper by Olivier Pascal of the European Commission's DG XIII, which presented some of the initial results of the STAR programme (Pascal, 1990). What basically triggered the STAR initiative was "the sustained cycle of recession -- lack of demand leading to a lack of supply and consequently lower demand -- that is widening the disparities between the regions in Europe in this sector". The basic aim of the STAR programme, designed to run from 1986 to 1991, is to introduce advanced telecommunications services into those Community regions which currently lag behind in terms of economic development, thus virtually all of the 50 regions which benefit from STAR are Objective 1 regions in terms of the new ERDF classification.

A total of 1 500 million Ecus has been allocated to the STAR programme, of which 780 million is provided by the ERDF with the remainder from public and private sector funds at the national level. Of this total budget 80 per cent is devoted to investment in advanced telecommunication infrastructures (e.g. transmission networks and laboratories to test and approve equipment) and 20 per cent is devoted to applications (e.g. feasibility studies, promotion activities and demonstration projects). The major target group is the SME population in each region, firms which are least likely to benefit from advanced telecommunications if left to their own devices. To date the most significant sectors of activity as regards applications are tourism (Spain and Italy), trade and distribution (Portugal), food, transport and services (Italy and Spain).

Among the major lessons that have been learnt so far one of the most important is the difficulty of arranging "co-management" between all the actors involved: telecom operators, service suppliers and financiers on the one side and the regional, national and Community authorities on the other. For example, it takes a minimum of 12 months to set up a viable organisation to define a project within the guidelines of the programme.

STAR interacts with the regional development process in two ways: first through the infrastructure, by improving access to major networks and by remedying the "missing links" and, secondly, through sectoral applications, by

enhancing SME awareness of the ways in which advanced services can improve product, process and organisational capabilities. These two dimensions, supply and demand, cannot be treated separately.

Thus far, Pascal argued, STAR had proved to be a very successful catalyst in both these spheres: it has boosted supply, through encouraging operators to extend their investment programmes in advanced services to less favoured regions; and it has boosted demand, by helping SMEs to realise the strategic importance of advanced telecommunications services. As we shall see in section six, however, a number of modifications need to be made in the STAR-like programmes of the future, especially as regards the 80/20 weighting in favour of infrastructural supply.

In the final presentation Gillespie and Goddard (1990) argued convincingly that telecommunications was a necessary, but far from sufficient, mechanism for regional development. In doing so they suggested that telecommunications strategies cannot be deployed without reference to the form of development that obtains in a particular region. For example, the dominant form of development in many less favoured regions is that of the "branch plant economy", associated as it is with high levels of external control, low local multipliers and a narrow range of technical skills. In this form, which the authors described as "Fordist", the internal economic structure of the region is highly fragmented and incoherent in terms of indigenous linkages.

However, new "post-Fordist" forms of development were said to be emerging, and these appeared to offer more scope for creating a greater degree of internal coherence in the regional economy. The stimulus for this form of development is the decline of vertically-integrated corporate structures on the one hand and, on the other, the premium that is now attached to spatially proximate networks of firms which may provide the basis for a renaissance of regionally-focused production systems.

Distinguishing between these two different forms of development was essential, so it was argued, because they are associated with quite different patterns of telecommunications usage. This was illustrated schematically by two contrasting "development paths" for a hypothetical peripheral region in the UK (see appendix 2). The first column -- the positive scenario -- corresponds to a path which accentuates the possibilities for indigenous development and greater coherence in the regional economy, that is, the "post-Fordist" form of development. In this scenario stronger horizontal integration between firms within the region implies that applications of advanced communications are found across the range of enterprise types, i.e. SMEs as well as the branches of multinational firms.

The second column -- the negative scenario -- corresponds to the traditional "Fordist" form of development. In this scenario the main applications of advanced communications technologies are as delivery mechanisms for externally-produced goods and services; so much so that the region concerned will have little role to play in shaping the infrastructure or the services which run over it because the latter are designed primarily to serve the interests of external organisations.

The main implication of this analysis was thatx telecommunications alone was nowhere near sufficient to enable a region to make the transition from one form of development to the other, from the "Fordist" to the "post-Fordist". As regards telecommunication strategy itself a number of inter-related initiatives had to be combined and, by way of illustration, the authors drew on the recent experience of the Northern region in the UK. Three main elements of this regional strategy were identified: (1) targeted awareness-raising campaigns, as distinct from the less effective general awareness campaigns (2) promoting the "network firm" model of industrial organisation, which involves collaborative networking among similar types of user, e.g. tourist sector and offshore engineering sector and (3) filling the skills gap by establishing an Advanced Telecommunications Centre, which offers a four-year training programme for school-leavers.

One of the most instructive features of this paper was the way in which Gillespie and Goddard reformulated the basic question which we should be asking ourselves. Rather than asking how best to promote telecommunications in less favoured regions, the question ought to be: what sort of telecommunications, aimed at what sort of user and to achieve what sort of developmental objectives? To my mind this is a critically important formulation because there are very many types of region and, because each has its own nuances, generalisations are less than useful from the policy design standpoint.

VI

TOWARDS THE NETWORKED ECONOMY

Having summarised the key findings of the seminar it is time to generalise the discussion. In this final section of the report, which draws on the debates at the seminar, I shall try to distil some of the main implications for both policy-making and future research agendas. Let us remind ourselves at the outset that the seminar covered some very diverse situations: rural and remote regions in countries with advanced networks (Sweden, Norway, Finland and France), rural and remote regions in countries with much less advanced networks (Turkey, Portugal and Ireland) and depressed industrial regions (UK). Clearly, these situations cover a very wide spectrum of need, hence what may be possible in one context may not be sustainable in another. In other words we have to be more alive to the specificity of regional needs on the one hand (e.g. basic versus advanced services) and to the potential relevance of different telecommunications-based delivery mechanisms on the other (e.g. fixed links versus radio technology). The old English adage of "horses for courses" is particularly apt in this respect.

Kiruna was the first seminar with an internaional dimension to stress that irrespective of the diversification and sophistication of the supply of telecoms there can very well be no impact on regional development if care is not taken to ensure a balance between supply and demand and to suscitate demand. One can think that the growing sophistication of the supply of telecoms can produce perverse effects as regards regional development by accentuating a certain number of disparities, especially between urban and rural areas. The Kiruna seminar was one of the first to clearly draw attention to the mirages provoked by increasing supply. The great quality of the seminar was the accent on demand. The major programmes with a regional vocation in the matter of telecoms, e.g. in some countries or in the EEC, run up against this difficulty. Very often it is not so much a question of money but of developing good regional development programmes. An interesting comparison can be drawn between what can be done with telecoms in regional development and the development of road networks. The history of roads shows that once a country constructs a modern road network the problem is then that of developing the fleet of motor vehicles. This in turn leads to a new demand for roads. In telecoms not only is a large part of the supply not congested but is not used sufficiently to attain a threshold of economic return. This means that there are considerable differences between some infrastructures such as roads and railways, and telecoms.

Perhaps not surprisingly, the overwhelming conclusion of the Kiruna seminar was that telecommunications had enormous potential to play a much more effective role in ameliorating what is often thought to be one of the most intractable developmental problems in less favoured regions (LFRs), namely,

that of geographical peripherality. At this general level there was also a good deal of agreement about the fact that a much more pervasive networked economy was emerging, at the intra-corporate level and at the inter-corporate level.

Regarding the first dimension it was becoming clear that corporate innovative performance was more than ever related to a firm's "information base", on its antennae for updating it and on its ability to diffuse this information throughout the entire organisation. Secondly, it was also clear that transactions between firms were increasingly mediated by advanced computer-communications; so much so that as buyer-supplier links become on-line links, this raises the spectre that firms that are not in these networks may soon find themselves out of the market! In both cases telecommunications could help to overcome one of the major problems in the SME sector, the problem associated with the "not small, but lonely" syndrome (Cooke and Morgan, 1990a).

The trend towards a networked economy was perceived to carry both threats and opportunities for LFRs. The threats lay in the fact that many firms in these regions did not have good enough access to, or knowledge of, these advanced networks and services. The opportunities lay in the fact that these networks could, in principle, help firms in the LFRs to access advanced databases (thereby raising them above the constraints of a poorly-endowed local information milieu) and afford them a better opportunity of becoming an on-line supplier to a major customer. Furthermore, the development of telecom networks offers a number of new opportunities within the firm, not least in terms of giving firms much more scope to change production functions at short notice.

However, the transition to the networked economy is paralleled by the transition to a more liberal regulatory environment and, on balance, many participants seemed to think that this did not augur well for LFRs. Although liberalisation was expected to have a number of benefits -- in terms of lower prices, a wider array of services and equipment, better customer service, etc. -- it was widely felt that the shift to cost-based pricing could well disadvantage residents and businesses in the LFRs, especially those in rural and remote areas, where the real costs of supply are that much greater than in high density urban areas. This process of tariff rebalancing is occurring at a time when some sections of the population are still without access to plain old telephone service (POTS), to say nothing of the more advanced type of services now coming on stream.

As regards the residential market we are still confronted with the problem of telephone penetration rates that fall short of genuine "universal service". Although most OECD countries claim to have reached a "saturation" rate in terms of POTS provision, this rate still leaves between 10-20 per cent of households in many countries without a telephone. Even in the most advanced regions, like the South East of England, there were still nearly one million homes without a telephone in the London area in 1986 (Hills, 1989). The fact that London cannot be classified as a "remote" region perfectly illustrates the point that the barriers to "universal service" are social as well spatial in nature.

Assuming that unconnected homes actually want to be on the network, and assuming that genuine "universal service" is still a desirable policy goal, then it follows that much more needs to be done to ensure affordable access and usage, two terms that should not be confused.

Much can be learnt from the US, which appears to be way ahead of Europe in both thinking about, and acting upon, these issues. Policy-makers and researchers in Europe need to pay far more attention to such US initiatives as "Link-Up America", "Lifeline" and the "Universal Service Fund". These vary from state to state: in California, for example, the funds for "Lifeline" service come from a tax on intra-state toll calls, the equivalent of a subsidy from tolls to local calls, whereas New York's service is financed from a tax on so-called "adult" value-added services (i.e. "dial-a-porn"). However, the point to note is that "universal service as a system of cross-subsidies within the telephone network is on the way back in the US, although more targeted towards the poor than previously" (Hills, 1989).

Whatever the weaknesses of such schemes, the fact remains that they represent a real attempt to grapple with a new dilemma in the telecommunications sphere: how to secure "universal service" in a liberalised telecom market? If the US is any guide to the future then it is also worth noting that American consumer groups are once again ahead of their European counterparts in their attempt to broaden the definition of "universal service". For example, consumer groups in California argue that traditional "universal service", defined as affordable access to basic telephony for virtually all citizens, is no longer sufficient in the era of the "Intelligent Network". Among the services which they deem to be "basic" are touchtone service, conventional phone service, access to publicly supported information services (e.g. data bases and public library services), educational services and services for the disabled (IN Task Force, 1987; Morgan and Mansell, 1990). The question as to what constitutes "universal service" in the residential market seems set to become an issue in Europe in the not too distant future.

Equally challenging policy initiatives are required if SMEs are to gain the full benefits of advanced telecommunications, and especially SMEs in less favoured regions. Without bold and imaginative programmes to promote more widespread take-up of advanced telecommunications services then it is likely that centre-periphery usage disparities will widen still further. There are two reasons why this may occur, especially in a liberalised telecommunications environment:

-- on the demand side, take-up of new telecommunications services tends to be highest in the most prosperous cities and regions (e.g. New York, London, Paris, Frankfurt). This is because firms in the centres of economic activity tend to be much more alive to the potential of such services, they have the skills to exploit this potential and, perhaps most important of all, their activities are biased towards the more information-intensive sectors and operations (e.g. sectors such as financial services and operations like corporate headquarters);

-- uneven usage is reinforced on the supply side by demand-driven strategies on the part of telecom operators in liberalised environments. In the UK, for example, over 90 per cent of Mercury's revenue in 1988-89 was derived from sites in the City of London, where the UK's largest and most sophisticated business users are located. BT's new service offerings are also biased towards these more lucrative corporate customers, e.g. its new Flexible Access System, a fibre-based broadband transmission system, was deployed first in the City of London (Morgan, 1990).

Spatial biases of this kind are perfectly understandable: they are dictated by the inhospitable economics of network evolution in a competitive environment, i.e. heavy traffic routes in general, and large corporate users in particular, are serviced first as they are the most profitable (Gillespie and Hepworth, 1988). To put it another way, in a liberalised enviroxnment cost-recovery becomes one of the most important criteria when assessing the spatial allocation of investment and this inevitably sets a premium on high traffic routes. These spatial biases need to kept in mind given all the hyperbole about the "distance-shrinking" nature of telecommunications technology.

So what can be done to promote the take-up of advanced services in firms outside the existing centres of economic activity and what models of policy design do we have at our disposal? On the question of policy design the seminar furnished some instructive lessons. Let us consider two of these, the Swedish Demotel project and the European Commission's STAR programme, both of which generated considerable discussion at the seminar.

As we have seen, the major aim of the Demotel project is to generate and diffuse advanced telecommunications applications in private and public sector organisations, especially in SMEs located in less favoured regions. This project is based on some very sound criteria, e.g. the costs are split equally between the user and the telecom operator and, to qualify, the application must be capable of being diffused to a wider population of business users. This strategy, which is very similar to France Telecom's partnership policy for ISDN diffusion in France, embodies two of the cardinal principles of successful diffusion, namely, learning-by-doing (where the user gains practical "hands-on" experience of the new application) and learning-by-interaction (where close buyer-supplier iteration helps to refine the new application). Utilising these basic principles is nowhere more important than in the context of less favoured regions, where the pre-existing stock of knowledge about new applications is particularly deficient.

However, a question was raised (by John Goddard) as to how one actually diffused this innovative experience to a wider group of users when such applications often embody software-specific features and/or proprietary information? Although this was admitted to be problematical, it seems that Demotel managers try to overcome this barrier through the very terms of the project plan, terms which specify that other users can access whatever information is generated. I shall return to this issue of information flow later because, although it is one of the most important barriers to diffusion, it remains one of the least understood by researchers and policy-makers alike.

Turning to the STAR programme, this is perhaps the best known initiative to promote the take-up of advanced telecommunications applications in less favoured regions. But what are the lessons? Although STAR is scheduled to run until 1991 it is not too early to begin an evaluation of the programme. The discussion of this question revolved around four issues. The first, and perhaps most important, issue seemed to be the balance of emphasis as between infrastructural support (80 per cent) on the one hand and applications (20 per cent) on the other. Drawing on the experience of the Irish Republic, one of the recipients of the STAR programme, Mel Healy argued that this 80/20 emphasis was the major failing. In his view the Irish PTO (Telecom Eireann) threatened to soak up 100 per cent of the funds, leaving little or no resources with which to support the applications side (i.e. feasibility studies, promotion activities and demonstration projects).

In this view, a view which was widely supported, the emphasis in future programmes ought to be on applications (i.e. on the demand side) especially as the infrastructure was now in place. Unless this emphasis is changed the less favoured regions might find themselves with a grandiose infrastructure which is not used, the technological equivalent of cathedrals in the desert.

The second lesson, which was partly related to the first, was the need to counteract the excessive influence of the telecom operators in the "co-management" of STAR projects. With their unrivalled expertise in network management, not to mention their commercial muscle and their political influence, the PTOs are often able to dominate the "co-management" coalition, as seems to have been the case in the Irish Republic. Inadvertently, they are aided and abetted by STAR’s heavy emphasis on the supply side of telecommunications. If and when this emphasis between supply and demand is changed, any future STAR-like programmes should try to counteract this inordinate influence by mobilising user groups for example. Indeed, if the aim is to educate the market about information and communication technologies, then there is no substitute for much greater user involvement in the design and development of new applications, as the EC’s RACE programme has now discovered.

The third lesson of STAR is that much more attention ought to be paid to cross-border applications, a point that gains added significance with the advent of the Single European market after 1992. Many participants subscribed to the view that a uniform Europe-wide tariff for the public data network would greatly facilitate such cross-border applications.

The fourth lesson is that "support" means more than money. This was a point which Jean-Paul de Gaudemar made at the beginning of the seminar, when he argued that new organisational structures, permitting greater inter-departmental co-ordination, had to be created at governmental level. Without such a focus, he argued, it would be difficult if not impossible to integrate public support programmes for telecommunications, regional development, education and training. This pertains to all modes of policy delivery (regional, national and supra-national) and it is critically important if we are truly serious about developing a new networking culture. However, we should not belittle the barriers to such organisational innovation in the public sector, e.g. "turf-fights", institutional inertia, department-based budgets etc.

Central to the task of creating a new networking culture is the nature and quality of information flows. The significance of this subject was underlined in the OECD's Athens seminar, where the rapporteur called for an audit of "information environments" (Goddard, 1987). Sadly, however, little or nothing has been done to implement this recommendation, despite the fact that here is a subject which cries out for more extensive research.

Although we blithely talk of the "information economy", of an era in which "information" has become a strategic resource, the fact remains that the quality of information flows varies enormously both within and between firms, and this is ultimately to be explained in terms of that least palpable of factors, namely, "corporate culture". Let us consider two examples to illustrate this point:

1) it has been argued, quite persuasively in my view, that one of the key ingredients in the innovative success of Japanese firms has been the organisation and efficacy of information flows within the firm, especially horizontal flows between different departments, e.g. product design and manufacturing (Aoki and Rosenberg, 1987);

2) recent research on innovative regions in Europe suggests that Baden-Württemberg's industrial success owes much to the quality and strength of information flows between buyers and suppliers in the region, partly due to the long-term, high-trust social relations that were prevalent in the region (Cooke and Morgan, 1990a; 1990b).

This simple but fundamentally important point implies that, in the design of telecommunications policy, we should not assume that an application which has stimulated better information flows in one region will have the same effect when diffused to another region. What this point also implies -- something that cannot be repeated too often -- is that telecommunications policy must be harnessed to other, complementary, initiatives if the quality of "information environments" in the less favoured regions is to be enhanced. Telecoms are very important for making regional development possible but are just one of the prerequisites for success. The major problem is not so much the supply of new telecoms -- the technique -- but more the demand or use of that infrastructure. Of major importance for future work is to show even more clearly what are the gains in economic terms from using this technique in rural areas.

This brings us back full circle to the issue which was raised at the outset of the report: policy communities. We are now in a position to appreciate that the policy challenge is wider, and perhaps more daunting, than arranging a marriage solely between the telecom and regional policy communities because the latter tend to have little or no responsibility for educational and training provision. Of all the complementary assets with which a regionally-focused telecom policy must be orchestrated, none are more important than education and training.

As things stand at the moment few of the players engaged in the regional development policy process have the skills and expertise required to educate the market about new telecommunications applications. They are even less equal

to the larger task of creating a new networking culture in their regions. Indeed, many local and regional development authorities find it difficult to have an informed dialogue with their PTOs, such is their lack of knowledge. None of this should be in any way construed as an indictment of existing personnel; they are simply the product of their age, an age which pre-dated the new ICT paradigm.

What is needed now is a cadre of well-trained professional animateurs, or else hybrid teams, each of which would be equipped to make informed decisions about local needs on the one hand and appropriate telecommunications applications on the other. If the experience of my own region -- Wales -- is any guide, then we can say that such personnel are acutely aware of their shortcomings and, encouragingly, they are keen to acquire the skills needed to participate more fully in the new networked economy. The point is that they cannot do it alone. Given the crucial significance of building bridges between hitherto separate policy spheres, so as to develop cross-functional skills and competence, should bodies like the EC and the OECD not try to do more here? Finally, what are the implications of this analysis for future research and policy-making? At least two sets of questions suggest themselves in each of these categories.

On the research front we need to know a good deal more about information flows; that is to say, what organisational structures and cultural practices are associated with the information flows in "best practice" firms and regions and to what extent, if at all, are they transferable to less favoured regions? Secondly, with the trend towards liberalisation of telecommunications we will need to monitor the effects of more demand-led PTO policies on the residential market and on SMEs in less favoured regions. Here the emphasis ought to be on what can be done to secure genuine "universal service", that is, to increase access and usage of POTS. This emphasis is to be contrasted with the more negative tendency, apparent in both the US and the UK, which is more concerned to monitor drop-off rates.

On the policy front the most important challenge is to devise a spatially-sensitive telecommunications policy and to orchestrate this with regional innovation policies: an integrated approach of this type would be of inestimable value to less favoured regions. Secondly, policy-makers ought to assess the potential for using telecommunications to decentralise economic activity from the major urban centres. This could have two positive effects: it could help to redistribute activity from the "centre" to the "periphery" on the one hand and, on the other, it could help to ameliorate traffic congestion, environmental pollution, skills shortages and inflated property prices, all of which are slowly choking our central cities.

With judicious planning and design, advanced telecommunications couldx help OECD countries to secure three of the most important goals of the 21st century, namely, greater economic efficiency, wider social equity and better environmental balance.

VII

CONCLUSIONS AND POLICY OPTIONS

The main conclusions reached by the seminar participants are set out below.

Regional policies in OECD countries have tried to redress the imbalance between the lagging and developed regions. While in some cases these policies have helped in preventing increasing disparities from occurring between regions, they have not in most cases been successful in narrowing the regional development gap. As a result regional policies have been changing towards greater emphasis on regional innovation, greater use of indigenous resources and on enhancing the viability of regional infrastructures.

The definition of infrastructure by regional agencies has been broadening to include information and communication technologies. This has been in recognition of the role of communication and information technologies in developed economies in terms of the generation of new economic activities, the transactional role of communications through the interlinkage of business activities, their ability to bring new services to regions and the ability to use communications to reduce economic and social disadvantages associated with geographic isolations. Given this "distance-shrinking" potential, telecommunications is now seen as a major item in the repertoire of regional innovation policy.

Advanced telecommunications enables firms in lagging regions to obtain the necessary technical and commercial information required to maintain their relative competitiveness. Such access is important for firms located in regions which have a poorly endowed local milieu. This is especially important for small firms, where the main problem is often not being small, but being lonely. More generally, telecommunications is increasingly important to product, process and organisational innovation so that deprived of such access firms in lagging regions will be unable to implement the adjustments required for modern production and service provision.

Advanced communications in lagging regions not only allows firms to reach-out to the main hubs of economic activity, but also allows these firms to become more integrated in the central stream of economic activity. Such technologies allow firms and administrations to relocate in lagging regions to take advantage of lower costs without losing their day-to-day contact with suppliers, markets and customers.

Such relocation also has positive effects in that it can make an important contribution to easing some of the problems that beset major centres of economic activity (e.g. traffic congestion, inflated property prices, burgeoning salary levels, environmental pollution, etc.).

Innovative use of advanced communications can also help overcome constraints imposed by minimum threshold levels required to economically justify provision of necessary services to remote regions. Concepts of telemedecine, tele-education, the provision of telecottages, and provision of social services through communications are relevant in this regard. Much can be learnt from the Nordic experience with Community Teleservice Centres because this experience would seem to be transferable to other regions.

Despite the potential of advanced telecommunication services for developing regions, the take-up of such services is greatest in the more prosperous cities and regions of OECD countries. The main reasons for this uneven exploitation of telecommunications would seem to be that firms in the centres of economic activity are much more aware of the potential of these services; they have the skills to exploit this potential; their activites are biased towards information-intensive operations and sectors.

These uneven demand-side factors tend to be reinforced from the supply-side because the economics of investment imply that heavy traffic routes and locations are favoured by the telecommunications operators and telecommunication service suppliers when constructing new networks or offering new services.

The increasing liberalisation of telecommunication regulatory structures which are taking place in OECD countries are viewed as generating positive benefits on economies. In that increased telecommunications competition stimulates a more rapid diffusion of innovative services, leads to lower prices and greater technological rivalry it should have positive spill-over effects on lagging regions. But liberalisation also raises some concerns.

In a liberalised telecommunications market structure cost-recovery becomes an important determinant of public telecommunications strategy given cost-oriented tariff policies. This tends to reinforce the predeliction for investment and service provision in high traffic regions.

An underlying objective of the Seminar was to bring closer together two policy communities which have developed independently. As well it was aimed at exchanging experiences. It became clear that there are a range of different national experiences and priorities reflecting particular economic, geographic and social structures. Some countries are still concerned in attaining universal telephone service. In others, some regions take a slow but balanced approach in developing supply and demand simultaneously. For others rapid provision of advanced infrastructure is given priority on the basis that this will allow for the generation of demand and make it easier to attract investment. There are also divergencies in how the problem of providing services to remote and rural regions is tackled. In certain areas emphasis is placed on effective use of existing equipment, in others emphasis is placed on providing more sophisticated and advanced technologies.

It has been recognised that communication technologies provide only a partial solution, and cannot alone provide a solution to regional economic backwardness. That is, telecommunication is a necessary, though by no means a sufficient condition for economic growth and regional development. But, the technological gap between advanced and lagging regions will certainly increase if facilities offered to the advanced regions are not also available in the backward regions. For this reason alone governments should be sensitive to the need to ensure that new communication technologies and services are available in the lagging regions at the same time as in advanced regions.

There has been recognition of the dual role of communication technologies. It can serve to centralise economic activity, it can also be decentralising. For this reason as well a more balanced deployment of telecommunication networks and services should be aimed for. In order to ensure that lagging regions have access to certain key telecommunication services which are available on a wide-spread basis, there may be a need to consider in the future the notion of redefining universal service.

The less favoured regions are unlikely to generate sufficient demand for advanced telecommunications services unless steps are taken to stimulate this demand (e.g. through awareness campaigns and service demonstration projects aimed at local user groups). This demand stimulation exercise would need to be integrated with measures designed to enhance skills for the use of information and communication technologies.

Programmes for the diffusion of telecommunications services in less favoured regions (such as the European Commission's STAR and ORA programmes) ought to be given greater priority than hitherto, otherwise the gross disparities in take-up as between favoured and less favoured regions seem set to continue.

In the context of telecommunications liberalisation it would be inappropriate for governments to impose obligations, without appropriate compensation, on public telecommunications operators to offer new networks and services in developing regions if these investments are uneconomic. There is therefore a need to address more directly, and through targeted regional policies, the problem of uneven development of infrastructure and services, if the benefits of information and telecommunication technologies are to be more widely diffused.

Advancing the diffusion and use of new telecommunication networks and services in lagging and remote regions needs to be part of an orchestrated grouping of policies that work for the same end. Attaining a frictionless plane in the economic geography of nations is not a reality, but certainly the appropriate use of advanced telecommunication services has a role in moving in this direction. To do this there needs to be close co-operation between government and regional administrations, telecommunication operators, service suppliers and user.

Appendix I

Percentage of Households with Telephones in the United Kingdom

	1985/6
Great Britain	82
North	74
Yorkshire and Humberside	79
East Midlands	82
East Anglia	85
South East	88
West Midlands	84
North West	81
England	83
Wales	75
Scotland	80
Northern Ireland	72

Source: Regional Trends (1989).

Appendix II

Peripheral Regions in the Information Economy -
Positive and Negative Scenarios

ASPECT OF THE REGIONAL INFORMATION ECONOMY	POSITIVE SCENARIO	NEGATIVE SCENARIO
A. Information Industries and Information Activities		
A.1 Information industries	Rapid growth within the region	Static or slow growth, with increasing imports of information services
e.g. Audiovisual Production	Further opportunities for an independent regional production sector	Further centralisation of independent production in London
A.2 Information Activities in Other Sectors	Rapid growth of information activities and information jobs, as all activities become more information intensitive	Static, or declining, as existing low grade activities (in private and public sectors) are subject to increasing automation
	Attraction of back-office activities	Perpetuation of low wage clerical orientation to information work in region
A.3 Application of IT in the Workplace	Advanced applications of IT systems, creating added value	Applications focusing on automating existing processes, to reduce costs and labour inputs

ASPECT OF THE REGIONAL INFORMATION ECONOMY	POSITIVE SCENARIO	NEGATIVE SCENARIO
A.4 Application of Advanced Communication Technologies	"Outward" orientation enabling region's enterprises to gain access to remote markets for information products and services	"Inward" orientation, enabling remote enterprises to gain access to the region's markets for information goods/ services
	Creation of new tele-working opportunities	Tele-working based on minimising wage costs, perpetuation of low wage economy role
A.5 Requirements for IT Skills	Growth in the level of regional demand for a broad range of information and IT application skills creates a regional labour market for such skills	Level of demand for information and IT application skills fails to keep pace with national demand growth. Region increasingly integrated into a national (i.e. Southern) labour market with a net outflow of highly skilled and qualified workers
	Innovative use of networks to gain competitive advantage creates opportunities in region for software development/ systems analysts, etc.	Innovative use of networks to gain competitive advantage creates opportunities at head offices in the south for software development/systems analysts, etc. Software packages down-loaded to the regions, limited skill requirements at point of use

ASPECT OF THE REGIONAL INFORMATION ECONOMY	POSITIVE SCENARIO	NEGATIVE SCENARIO
B. Production Activities		
B.1 Organisation of Production	Emergence of flexibly specialised organisation incorporating large and small firms	Extension of Fordist/ Taylorist division of labour based on units of large firms
	Region becomes an increasingly integrated unit of production. Dense internal linkage structure	Region becomes an increasingly fragmented collection of branches. Limited internal linkage structure
B.2 Application of IT in the Workplace	Re-programmable, flexible technologies processes	Automated control and integration of separate
B.3 Application of Advanced Communications Technologies	Gradual development of telematic networks and services underpinning the dense transactional structure of the region’s economy	Internal corporate networks for the control and integration, increasingly in real time, of regional branches by remote head offices
B.4 Implications for Labour Requirements	Multi-skilled production workers, with considerable job autonomy	Production workers take on multiple tasks, with limited job autonomy
	Considerable demand for local programming capability	Software and system development undertaken elsewhere, and remotely maintained
C. Communications Infrastructure		
C.1 Nature of customer demand	Switched services, full inter-connection (as many networks as there are customers)	Point-to-point, little or no inter-connection
C.2 Geographical orientation of customer demand	Strong local orientation, even for advanced networks	Very limited local orientation; demand patterns focus on national and international links

ASPECT OF THE REGIONAL INFORMATION ECONOMY	POSITIVE SCENARIO	NEGATIVE SCENARIO
C.3 Universality of Service	All important	Unimportant
C.4 Participation of small firms in advanced network	High	Low
C.5 Role of region in shaping infrastructure and services	High: region's particular needs feed through into a distinct pattern of demand	Low: infrastucture and services determined by needs of corporate clients at national and international levels

Annex/Annexe

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References

ARMAN, P. (1990) {The Concept of Telecottages}.

AOKI, M. and ROSENBERG, N. (1987) {The Japanese Firm as an Innovative } {Institution,} Stanford University Mimeo.

BENSAID, A. (1990) {New Techniques of Communication: Multi-media Complexes and } {the Development of Fragile Zones in France}.

BILGEN, S. (1990) {A Case-Study of Uneven Penetration of Basic Telephony: } {Problems and Policies in Turkey}.

BINELLI, P. (1990) {Development of Telecommunications Via Satellite in Italy: } {As Regards the System of Civil Protection}.

CARLSSON, B. (1990) {Technical Solutions in Sweden for Providing Companies in } {Rural Areas with Advanced Telecommunications}.

COOKE, P. and MORGAN, K. (1990a) {Learning Through Networking: Regional } {Innovation and the Lessons of Baden-Württemberg, RIR Report No.5, Dept of } {City & Regional Planning,} University of Wales, Cardiff.

COOKE, P. and MORGAN, K. (1990b) {Industry, Training and Technology Transfer: } {The Baden-Württemberg System in Perspective: Report to the Welsh Office,} Cardiff.

COSTANZO, P. (1990) {How Do We Finance the Supply of Advanced Telecom } {Everywhere?}

GILLESPIE, A. and HEPWORTH, M. (1988) {Telecommunication and Regional } {Development in the Information Economy: A Policy Perspective,} PICT Paper No. 1, ESRC, London.

GILLESPIE, A. and GODDARD, J. (1990) {Telecom and What More?}

GODDARD, J. (1987) {Information and Communications Technology for Regional } {Development: Rapporteur's Summary of OECD Seminar,} Athens, 7-9 December.

FAVRE, B. (1990) {The Use of New Communication Techniques in a Small Swiss } {Region}.

HALL, H. (1990) {Technical Solutions for Rural Areas}.

HAMILTON-GRIERSON, P.J. (1990) {Telecommunications in the Highlands and Islands } {of Scotland}.

HEALY, M. (1990) {Stimulating the Electronic Marketplace in Ireland}.

HETLAND, P. (1990) {Telecommunications and Regional Development in Norway: } {Policies and Policy Options}.

HILLS, J. (1989) {Universal Service: Liberalisation and Privatisation of } {Telecommunications, Telecommunications Policy}.

HIRAI, M. (1990) {Outline of Info-Communications Policy for Regional Communities } {in Japan}.

HOUSE, A. (1990) {Telemedicine and Experiences with Telecoms in Remote and Less } {Developed Regions in Canada}.

INTELLIGENT NETWORK TASK FORCE (1987) {The Intelligent Network}, California.

KIRVES, L. (1990) {Mobile Telephone Networks: Rural Applications and Examples } {from the Finnish Archipelago and Lappland}.

MORT, K. (1990) {Technical Solutions for Remote Areas}.

MORGAN, K. (1990) {Problems on the Road to Broadband, Paper to the TUC } {Conference:} Broadband 2000, London, 10 July.

MORGAN, K. and MANSELL, R. (1990) {The Coming Intelligent Network, in P. Cooke } {(ed) Regulation, Innovation and Spatial Development, Sage, forthcoming}.

NONHEBEL, M. (1990) {Telecommunications and United Kingdom Regional Development}.

NYOMO, B. (1990) {Telemedicine in Norway.}

PASCAL, O. (1990) {Current Situation of the STAR Programme}.

ROBALO DE ALMEIDA, A. (1990) {Stimulating Advanced Telecom Services in Portugal}.

SCHWARTZ, G.G. (1990) {Telecommunications Competition and Economic Development: } {Conflicting Views and Policy Approaches in the United States}.

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