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**The effects of new information
technology on the less-favoured
regions of the Community**

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technology on the less-favoured
regions of the Community**

by

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PREFACE

This report is based upon a study commissioned by the Directorate-General for Regional Policy of the Commission of the European Communities. The study had three main objectives:

1. To provide a statement of the existing distribution of new information technology within the regions of Europe, including the influence of Community policies on this distribution, and to make a reasoned assessment of the impact of these technologies on the less-favoured and particularly the peripheral regions.
2. To provide guidelines that the Commission might follow in the formulation and execution of Community policy in the field of new information technology in order to take account of the specific problems of the less-favoured regions of the Community.
3. To put forward proposals on what measures might be taken in relation to new information technology for the Community's regional policy especially the non-quota section of the European Regional Development Fund (ERDF).

The study commenced in February 1982 and was completed in November 1983. It was directed and co-ordinated by the Centre for Urban and Regional Development Studies (CURDS) at the University of Newcastle-upon-Tyne, UK. The study comprises work undertaken by experts and consultants in the Member States, as well as by CURDS, and was divided into three phases of work.

Phase I of the study examined the infrastructure of New Information Technology (NIT) in each country, the manufacture of NIT, and its applications within user sectors such as manufacturing, services and agriculture. Particular attention was paid to the regional aspects of NIT. Also reviewed were existing Community and national policies towards NIT. The findings from this phase of the work, drawn together into a report which attempted to provide a European-wide synthesis, were submitted to the Commission in October 1982.

Phase II of the study went on to examine the impact of NIT and its potential contribution to the development of selected less-favoured regions of the Community. Case studies were undertaken in Greece, Italy, Ireland, France and the United Kingdom, with regions selected within them so as to represent regional problem types and potentialities ranging from relatively under-developed agricultural regions to regions undergoing major industrial decline. An additional case study was undertaken to explore telecommunications tariff variations between European regions. The findings of Phase II of the project were submitted in report form to the Commission in October 1983.

Phase III of the project involved providing policy options and recommendations for the Commission (i.e. objectives 2 and 3 above). These were presented in the project final report (November 1983), which also summarised the findings of the previous phases of the project. The current report is based upon the material generated in Phases I and II of the project - it is concerned with the present and likely future impact of new information technology on the less-favoured and particularly the peripheral regions of the Community.

The experts who contributed to the study are indicated below:

Expert

Contribution

'Prognos', Basle.

- Provision of technical advice to CURDS and review of NIT impacts in France and Germany (Phase I).

Professor C. Antonelli,
University of Turin.

- Review of NIT impacts in Italy (Phase I and II).

Dr. A Foley, N I H E,
Dublin and Mr. N. Marshall,
University of Birmingham

- Review of NIT impacts in Ireland (Phase I).
- Case Studies of Mid West and North East Regions of the Republic and the border Region of Northern Ireland (Phase II).

Communication Studies and
Planning Ltd., London.

- Review of NIT developments in Denmark, Netherlands, Belgium and Luxembourg, and assistance to CURDS in connection with the review of the UK situation (Phase I).
- Telecommunication tariffs variation study, in collaboration with CURDS (Phase II).

Centre for Planning and
Economic Research, Athens

- Review of NIT impacts in Greece (Phase I).
- Case Studies of Heraklion, Crete and Salonika, Macedonia (Phase II).

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- Case Study of Languedoc - Roussillon region (Phase II).

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of Reggio Calabria.

- Case Study of Reggio Calabria, Calabria and Catania, Sicily (Phase II).

All other work including the UK Phase I Report, Phase I Synthesis Report, UK Phase II Case Study (Northern Region of England), Phase II Synthesis Report, Phase III Final Report and the present Research Series Report have been undertaken by CURDS.

Acknowledgement

We would like to thank Mrs Olive Teasdale of the Drawing Office, Department of Geography at Newcastle University for her help in re-drawing a number of the maps and diagrams for publication.

CHAPTER ONE

INTRODUCTION

New Information Technology (NIT) is developing rapidly and consequently its definition is still fluid. In a broad sense, the term comprises the use of modern technology for the collection, storage, processing and transmission of information in digital form and covers a broad field of mechanisms, equipment, capabilities and technologies (See Table 1.1). The core area embodied by the term is the coming together of advanced, high-speed telecommunications with the enhanced and more flexible computing powers made possible by the microprocessor. Progress in the new technologies has led in the telecommunication field to the creation of multiple new services, such as teletex (remote printing of texts), videotex (data base interrogation), telefax (facsimile document transfer), and in the field of microprocessor applications, to the development of new products such as programmable robots, word processors and mini- and micro-computers.

New Information Technology affects, directly and indirectly, a very broad spectrum of economic activities and agents : private enterprises and public administrations, industry and services, hardware and software, production and consumption. Changes brought about by the new information technologies are becoming a major factor influencing economic development in the Community and their role will continue to increase in the future. These new technologies will clearly have a differential impact on the various regions in terms of employment, output and productivity. Furthermore, the fundamental question arises whether they will strengthen geographical concentration of activities and population or, on the contrary, encourage decentralisation and deglomeration.

1.1 Approaches to impact analysis

Any attempt to assess the impact of developments in information technology must take account of its very wide range of applications; it will affect what goods and services are produced and how they are produced and delivered. In employment terms it will therefore affect the industries in which people work (i.e. production classification of employment) and their

Table 1.1 : Field Covered by Information Technology

Functions	Mechanism	Equipment	Capability	Technology
1. Acquisition or input of information	<ul style="list-style-type: none"> - Signal and Image Processing - Sensing 	<ul style="list-style-type: none"> - Sensors - visual, tactile, thermal. - Speech Recognition - Word Processors - Work Stations etc. - Videotex 	<ul style="list-style-type: none"> - Handling of complex data at high speed 	<ul style="list-style-type: none"> - Optoelectronics - High Speed low power consumption IC's - Intelligent Parallel processing and software
2. Transmission of Information	<ul style="list-style-type: none"> - Wide Band Transparent Networks Local Area Networks 	<ul style="list-style-type: none"> - Electronic Digital Exchanges - Optical Fibre Links - Satellite Links 	<ul style="list-style-type: none"> - Secure High Speed Transmission 	<ul style="list-style-type: none"> - Low cost low power digital IC's - Optoelectronics - Reliable microelectronic Components - Software
3. Storage of Information	<ul style="list-style-type: none"> - Data Base Management Systems - Knowledge Base Management Systems 	<ul style="list-style-type: none"> - SC memories - Magnetic discs - Optical discs 	<ul style="list-style-type: none"> - Contents addressable - Easy to access with unstructured requests 	<ul style="list-style-type: none"> - Advanced software - High speed logic circuits - Magnetic - Optical
4. Processing and Analysis of Information	<ul style="list-style-type: none"> - Intelligent systems that analyse and recommend decisions based on knowledge 	<ul style="list-style-type: none"> - Data flow machines - Inference machines - Multipressor machines 	<ul style="list-style-type: none"> - Ability to handle text, data, voice, or image and interface with the non expert user on a basis of equality 	<ul style="list-style-type: none"> - New architectures - Advanced software - High speed logic circuits - Optical circuits
5. Derivation of consequential management systems	<ul style="list-style-type: none"> - High definition display systems for data, text and images - Speech generation 	<ul style="list-style-type: none"> - Work Stations - Flat Panel Displays 	<ul style="list-style-type: none"> - Recognition of the fact that the man and machine will be intelligent partners in operation of the systems 	<ul style="list-style-type: none"> - Intelligent processing - Advanced software - Low cost complex digital circuits - Optoelectronics

In each of the above functions there must be provision for the interchange of information between the human and the machine when the functional tasks are shared through adequate communication channels and language translators.

Source : IT-NEWS - Edition 12, 20 May 1983 - An internal publication of the Information Technologies Task Force of the Commission.

occupations (i.e. process classification of employment). Some effects will be positive in job terms, others negative.

Figure 1.1 is an example of such a matrix of possible job gains and losses associated with microelectronics (Pastre et al, 1981)¹. It suggests that certain occupations (e.g. secretarial occupations) are particularly vulnerable to displacement because they are largely involved with information processing, an area where NIT offers considerable scope for productivity gain. It also suggests that such information occupations occur in all sectors of the economy; as a result their future will be influenced not only by their own productivity but by the success of the particular sectors in which they are found. Thus while the future of particular occupations can to some degree be anticipated, the interaction of occupational and sectoral effects is much more difficult to ascertain.

In reality of course, these changes occur in particular places, with job creation and job displacement being indissolubly linked. For example, in localities where industries fail to introduce new products and processes, jobs will be lost indirectly to industries in competing areas which are able to produce existing products at lower prices or provide more attractive competing products. Such sectorally based job losses may be greater than those resulting from the direct displacement effects on particular occupations of introducing new process technology.

As the EEC's FAST team have argued:

"The implications of rejecting IT are doubly negative. Loss of competitiveness (and eventually the job 'defended') and lost opportunities for job creation elsewhere... The absolute job creation potential of a technology can never be measured even with hindsight and a fortiori when it so profoundly affects economic activities. It is therefore more useful to concentrate upon the adaptive efforts

1. O. Pastre et al (1981) "L'impact de l'information sur l'emploi en France a l'horizon 1985 in Informatisation et Emploi : Menace ou Mutation". Documentation Francaise, Paris.

**Fig. 1.1 : Projected impact of microelectronics,
France**

SECTORS	QUALIFICATIONS	43 707	12 625	23 308	160 240	35 933	177 720	93 230	178 718	95 173	1 734	262 778	169 951	391 941	23 434	94 201	391 373	260 268	405 940	210 739	513 736	25 163	97 403	112 653	203 941	221 422	94 201	87 403	75 007	TOTAL		
Fisheries, forestry and agriculture...	Agricultural & forestry workers & fishermen...																														77 054	
Water, gas, electricity.....	Engineers and technicians (agr. and agro food)																														140 502	
Oil and liquid fuels.....	Engineers (mathem., management, data processing)																														44 220	
Solid mineral fuels.....	Other Engineers																														2 045	
Mining, miscellaneous minerals.....	Foremen																														65 907	
Fabricated metal products.....	Testing and checking technicians																														204 346	
Basic metal Industries.....	Job engineers																														305 313	
Mechanical engineering.....	Supervisors																														456 251	
Motor vehicles, ship and aircraft built	Project designers																														216 615	
Electrical engineering and electronics	Design draughtsmen																														488 124	
Glass.....	Specialist skilled workers																														74 462	
Ceramics and building materials.....	Other skilled workers																														139 643	
Construction.....	Semi-skilled workers and labourers																														1 168 563	
Chemicals, rubber, asbestos.....	Skilled warehouse porters																														446 630	
Agro-food.....	Drivers																														358 015	
Textiles.....	Transport workers																														378 042	
Clothing.....	Higher management																															245 437
Leather and skins.....	Secretaries																															115 221
Wood and furniture.....	Accountants and cashiers																															194 117
Paper and paperboard.....	Other qualified administrative workers																															137 764
Printing and publishing.....	Analysis and programmers																															183 836
Other manufacturing.....	Card-punch machine operators																															185 309
Transport.....	Higher management, retailing																															614 460
Food and beverages.....	Technical salesmen																															353 120
Non-food retailing.....	Skilled retail trade salesmen																															1 141 169
Banking and insurance.....	Higher management, finance																															2 474 590
Other services.....	Qualified financial personnel																															741 072
	Others																															

Key : + foreseeable increase in employment
 - foreseeable decrease in employment
 Source : Pastre et al., 1981.

necessary within the whole economy to realise the potential of the technology and thus promote full employment in Europe."²

This reads like an agenda for regional policy, for the adaptive effort required will be much greater in some regions than in others, and the nature of this adaptive effort will be deeply conditioned by the structure of Europe's cities and regions.

1.2 Peripherality, new information technology and the less-favoured regions of Europe

The context within which the present study has been commissioned is one of growing regional economic disparities in Europe; in the 1970s the more prosperous regions increased their national domestic products at a faster rate than the less prosperous regions, and the gap between them consequently widened. At this European scale, a clear association exists between peripherality and relatively low incomes per head (Keeble, 1981; Table 1.2). Not only do the core regions of the Community possess more dynamic and buoyant economies, but for a variety of structural reasons they seem likely to derive the main benefit from the new information technologies; thereby further increasing the gulf between Europe's prosperous core areas and its less-favoured periphery.

Such structural reasons include their existing greater specialisation in higher technologies, their concentration of decision-making units and research and development capabilities, market concentration, better levels of education, and greater degree of economic integration. In this sense then, new information technology developments could be like many others which have served to perpetuate and reinforce economic disparities between European regions.

2. EEC-FAST B2 'Information Technology and job creation potential', Brussels, 1982.

Table 1.2 : Aggregate Regional GDP per Employee, 1973-1977

	1973		1977		1973-77	
	EUAs per empl. (EEC=100)	INDEX (EEC=100)	EUAs per empl. (EEC=100)	INDEX (EEC=100)	EUAs per empl.	CHANGE (%)
Central Regions (35)	10,563.8	118.8	17,146.5	122.1	+6,582.7	+ 62.3
Intermediate Regions (39)	8,250.5	92.9	12,844.3	91.5	+4,593.8	+ 55.7
Peripheral Regions (31*)	7,252.3	81.6	11,172.0	79.6	+3,919.7	+ 54.0
TOTAL EEC9 Regions (105)	8,885.8	100.0	14,039.9	100.0	+5,154.1	+ 58.0

Based on : LFS data from Eurostat

* includes single value for Denmark

Source : Keeble

In one very important respect, however, new information technologies are different from those that have gone before and offer different possibilities. One of the characteristics of peripheral and less-advantaged regions is their poor information environment; being remotely located in relation to the centres of economic progress imposes constraints upon their access to information; information, for example, on markets, or contracts, or patents, or new technologies, or new forms of organising business. As the pace of economic change increases, societies in the developed world are becoming increasingly dependent upon information as the key economic resource - indeed, many commentators would argue that the 'information society' is already with us. Certainly, information activities have expanded very rapidly in the post-war period and now employ approximately one-third of the workforces of advanced western nations (OECD, 1981). We can reasonably argue that regions which are weakly integrated into the information society, or are weakly linked with the centres of information generation and dissemination, are increasingly going to become disadvantaged in terms of their ability to share in technological and wealth-creating organisational advances.

New information technology, however, holds out considerable potential for peripheral regions to become better integrated with core regions, and for their 'information environments' to become enriched by this integration. Our emphasis in this study is not information technology per se but the uses and application of information and knowledge which the technology can facilitate. Consequently we focus more upon the uses of NIT and how these will be regionally differentiated than we do upon the actual production of NIT itself; for it is in the explicitly 'distance-shrinking' application of NIT that the transformation of core/periphery relationships is made possible, and considerable opportunities are afforded for the economic development of Europe's less-favoured periphery. The role of physical resource endowments in limiting or creating a region's development potential has declined markedly over time; increasingly the key to development is access to information coupled with the existence of economic and organisational structures which are able to assimilate and apply the information. Information technology can prove considerably access to information and economic integration in the wider sense, but this potential can only be realised if the appropriate institutional and organisational structures are in place or can be encouraged to grow. Any regional policies then that are directed towards new information technology need to

be framed within the context of a region's strengths and weaknesses, and seen as a way of facilitating a region's achievement of its development potential. As we will demonstrate in the following chapters, this potential, and the economic sectors upon which it is based, vary considerably between different types of region.

1.3 Organisation of the report

The present report begins by reviewing the developments in telecommunications, which can in many ways be regarded as the basic infrastructure for the application of NIT. Chapter 2 contrasts the experience of European member states in their attempts to modernise telecommunication systems and to provide new services. Chapter 3 goes on to consider regional variations in telecommunications infrastructure provision and in the level of demand for telecommunication services. Chapter 4 explores in more detail one of the important issues to emerge from this review with respect to the less-favoured regions of Europe, namely the extent to which the structure of telecommunications tariffs serve to disadvantage peripherally-located regions.

In Chapter 5, the focus shifts away from telecommunications to the actual production of NIT. The most obvious job-creating effects of NIT are in the manufacture of NIT products and in the software activities upon which the products and subsequent applications are dependent. The chapter reviews the evidence on the location of NIT production, distinguishing as far as possible between hardware and software activities.

Chapter 6 moves on to consider the use of NIT. The generic nature of the technologies results in their very wide-ranging applications across industrial sectors. The chapter reviews in turn the present and likely future use of NIT in the agricultural, manufacturing and service sectors of the economy. In each case, our emphasis is upon the geographical dimension to any differentials between enterprises in their use of NIT or in the impacts of use upon organisation, employment, etc.

Chapter 7 then takes a number of specific regional case-studies to demonstrate the varying impact NIT is having and the varying potential it offers to less-favoured regions.

Finally, Chapter 8 raises a number of policy issues arising from the study. It concludes that there is a need to introduce an explicit dimension into the Community's regional policy if the benefits of NIT are not to be concentrated in the most prosperous core regions of Europe.

CHAPTER EIGHT

POLICY ISSUES ARISING FROM THE STUDY

8.1 The need for an explicit regional new information technology policy

We would contend that the Community's existing policy instruments are, for a variety of reasons, not adequate to deal with the situation we have described in previous chapters in which the less-favoured regions are 'missing out' on the benefits of NIT while being in danger of suffering direct and indirect disbenefits. On the one hand, existing Community policies towards encouraging NIT have, because of their principal objective of creating a strong European industry, not been able to take account of the regional dimension. Although it has been recognised that there are, and will continue to be, negative effects associated with new information technology, and that retraining programmes and programmes to encourage SMEs will consequently be necessary, almost inevitably these industrial information transfer and social policies have, because of their wider objectives, not been able to adequately take into account the problems caused by the uneven geographical impacts of NIT.

While existing technology and industry policy lacks a regional dimension, existing regional policy lacks an industrial or technological dimension. Thus although certain aspects of NIT can be considered eligible for assistance under existing funds such as the ERDF - telecommunications infrastructure providing perhaps the most important example - other aspects of NIT developments and applications are not eligible within the present policy parameters. We therefore conclude that there is a need to develop an explicit NIT element within the Community's Regional Policy; without such a policy development, we believe that on the basis of the evidence we have assembled, the benefits of new information technology will be concentrated predominantly in the core regions of the Community, thereby diminishing the prospects for continued economic integration and balanced regional growth.

The purpose of this concluding section is to highlight a number of the policy issues which have arisen from the analysis presented in the previous chapters. Our comments are directed primarily at a European scale of policy concern, but a number of them would be equally applicable within the

context of regional policies operated by individual member states. Our intention here is not to spell out detailed policy proposals but to identify major issues of policy concern in the light of the different problems which the less-favoured regions are experiencing with respect to New Information Technology.

8.2 The diversity of 'the problem'

The range of policy responses needs to be broad primarily because regional NIT deficiencies and weaknesses take many forms. For example, in many of northern Europe's peripheral regions, the supply of telecommunications infrastructure and service provides a perfectly adequate base for NIT developments; in a number of the Mediterranean regions, however, in Southern Italy and particularly in Greece, there are major deficiencies with respect to the quantity and quality of telecommunications infrastructure. Within any 'policy package', infrastructure deficiencies and their amelioration need to be addressed, but this section of the package will be more appropriate in some regional contexts than in others.

As well as the type of problem with respect to NIT varying considerably between regions, the potential contribution of NIT within broader regional development strategies can only really be determined at the level of particular regions. This is because the strengths and weaknesses of regional economies, and the development potential of the productive enterprises within them, vary considerably even between regions which superficially appear to have the same type of economic structure. As an illustrative example of this proposition, take NIT applications within agriculture, such as interactive videotex systems providing information on markets, supply prices, weather, technical advances, and so on. Our Phase II Case Study contractors discussed such developments with representatives of the agricultural communities in the regions concerned. The point was made in Reggio Calabria (Calabria, Italy) that an agricultural sector almost entirely made up of subsistence peasant farmers, relying heavily on state income support, would have no possible need for a process innovation which provided them with better information about market changes when they were not, in fact, selling their goods to market in the first place. In

other words, the application of NIT could not be realistically envisaged as the sector has no real development potential which NIT could help exploit.

In contrast, much interest was expressed by agricultural representatives in Heraklion (Crete, Greece) in applications such as videotex systems; not only is the level of organisation of small scale producers into marketing co-operatives considerably greater than in Reggio Calabria, but the orientation of production towards national and international markets is much more evident. There is still of course a backward peasant sector as well, but in overall terms agriculture in Crete seems more dynamic and offers much greater development potential than it does in Reggio Calabria - as a result, there is a possible role for NIT to play in facilitating its further development. This example serves to show that particular policies will be appropriate in some regional contexts but not in others; we need therefore to envisage a 'package' of measures from which those relevant to each region can be selected on the basis of the types of problem they face and the types of potential which they offer. In the sub-sections which follow, we outline some of the major issues which would need to be addressed by a European regional NIT policy.

Even within a single region, however, we need to make clear from the outset that formulating an 'appropriate' regional NIT strategy is by no means straightforward, while the task of actually implementing a strategy may require a considerable degree of co-operation between a surprisingly large number of public and private agencies within any region. The Case Study report of the Northern Region of England, for example, faced with the absence of a regional planning agency recommended that a Regional NIT Committee would need to be established both to provide a forum for formulating a regional NIT strategy and as a way of establishing the necessary inter-organisational harmonisation which would make its subsequent implementation possible.

8.3 Regional policies towards the new information technology industries

Within this part of the package it would be necessary to distinguish between hardware and software activities and between policies concerning the attraction of mobile investment and those concerning the encouragement of indigenous NIT production. Regions with little or no existing

production of information technology, such as much of Greece and Southern Italy, are clearly going to find it difficult either to attract mobile investment projects or to develop their own indigenous NIT industries. Other regions which already have NIT production capacity, such as, of our case study locations, Languedoc-Roussillon or the Mid-West of Ireland, are likely to be best served by trying to encourage the indigenisation of the industry, for example by promoting local supply linkages.

The first policy issue to address is to ensure that there is a regional dimension to Community or national policies towards NIT industries. Community policy towards NIT is based on the fundamental objective of attempting to ensure that a European production industry survives in the face of American and Japanese competition; the location of production within Europe has not been perceived of as a relevant issue. Most member states also employ policies to foster the development of national high technology industries, with the regional implications rarely considered. As a result, high-technology projects can often attract effectively the same or even greater aid in grants from technology-specific or innovation-oriented schemes as they could from regional policy schemes; because of ceilings to total grant aid, in such cases there may be no regional differential at all, and hence no incentive for mobile projects to consider locating in the less-favoured regions. To an extent, ceilings on aid are determined by the CECs Competition Policy Directorate-General. It would seem important, in order to facilitate more balanced regional growth in the new technologies, to permit national governments to provide regional 'top-up' aids to sectoral or high technology schemes (i.e. by allowing the normal aid ceilings to be exceeded).

The same lack of a regional dimension is also evident within the Community's own industrial policies, such as those designed to promote innovation. Consideration could usefully be given to the means of ensuring that a regional dimension is incorporated into these policies. This would not necessarily impose constraints on other Directorates or dilute other Community initiatives; on the contrary, the size of the ERDF could provide considerable opportunities for implementing policies which are less well-endowed in resource terms by, for example, providing 'add-on' support to technology projects locating in or benefitting the less-favoured regions of the Community.

Even if projects are attracted to less-favoured regions, in the long-run it is only through strategies aiming to 'indigenise' NIT production that the full benefits would accrue to the regions, ultimately enabling them to develop their own NIT production industries and the ability to generate new products. This process can be initiated by actively encouraging the 'regionalisation' of material and service linkages to NIT industries. A variety of policy instruments could be used to promote this objective, ranging from the insistence upon regional supply 'quotas' which has been employed to good effect in France, to financial aid for NIT-related new firm formation and product diversification, through to promoting the greater diffusion of information on NIT contracts, supply requirements, etc to enterprises, particularly small and medium sized enterprises, in peripheral or less-favoured parts of the Community. These examples apart, product innovation based on NIT is perhaps too narrow a focus for a regional policy; its stimulation needs to form part of a broader regionally oriented innovation policy.

The aim of such a policy should not be equalisation of levels of technological achievement between the regions of Europe through the dilution of the resources of core regions, rather it should be to release latent potential in the lagging regions which would add to the sum total of technological advance in the community as a whole. For example, a better balance of R & D effort between centralised laboratories in core regions and R & D effort close to the production line could assist the lagging region and improve the overall effectiveness of the same amount of R & D input.

Such a policy could contain a number of elements:

- (i) Contribution towards the cost of building R & D facilities adjacent to factories in less-favoured regions (e.g. high depreciation allowances).
- (ii) Contribution towards the costs of relocation of parts of public R & D laboratories relevant to the industrial structure of particular regions.
- (iii) Contribution towards the cost of employing R & D personnel in such facilities.

- (iv) Contributions towards the costs of the introduction of science parks, adjacent to universities and other institutes of higher education, including contributions towards the costs of Universities working with local SMEs.
- (v) Technical advice to SMEs provided by expert panels drawn from large firms and local universities, including advice on the use of computerised databases to monitor technical development.
- (vi) Technology brokerage services linking together new product opportunities with SMEs.
- (vii) Technical training programmes orientated at all levels but particularly senior management lacking a scientific background.
- (viii) Regional NIT applications centres, with a brief to undertake R & D (with a focus on D) in hardware and software applications relevant to regional industry and commerce.

A final major policy issue which needs to be addressed with respect to the production of NIT is the need to develop policies which are targetted at, or at least do not discriminate against, NIT 'software' activities. We would argue that these software aspects of NIT production, ranging from software products per se through to computer services, are if anything more important than the hardware elements, because they also help to create the conditions of subsequent applications of NIT within the wider regional economy. Clearly then, NIT-related services should essentially be treated in the same way as manufacturing projects, and in no way discriminated against on the basis that they are 'service' industries. Within the ERDF, this would mean a change in the regulations to remove a mobility criteria for services (other than tourism) within the quota section and a change in the maximum firm size threshold within the non-quota section to bring NIT-related activities defined as falling within the service sector into line with manufacturing activities.

8.4 Regional policies towards telecommunications infrastructure

As demonstrated in earlier chapters, telecommunications infrastructure is far from adequate in a number of peripheral parts of the Community, including Ireland, Southern Italy and, particularly, Greece. We would contend that existing regionally-oriented support for telecommunications investment (in the form primarily of the Infrastructure Section of the ERDF) is of crucial importance in ensuring that peripheral and less-favoured regions do not fall further behind in the provision of the infrastructure upon which so many NIT developments are based. A case can further be made for considering whether infrastructure outside the present assisted areas, but affecting directly the level of their services, should be eligible for assistance in the regional funds. Examples of this type of problem were identified in the regional case studies, including the Milan telex node, the Athens international telephone exchange, and the Dublin data network links. There is perhaps little point in subsidising investment in peripheral regions if other crucial parts of the network are inadequate.

Another issue which may develop if member states follow the UK route to network liberalisation is the desirability or otherwise of infrastructure investment support for competitor networks. If the Mercury project in the UK is anything to go by, peripheral and rural regions are unlikely to be able to demonstrate the market potential to warrant investment in the new network infrastructure. If such competitor networks do become established, some mechanism (which could range from investment aid to a basic requirement in granting a license) will need to be found to ensure that peripheral regions do not suffer a deterioration in their telecommunication services (which could arise indirectly through the response of the PTT in attempting to meet the competition, for example, by concentrating their new investment in core regions).

A further question concerning telecommunications infrastructure which European regional policy could usefully address is the case for extending the eligibility for aid to network attachments - such as electronic switchboards, call connect systems, telex and facsimile machines, data modems, data and videotex terminals, etc. In a very real sense, these network attachments are as much part of a region's 'telecommunications

infrastructure' as those parts of the public networks which run into the factory or office. The difference of course is that the attachments are not normally publicly funded, in whole or in part, and would not therefore meet the conditions for eligibility. We would suggest nevertheless that eligibility rules and investment size minimum levels should be re-examined to determine whether a means can be found for encouraging the diffusion of the basic infrastructure for NIT applications within enterprises in peripheral regions.

A number of policy issues were raised in the consideration of regional telecommunications tariff variations in Europe. A particular anomaly in need of attention concerns the effects of national borders on tariff rates. Certain border regions face cost penalties as a result of international calls generally being charged at higher rates than national calls, regardless of the distances involved. We would urge that pressure is applied to European PTTs to encourage them to harmonise their tariff structures, particularly as they affect border regions.

The report has also noted the fact that peripheral regions within member states are to an extent disadvantaged with respect to their costs of telecommunications, since most variable costs are charged according to distance. We contend that pressure should be applied or inducements offered to national PTTs to take greater cognizance of the regional dimension not only within their investment plans but in their tariff structures as well. For example, a reasonable case can be made for passing on some of the benefits of ERDF infrastructure aid for telecommunications projects to the consumers of telecommunications services within the regions concerned, perhaps by lower installation costs of equipment or by differential tariff rates.

8.5 Regional policies towards the use of new information technology

Although not all less-favoured regions of the Community have deficiencies with respect to their telecommunications infrastructure, all make markedly less use of NIT than do their core region counterparts. The reasons for this are complex and varied; although in some instances the economic structures of less-favoured regions are simply less appropriate for the application of NIT, there seem in addition to be marked deficiencies with

respect to the awareness of NIT and the benefits it can bring coupled with a number of regionally differentiated barriers to adoption which are serving to inhibit the diffusion of NIT within the economies of less-favoured regions. A number of elements of a policy package designed to counter the awareness/adoption constraints prevailing in such regions can be envisaged:

Illustrative examples would include :

- NIT demonstration projects within Public Agencies in less-favoured regions, particularly those concerned with economic development issues (industrial, agricultural, SMEs, regional development, etc). Relevant applications of NIT would encompass inter-office communication systems, videotex projects, etc. The demonstration effect would not be directed at technical feasibility but at showing by demonstration the usefulness and ease of use of the new office and communication technologies.
- The establishment of regionally relevant data bases/information systems. Examples could include data bases on export information, industrial capacity registers, sources of supply, industry-specific technical information, etc.
- The establishment of NIT Information and Resource Centres. The purpose of these centres would be to: (a) demonstrate, particularly to SMEs but also to large firms and agencies, the range of applications of NIT (e.g. telecommunications developments, database searching, mini-computing systems, etc) and to provide impartial advice on appropriate hardware and software, sources of supply, etc; (b) a subsidiary function could be to provide 'bureau-type' NIT services to SMEs (e.g. telex, facsimile transfer, database searching, etc).
- Support for NIT feasibility studies: including studies on the feasibility of enhancing the telecommunication links of enterprises and groups of enterprises (e.g. non-terrestrial

telecom links in remote areas, cabling, local area networks, the shared use of long-distance leased lines by SMEs) and the feasibility of establishing new services based on NIT (e.g. videotex services, computerised databases, value added network services, etc).

- The establishment of NIT Applications Research Institutes, the purpose of which would be to engage in research and development work within the field of NIT hardware and software applications of relevance to particular regional economic sectors or regional requirements. The maximum benefit would come from a network of such centres, each using pooled information and expertise to develop applications of NIT relevant to particular regional contexts.
- Support agencies/intermediaries offering (impartial) advice on NIT applications (for example by supporting consultancy costs) or offering particular services which benefit from the application of NIT (e.g. access to technical information from remote sources).

Our approach in these examples, and indeed in the study as a whole, has been to focus on the needs of regional productive enterprises rather than on new technology per se. Hence our emphasis here on intermediaries and 'information brokers' as well as on videotex experiments and the like. Technological solutions to managerial or institutional deficiencies seem unlikely to succeed, for they generally fail to adequately define the nature of the problem. We need firstly to determine what are the constraints upon or inadequacies of regional productive enterprises before posing the question of whether NIT can assist in overcoming these constraints or reducing the inadequacies. Applied in this way, NIT can indeed offer considerable possibilities for enhancing the development potential of the less-favoured regions of the Community. Following Schmookler (1972) we contend that the benefit of a given technology to a society is determined by the number of people who have access to it, or access to its benefits; the full benefits of new information technology to

European Society will not be realised if the peripheral or less-favoured regions continue to lag so markedly behind the rest of the Community in their use and application of the developing technologies. Without policy intervention, we must conclude that this gap is likely to widen rather than to narrow, and that the consequent concentration of the information and knowledge upon which future wealth will be generated will serve to widen inter-regional disparities in economic well-being.

BIBLIOGRAPHY

- ABBOTT L.F. (1978) Technological Development in Industry. A Survey of Social Aspects. Industrial Systems Research.
- ACARD (1980) Computer Aided Design and Manufacture. Cabinet Office, Advisory Council for Applied Research and Development, HMSO London.
- ACARD (1980) Information Technology. Cabinet Office, Advisory Council for Applied Research and Development, HMSO, London.
- ADAS (1980) Introduction to On-Farm Computing. Micro-Computers in the Farm Office Series, No.1. Agricultural Development and Advisory Service, Ministry of Agriculture Food and Fisheries.
- ALDERMAN N, GODDARD J.B., THWAITES A.T., & NASH P.A., (1982) Regional and Urban Perspectives on Industrial Innovation : Applications of Logit and Cluster Analysis to Industrial Survey Data. CURDS Discussion Paper No. 42, University of Newcastle upon Tyne.
- ALVEY COMMITTEE (1982) A Programme for Advanced Information Technology. The report of the Alvey Committee. HMSO, London
- ANTONELLI, C (1982) New Information Technologies and Regional Economic Development in Italy. NIT Project, Phase I Report, Centre for Urban and Regional Development Studies, University of Newcastle.
- APPLEYARD R.K. (1981) The Role of the European Commission in the Information Environment, Journal of Information Science, Vol 3. No.6.
- AREGON REPORT (1981) Videotex in Agriculture. Final report to the Commission of the European Community by Aregon International Ltd. IPC Agricultural Press and Misset.
- BACHTLER J. (1981) A survey of the Banking, Insurance and Finance Sector. Department of Geography, University of Birmingham.
- BACHTLER J. (1982) The French Banking System. Department of Geography, University of Birmingham.
- BAKER K. (MP) (1982) Information Technology and Industrial and Employment Opportunities. (One of three Cantor Lectures (see Firnberg, Inglis) delivered by the Minister of State for Industry and Information Technology, 10th May 1982). The Royal Society for the Encouragement of Arts, Manufactures and Commerce Journal No. 5316, Vol.cxxx, London.
- BALLAM A. (1981) Electronic Banking, Bankers' Magazine, October, p 41.
- BALLAM A. (1982) Electronic Banking : A look at Nat West's Automation. Banker's Magazine, January, p 40.
- BANKER'S MAGAZINE (1981) Survey : Banking Technology : November, pp 21-42.

- BANNON L., BARRY U. and HOLST O. (Eds) (1981) Information Technology : Impact on the Way of Life. A selection of papers from the EEC Conference on the Information Society held in Dublin, Ireland, 18-20 November 1981. Organised by NBST, Ireland and CEC Fast Programme. Tycooly International Publishing Ltd., Dublin.
- BEESELEY M.E. (1981) Liberalisation of the use of the British Telecommunications Network : A report to the Secretary of State, DOI, HMSO, London.
- VAN BEINUM H. (1981) Office Automation and the Space Shuttle : What's the Use?. Communication Studies and Planning Ltd, London.
- VAN BEINUM H. (1981) Survey results of the current status of small businesses in their use of office automation. Report No. UNI/81345/BN, Communications Studies and Planning Ltd., London.
- BELL D. (1976) The coming of Post-Industrial Society. Basic Books, New York.
- BIEHL D., LUDWIG J., MUNZER U.A., RABIGER J., STEIN R., SCHILLRIANN C., WINTER H. (1981) The Contribution of Infrastructure to Regional Development. National Report, Federal Republic of Germany, E.C. Infrastructure study group.
- BIRD E. (1978) Services for Small Businesses : Potential for Business Support Systems using Telecommunications and Computing. Report No. PO2/78120/EB, Communication Studies and Planning Ltd., London.
- BOLTON J.E. (1971) Small Firms : Report of the Committee of Inquiry on Small Firms. HMSO (CMND 4811), London.
- BRANSCOMB L.M. (1976) Trends and developments in computer/telecommunications technologies, in Conference on Computer/Telecommunications Policy, OECD, Paris.
- BRAUN E., & SENKER P. (1982) New Technology and Employment. MSC, London.
- BROADBENT A. (1982) New Technology and Older Industrial Regions in the UK : The impact of New Technologies in Telecommunications, CES London BURISA, BURISA, No 56, Newsletter of the British Urban and Regional Information Systems Association.
- CAMAGNI R.K. and CAPPELLIN R. (1983) Sectoral Productivity and Regional Policy. Final Report to the CEC.
- CAMRASS R.J. (1982) Competition In Europe : Opportunities and Threats. In Arthur D. Little, The Changing Basis of Competition in the 1980s.
- CANE A (1983) Special Report on Computer Services, Financial Times, 10.10.83.
- CAPITAL PLANNING INFORMATION LTD. (1982) Information and the Small Manufacturing Firm. Capital Planning Information Ltd., Edinburgh.

- CLARK C. (1966) Industrial Location and Economic Potential, Lloyds Bank Review, 82.
- CLARK D. (1978) The Spatial Impact of Telecommunications, in DoE Research Report 24, London.
- CEC (1977) Proposal for a Council Decision Adopting a Multi-Annual Programme (1978-1981) for the Data Processing Sector (Submitted to the Council 8 November 1976), Official Journal of the European Communities
- CEC (1979) European Society faced with the Challenge of New Information Technologies : A Community Response. COM (79) final, Brussels
- CEC (1981) Proposal for a Council decision relating to the Co-ordination of the activities of the member states and community institutions with a view to setting up a Community Inter-Institutional Information System. COM (81) 358 final, Brussels.
- CEC (1981) Scientific and Technical Research and the European Community : Proposals for the 1980's. COM (81) 574 final, Brussels,
- CEC (1981) Proposal for a Council Decision adopting a programme of Research and Development in the field of Science and Technology for Development 1982 - 1985. COM (81) 212 final, Brussels.
- CEC (1981) Social Change and Technology in Europe Information Bulletin No.1, CEC, Brussels.
- CEC (1981) New Information Technology and Unemployment. Notes on a debate. Social Change and Technology in Europe : Information Bulletin No.2, CEC, Brussels.
- CEC (1982) Bibliography. Social Change and Technology in Europe : Information Bulletin No.3, CEC, Brussels.
- CEC (1982) Current events in Federal Republic of Germany, France, Italy, the Netherlands, Belgium and the United Kingdom. Social Change and Technology in Europe : Information Bulletin No. 4, CEC, Brussels.
- CEC (1982) New Technology and Women's Employment : Notes on a Debate. Social Change and Technology in Europe : Information Bulletin No.5, CEC, Brussels.
- CEC (1982) Current events in Federal Republic of Germany, France, Italy. Social Change and Technology in Europe : Information Bulletin No.6, CEC, Brussels.
- CEC (1981) Community Data-Processing Policy. Communication from the Commission to the Council, CEC, Brussels.
- CEC (1982) Vocational Training and New Information Technologies : New Community Initiatives during the period 1983 - 1987. Social Change and Technology in Europe : Information Bulletin No. 7, CEC, Brussels.
- CEC (1982) The Impact of New Technology on Trade Union Organisation. Social Change and Technology in Europe : Information Bulletin No. 8, CEC, Brussels.

- CEC (1982) Current Events in Scandinavia. Social Change and Technology in Europe : Information Bulletin No. 9, CEC, Brussels.
- CEC (1982) Robotics. Social Change and Technology in Europe : Information Bulletin No. 10, CEC, Brussels.
- CEC (1982) Transfer and Exploitation of Scientific and Technical Information. Proceedings of the symposium held by the Commission of the European Communities, Directorate - General for Information Markets and Innovation in Luxembourg, 10 to 12 June 1981. ECSC - EEC - EAEC, Brussels, Luxembourg.
- CEC (1982) On laying the foundations for a European Strategic Programme of Research and Development in Information Technology : The pilot phase. Communication from the Commission to the Council, COM (82) 486 final 1/2. Brussels.
- CEC (1982) Vocational Training and New Information Technologies : New Community Initiatives during the period 1983 - 1987. COM (82) 296 final, Brussels.
- CEC (1983) Adopting the first European Strategic Programme for Research and Development in Information Technologies (ESPRIT). Proposal for a Council Decision. COM (83) 258 final, Brussels.
- CEC (1983) On the Framework Programme for Community Scientific and Technical Activities 1984 - 1987. Proposal for a Council Decision. COM (83) 260 final, Brussels.
- CEC (1983) Study of the Regional Impact of the Common Agricultural Policy : Regional Policy series 21. Office for official Publications of the European Communities.
- CEC (1984) The Regions of Europe : Second Periodic Report on the Social and economic situation and development of the regions of the Community. COM (84) 40, CEC, Brussels.
- CES (1981/82) Micro-Electronics and Advanced Manufacturing Techniques Section 6 : Robotics : New Technology in Older Industrial Regions, CES, London.
- COMMUNICATIONS STUDIES AND PLANNING LTD. (1980) Information Technology in the Office : The impact on Women's Jobs. Communication Studies and Planning Ltd, London.
- CEPT. (1981) CEPT Bluebook 4th Edition : Public Data Networks - Plans of the European Telecommunications Administrations. CEPT/EURODATA Foundation (Roma, Den Haag, London).
- COOKE G. (1981) Employment and Technological Change : The Possible Implications for Scottish Clearing Banks, Scottish Bankers' Magazine, pp. 115-119.
- CIS (1982) Private line. CIS Report, Counter Information Services, London.
- CIS The New Technology. CIS Anti-Report No. 23, CIS, London.

- CRAIG G.M. (1979) Information Systems in UK Agriculture : Final Report of the Agriculture Information Review Committee. British Library Research and Development Report No. 5469. British Library.
- CRIPPS F.R. and GODLEY W. (1978) The Planning of Telecommunications in the United Kingdom, Department of Applied Economics, University of Cambridge.
- CRISP J. (1981) The optical fibre revolution : it's all done with glass, Financial Times.
- CURDS (1982a) Study of the Effects of New Information Technology on the Less-Favoured Regions of the Community : Phase I Report on the United Kingdom, CURDS, University of Newcastle.
- CURDS (1982b) Study of the Effects of New Information Technology on the Less-Favoured Regions of the Community : Phase I Synthesis Report, CURDS, University of Newcastle.
- CURDS (1983) Study of the Effects of New Information Technology of the Less-Favoured Regions of the Community : Phase II Synthesis Report, CURDS, University of Newcastle.
- CURDS (1984) Study of the Effects of New Information Technology on the Less-Favoured Regions of the Community : Final Report to DGXVI of the Commission of the European Communities, CURDS, University of Newcastle upon Tyne.
- DAVIES S. (1979) The Diffusion of Process Innovations. Cambridge University Press, Cambridge.
- DAVIGNON (1979) European Society Faced with the Challenge of New Information Technologies : A Community Response - report to Dublin Summit, CEC, Brussels.
- DEPARTMENT OF THE ENVIRONMENT AND TRANSPORT (1978) Impacts of Telecommunications on Planning and Transport. Research Report 24, Department of the Environment and Transport, London.
- DISTRIBUTIVE TRADES EDC (1982) Technology : The Issues for the distributive trades. A report by the working party on technology. Distributive Trades EDC, London.
- DOI - IT (1981) The Government Response to the ACARD Report on Information Technology (pamphlet) DOI, London.
- DOI (1981) Information Technology : The age of Electronic Information (pamphlet). DOI, London.
- DOI - IT (1982) Information Technology : A Bibliography. DOI, London.
- DOI & SHELL UK LTD. (1982) Helping Small Firms start up and Grow : Common Services and Technological Support. HMSO, London.
- EIU (1983) Review of Information Technology, Telecoms, Value Added Service. EIU, London.

- ENGLISH M. (1983) The European IT Industry : A short overview, CEC Information Technologies Task Force, Brussels.
- EURODATA (1982) Eurodata Foundation Yearbook 1982 Data Communications Services in Europe : (2 volumes - (1) Austria, Belgium, Denmark, Finland, France, Germany FR., Greece, Iceland, Ireland, Italy, Lux, (2) Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK., Euronet, Appendices. EEC. Eurodata Foundation, London.
- THE EURODATA REPORTS (1980) Data Communications in Western Europe in the 1980's Text Volumes:- 1 Management Summary; 4 Services and Tariff Scenario; 5 Statistical Background to the Results; 6 Methodology 1; 7 Report Guide and Classifications; Numerical Output Volumes:- 1 NTP Tables Part 1 and additional volumes; 2 NTP Tables Part 2; 3 NTP Tables Part 3.
- EURONET DIANE (1983) Euronet Diane News No 30, February/March 1983, (including Euronet Diane : 3 years progress), CEC, Luxembourg.
- "EUROPE" (1980) Telematics : Economics and Social Committee gives Unqualified Support to EEC Strategy proposed for New Information Technology, Europe.
- "EUROPE" (1981) New Technologies : Parliament Support's "Davignon Memorandum" on Micro-Electronics. Finds Telecommunications proposals too timid, Europe No. 3135.
- "EUROPE" (1981) Informatics : Content and Implications of the EEC Programme of Action in the Field of Micro-electronic Technology, Europe No. 3249. p 13.
- "EUROPE" (1982) Programme for Strategic Research on Information Technology ("ESPRIT" Project), Europe No. 3377.
- EUROPEAN COMPUTING SERVICES ASSOCIATION (1981) Fifth Annual Survey of the Computing Services Industry in Europe. ECSA, Belgium. (Prepared by the Quantum Science Corporation).
- EUROPEAN COUNCIL (1979) Council Decision of 11 September 1979 Adopting a Multi-annual Programme (1979 to 1983) in the field of Data Processing, Official Journal of the European Communities (No L231/23).
- EUROPEAN COUNCIL (1979) Council Resolution of 11 September 1979 on a Community Action Promoting Micro-Electronic Technology, Official Journal of the European Communities, III/1556/79
- EUROPEAN PARLIAMENT (1983) Working Document 1 - 1313/82 - for a decision concerning a plan for the transnational development of the supporting infra-structure for innovation and technology transfer (1983 - 1985).
- EUROPEAN REPORT (1980) Public supply : Commission pushing to include Telematics, European Report, No. 706.
- FAST (1982) Information Technology and Job Creation Potential. EEC - FAST B2. Phase 3 synthesis of specific studies conclusions and recommendations. ISCOL.

- FIRNBERG D. (1982) Creating an Information Technology Environment in Milton Keynes (one of three Cantor Lectures (see Baker, Inglis). The Royal Society for the Encouragement of Arts, Manufactures and Commerce Journal. No. 5316 Vol CXXX London.
- FOSTER F.G. ed. (1982) Information and Industrial Development. Proceedings of the International Conference on Policies for Information Processing for Developing Countries 9-13 March 1981, Trinity College Dublin, Ireland. Information Technology and Development Series (Ed. Bennon L., Barry U. & Holst O.) Volume 2, Tycooly International Publishing Limited, Dublin.
- GERSHUNY J.I. (1982) Social Innovation : Change in the mode of provision of services.
- GILLESPIE A.E. (1983) Technological Change and Regional Development. London Papers in Regional Science 12, Pion Ltd, London.
- GODDARD J.B. (1975) Office Location in Urban and Regional Development. Oxford University Press, London.
- GODDARD J.B. and Pye R. (1977) Telecommunications and Office Location, Regional Studies, Vol 11, pp. 19-30.
- GODET M.K. and RUYSSSEN O. (1981) The Old World and the New Technologies : Challenges to Europe in a hostile World. European Perspectives Series. In collaboration with other members of the FAST team. CEC, Brussels.
- GREEN S.R. (1981) The Location of the Computer Services Sector in the UK: Department of Industry Paper, South Eastern Regional Office.
- GREEN S.R. (1982) Location and Mobility of Computer Service Companies : Department of Industry paper, South Eastern Regional Office.
- HALEVI G. (1980) The Role of Computers In Manufacturing Processes. John Wiley & Sons, New York.
- HARRIS C.D. (1954) The Market as a factor in the Localisation of Industry in the United States, Annals of the Association of American Geographers, 44, 4.
- HIRST E. (1979) Information Technology and Employment : Perspectives on the theme of technological change. The Polytechnic of the South Bank, Department of Town Planning.
- HINES C., BENNET D., PELTU M., POPAY J. (1981) Issues in the new Technology Debate. Beyond Generalisations series. Department of Town Planning, Polytechnic of the South Bank.
- HOUSE OF LORDS (1981) New Information Technologies : Session 1980 - 81 27th Report, from the Select committee of the European Communities. HMSO, London.
- HUGHES P.K., MCCARTHY N. (1983) Behind the news : Cable Technology, Capital and Class, No 19.

- HULL C. and HJERN B. (1982) Helping Small Firms Grow : An Implementation Analysis of Small Firm Assistance Structures, European Journal of Political Research, Special Number, Implementation Beyond Hierarchy.
- HULL C. and HJERN B. (1983) Policy Analysis in a mixed Economy; An Implementation Approach, Policy and Politics, VII, No.3.
- I.D.C. Europa (1983) Analysis of European Computer Service Industry. I.D.C. Europa, London.
- INFORMATION SERVICES & USE (1982) Special issue containing the UN centre on Transnational Corporations Technical paper, Transborder Data Flows : Access to the International On-Line Data base Market : Vol 2. North Wollard.
- INFORMATION TECHNOLOGY ADVISORY PANEL (1982) Cable Systems. HMSO, London.
- JAMES V.Z., MARSHALL J.N. & WATERS N.S. (1979) Telecommunications and Office location. Draft report to Department of Environment. CURDS, University of Newcastle.
- KEEBLE D., OWENS P.L. & THOMPSON C. (1981) Centrality, Peripherality and EEC Regional Development. HMSO, London.
- KOWALSKI J.S. (1982) Information Development Poles : The West German Context. Research Memorandum No. 8219, Amsterdam.
- LAMBORGHINI B. and ANTONELLI C. (1981) The Impact of Electronics on Industrial Structures and Firms' Strategies, in Information, Computers, Communications Policy No. 5, Microelectronics, Productivity, and Employment, OECD, Paris.
- LANCASTER UNIVERSITY Study of low levels of utilisation of computing in SME's.
- LANDGALE J. (1982) Competition in Telecommunications, Telecommunications Policy.
- LANGDALE J. (1983) Competition in the United States' Long Distance Telecommunication Industry, Regional Studies, 17, 6.
- LOCKSLEY G. (1982) The EEC Telecommunications Industry : Competition, Concentration and Competitiveness, IV/669/82, CEC, Brussels.
- McKINSEY & Co. (1983) A call to action : The European Information Technology Industry.
- MACKINTOSH (1981 - 1984) European Electronics Companies File - Monthly News Bulletin. Mackintosh Publications, Luton.
- MAHON F.V. (1982) Perspectives of access to on-line information by the Developing Countries, UNESCO Journal of Information Science Librarianship and Archives Administration, Vol 4

- MAILLAT D. (Ed.) (1982) Technology : A Key Factor for Regional Development. Georgi, Switzerland.
- MALTHA D.J. (1982) Information needs in Agriculture : Quarterly Bulletin of the IAALD, 17(4), pp 170-177.
- MANDEVILLE T. (1983) The spatial effects of Information Technology, Futures, Vol 15 No 1.
- MARSHALL J.N. (1979) Ownership, Organisation and Industrial Linkage : A Case Study in the Northern Region of England, Regional Studies, Vol 13, pp 531-557.
- MARSHALL J.N. (1982) Corporate Organisation of the Business Service Sector, CURDS discussion paper No 43, University of Newcastle Upon Tyne.
- MARTI J. & ZEILINGER A. (1982) Micro's and Money : New Technology in Banking and Shopping. Policy Studies Institute, London.
- MARTIN J. (1978) The Wired Society. Prentice-Hall, London.
- MASSEY D.B. & MEEGAN R.A. (1979) The Geography of Industrial re-organisation : The spatial effects of the restructuring of the UK Electrical Engineering sector under the IRC. Progress in Planning, 10,3, pp 159-237.
- MEEGAN R. (1982) Telecommunications Technology and Older Industrial Regions, CES Paper No.7, CES Ltd., London.
- MENOU M.J. (1983) Cultural Barriers to the International Transfer of Information, Information Processing & Management, Vol 19 No 3 pp 121-129.
- METROPOLIS (1982) Telecommunications villes froides ou Telecommunautes, Metropolis, Vol VII, No 52/53.
- NATIONAL BOARD FOR SCIENCE AND TECHNOLOGY (NBST) (1981) Microelectronics : The Implications for Ireland : An assessment for the 1980's. NBST, Dublin.
- NBST (1981) Microelectronics : The Implications for Ireland : B. Sectoral Profiles. NBST, Dublin.
- NORA S. & MINC A. (1978) L'Informatisation De La Societe - Rapport Le President De La Republique, Paris. - (The Computerisation of society : a report to the President of France, MIT Press, 1980).
- NORMAN A. & LITTLE A.D. (1981) Electronic Document Delivery : The Artemis concept for document digitalisation and teletransmission : A study prepared for the Directorate - General Information Market and Innovation, CEC. Learned information (Oxford and New Jersey) Publication arranged by CEC Luxembourg.
- NORTHCOTT J. and ROGERS P. (1982) Microelectronics in Industry : What's Happening in Britain. Policy Studies Institute No 603.

- NORTHCOTT J., ROGERS P. and ZEILINGER A. (1981) Microelectronics In Industry, Extent of Use. Survey of Miroelectronic Applications in Industry, Interim Report 1. Policy Studies Institute. Research paper 1-3.
- NORTHCOTT J., ROGERS P. and ZEILINGER A. (1981) Microelectronics In Industry : Advantages and Problems : Survey of Microelectronics applications in Industry, Interim Report 2. Policy Studies Institute Research Paper 1-6.
- Oakey R.P., THWAITES A.T. & NASH P. (1982) Technological Change and Regional Development : Some Evidence of regional variations on product and process innovations, Environment and Planning A, 14.
- ONLINE (1980) Business Telecommunications : A Transcript of the Online Conference on Business Telecommunications. Online Publications Ltd., Northwood, UK.
- ONLINE (1982) Local Networks and Distributed Office Systems Vol 2 : System Selection and Implementation 1. Computer Networks. Online Publications Ltd., Northwood, UK.
- OECD (1979) Transborder Data Flows and The Protection of Privacy. OECD, Paris. ICCP series (Information computer communications Policy) No.1.
- OECD (1979) The usage of International Data Network in Europe. OECD, Paris. ICCP Series No.2.
- OECD (1980) Policy Implications of Data Network Development in the OECD Area. OECD, Paris. ICCP Series No. 3.
- OECD (1980) Handbook of Information Computer and Communications activities of major International Organisations. OECD, Paris. ICCP Series No.4.
- OECD (1981) Microelectronics, Productivity and Employment. OECD, Paris. ICCP Series No.5.
- OECD (1981) Information Activities, Electronics and Telecommunications Technologies : Impact on Employment Growth and Trade. OECD, Paris. ICCP Series, No.6. Vol 1.
- OECD (1981) Information Activities, Electronics and Telecommunications Technologies. OECD, Paris. ICCP Series No.6. Vol II, Background Papers.
- OECD (1980) New Structures and Strategies for Business Information OECD, Paris, General Dist ICCP.
- OECD (1982) Innovation in small and medium firms : A report by the Committee for scientific and technological policy. OECD, Paris.
- PACTEL (1979) Automation in European Banking 1979-1980
- PACTEL (1980) Report on a Workshop on Videotex in Agriculture (Luxembourg, February 1980). Pactel for the commission of the European Communities. (Prepared by Christie B.K. and Oades R.).

- PACTEL (1981) A Strategy for Information Technology, London.
- PAGE J.R.U.(ed.) (1981) Electronic Document Delivery : Proceedings of an Exhibition and Workshop Luxembourg, 18-19 December 1980. CEC 1981.
- PASTRE I. et.al. (1981) L'Impact De L'Information Sur L'Emploi En France A L'Horizon 1985. In Information Es Emploi : Menace Ou Mutation. Documentation Francaise, Paris.
- PLANQUE B. (1981) Innovation Et Dynamique Spatiale Des Systems Economiques, Centre D'Economie Regionale. (Doctoral Thesis).
- PROGNOS (1982) New Information Technology and the Less-Favoured Regions of Europe : National Report on Germany. NIT Project, Phase I, CURDS, University of Newcastle.
- PYE R. (1979) Focus on Europe : Defining telecommunications or bounding the ethereal. Telecommunications Policy, Vol 3., No.1.
- QUANTUM SCIENCE CORPORATION (1981) Fourth European Market Survey. Q.S.C. London.
- RICH D.C. (1975) Accessibility and Economic Activity : A Study of Locational Disadvantage in Scotland. Unpublished PhD Thesis, University of Cambridge.
- RICH (1980) Potential Models in Human Geography. Concepts and Techniques in Modern Geography (CATMOG) 26 Geoabstracts, UEA Norwich.
- ROTHWELL S. & DAVIDSON D. (1982) New Technology and Manpower Utilisation. Department of Employment Gazette.
- SCHMOOKLER J. (1972) Patents, Inventions and Economic Change (in Griliches, Z and Hurwicz, L (Eds), Harvard Univ. Press, Cambridge, Mass., USA.
- SCIBERRAS E., SWORDS-ISHERWOOD N.K. and SENKER P. Competition, Technical Change and Manpower in Electronic Capital Equipment : A Study of the UK Minicomputer Industry. SPRU Occasional paper series No. 8. Science Policy Research Unit, University of Sussex.
- STEPHENSON J.K. & RILEY N.W. (1982) The use of Patent Information in Industry. British Library project No.SI/G/324 - AW
- SWORDS-ISHERWOOD N & SENKER P. (Eds.) (1980) Microelectronics and the Engineering Industry - The need for skills. Science Policy Research Unit, Sussex University, Frances Pinter Ltd., London.
- THWAITES A., OAKLEY R., & NASH P (1981) Industrial Innovation and Regional Development - Volume 1. Final Report to the Department of the Environment, CURDS, University of Newcastle.
- THWAITES A.T., EDWARDS A & GIBBS D.C.(1982) Interregional diffusion of Production Innovations in Great Britain. CURDS, University of Newcastle.

US CONGRESS JOINT ECONOMIC COMMITTEE. (1982) International Competition in Advanced Industrial Sectors : Trade and Development in the Semiconductor Industry.

VERNIMB C. & SKYVINGTON W. (1980) (Eds.) Videotex In Europe : Conference Proceedings. Luxembourg 19-20 July 1982, CEC, Learned Information, Oxford and New York.

WILLIAMSON J.M. (1981) Foreign Experience with Cash Dispensers Point-of-Sales Terminals and Home Banking. Proceedings of Conference of the Danish Bankers' Association, Copenhagen.

THE YANKEE GROUP (1981) The Report on Electronic Mail : European Technology Update. C/IS Communications/Information systems.

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**The effects of new information technology
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The study provides a statement of the existing situation with respect to new information technology (NIT) in the Community, considering in particular the present and likely future impact of NIT developments upon the less-favoured regions of the Community. It shows that considerable variations exist in the regional impact of NIT; the peripheral and less-favoured regions of the Community are seen to be lagging behind the central and more prosperous regions; involvement in the hardware and software aspects of NIT production is far less developed. In short, the peripheral regions are failing to share in the benefits of NIT. In the longer term they may reap only the disbenefits through a continued deterioration in competitiveness. In order to prevent the gap widening between prosperous and less prosperous regions, the study proposes that a regional NIT policy be established.