Documento de Trabajo

8 9 1 8

PERSPECTIVES IN NEW TELECOMMUNICATIONS

TECHNOLOGIES

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SIMPOSIO 1.989

PLYMOUTH POLYTECHNIC

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1.- INTRODUCTION.

The technological revolution that has been developed on the information technologies field is particulary interesting in the telecommunication sector. In fact, a very great importance has been obtained by this sector and has become the basis for the economic growth in the next years.

By the year 2000, up to 7% of the European Economic Community's GPD may derive from telecommunications, compared with just over 2% today. By the end of the century, up to 60% of all jobs will also be dependent to a greater or lesser extent on telecommunications through information technology integration.

The aim of the present paper is, firstly, to analyze the new services derived from telecommunications and the new transmission technologies appeared on the last years, creating the basis of the technological revolution.

Secondly, it doesn't seem possible that any country, individually considered, is able to make a coherent policy in this field, because the necessary interrelation and interconectivity of the required equipments. In this sense, we will analyze how a common action of all the Community States has been armonized by the Community Telecommunications Policy. At the end, we will try to know the perspectives for the Spanish case, in the frame of the European policy.

2.- THE NEW TELECOMMUNICATIONS TECHNOLOGIES.

Telecommunications have taken 140 years, since the invention of the telegraph in 1847, to develop from a single service into the dozen or so services we know in the 1980s. But the growth in services and applications between now and the year 2000 is likely to be explosive, with the accelerating revolution continually breaking new grounds.

For a more detailed analysis of this field, we are going to distinguish between new telematics services and new transmission technologies. The first ones allow to open new posibilities to obtain, transform and transmit information, whereas the second ones only are new ways to transport the information.

2.1.- NEW TELEMATICS SERVICES.

The convergence of telecommunications and computer technology have permitted the appearance of new telematics services, most of them available in the main developed countries. In fact, the microelectronic evolution -with the chip revolution- and the application of computer languages to telecommunications - using binary code- have transformed the communications mechanisms in the world, opening a lot of new possibilities.

- The best known new telematics services are the following: teletex, facsimile, videotex, videoconference, mobile telephony and electronic mail. In figure 1, we can see the telecommunication evolution since its origin until its new developments near the 2000 year.
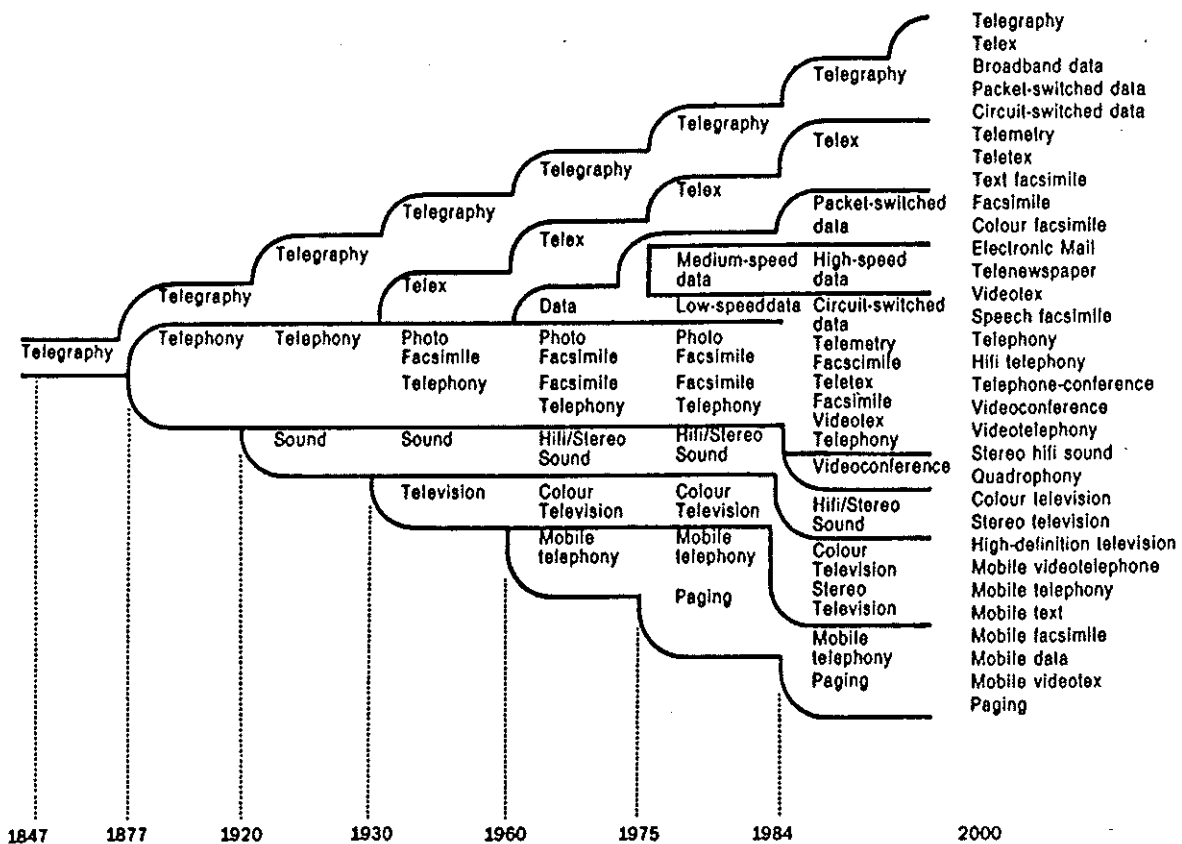

FIGURE 1. TELECOMMUNICATIONS PROSPECTS FOR THE YEAR 2000

SOURCE: GREEN PAPER

Particulary interesting for the business activities is the electronic mail. For centuries, paper documents have formed the basis of commercial transactions. From invitations to tender to final payments, numerous documents are exchanged between trading partners.

Today, in most cases, these commercial documents are electronically processed, then put in envelopes and sent by post. In addition to the slowness of delivery by post, this way of doing business has other major disadvantages such as transcription errors, data duplication, lost time, delays in processing data and low productivity. Together these mean increased costs.

In international trade, the cost related to paperwork are estimated to be between 3.5% and 15% of the value of the merchandise. On a volume of world trade of about ECU 2.1 trillion, the financial repercussions of any reduction in paperwork are therefore enormous. Example: a large company sends out 2.900.000 invoices per year. The cost of processing an invoice manually is estimated at ECU 9.60. If electronic processing of the invoicing reduces the costs of the paperwork by 25% this represents an estimated annual gain of ECU 7 million.

2.2.- NEW TRANSMISION TECHNOLOGIES.

The second group of the new telecommunications technologies is composed by the new information transport posibilities like the Integrated Services Digital Network, the use of Satellite communications and the optical fibre.

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THE INTEGRATED SERVICES DIGITAL NETWORK.

The Integrated Services Digital Network (ISDN) is an information transmission digital network that integer all the possible information signals -voice, image, text and data- in an interactive channel.

The present telephonics networks are based in an analogycal treatment of the electric signal derived from the word. If a network is digital, that means that the word will be converted in a digital signal in the start and arrival point. The same treatment is applicated to data text and image transmission.

The ISDN will offer a wide range of new services such as high quality telephony, high speed facsimile, high speed teletex, combined use of voice and data, and a large number of sophisticated suplementary services such as indicating to an engaged subscriber that a new calling subscriber is trying to

reach him; indicating to a called user information from the calling user; indicating to the user the call charged; and so on. These new services will establish a new degree of quality of service for the subscriber. They will allow in particular also small and medium sized enterprises to have access to new telecommunications services, would otherwise only be possible económically for large enterprises.

The ISDN is considered to be a natural evolution of the existing telephone network, that is, it should not be independent of the current telephone network but should support its progressive replacement. Throughout this phase, therefore, it should interwork whith the current telephone network and with certain specialized networks. Also, the ISDN is only a step towards the Integrated Broadband Communications Network (IBCN) that will offer more and better services and will be the used communications network in the long term future.

SATELLITE COMMUNICATIONS

The peaceful use of space -for telecommunications, earth recources exploration, navigational aids, weather information, scientific research and experiments- has developed rapidly in the last 30 years.

Since the first communications satellite "Early Bird" relayed across the Atlantic 300 voice circuits, or one television channel, between four European countries and the United States, commercial satellite communications have gained a quarter of a century of experience.

Although the number of today working satellites is not already very big -around 270- is foreseable an important increasing in this number for the year 2000. For this reason, a regulation is necessary to avoid the saturation and consequent interferences.

The problem of spacial communications involves many countries all around the globe. Then, some organizations like INTELSAT (110 country members) and EUTELSAT (26 country members) try to do the proper policy, respectively, in a global and european area.

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OPTICAL FIBRE

The evolution of the laser technology and the appearance in the sixties of a fibre able to transmit a light ray without distorsion, allow the discovery of the optical fibre like a new information technology transmission.

The new communication system arises from the joint between a sufficiently strong light source and a special materia able to transmit it without distorsion. Thus, that system presents some interesting advantages with respect to the traditional ones, such as: a bigger capacity, quality, speed, duration and less size and weight of the transmission cable. For instance, an optical fibre is able to transport in one second the information equivalent to the Encyclopaedia Britannica.

3.- EUROPEAN COMMUNITY TELECOMMUNICATIONS POLICY.

3.1.- PERSPECTIVES IN THE COMMUNITY.

The current wave of technical innovation we have analyzed has now led to rewiews in the Community the future organization of the telecommunications sector and its necessary regulatory adjustement. In this sense, the Commission has published in 1987 the Green Paper about the development of the common market for telecommunications services and equipment.

The aim of this report is to develop the conditions for the market to provide European users with greater variety of telecommunications services, of better quality and a lower cost, affording Europe the full internal and external benefits of a strong telecommunications sector.

A technically advanced, European-wide and low cost telecommunications network will provide an essential infraestructure for improving the competitivity of the European economy, achieving the internal market and strengthening Community cohesion. Telecomunications have a great influence not only on services in general, such as financial services, transport and tourism, but also on trade of goods and on European industrial cooperation.

To reach this aim, the Commission has made some proposals along these five main lines:

- Coordination regarding future development of telecommunication in the Community and common infraestructure projects. This concerns in particular the principal future stages of network development, the ISDN and the IBCN.

- Creation of a Community wide market for terminals and equipment. This concerns the promotion of european wide open standards, in order to give equal oportunity to all market participants.

- The launch of a programme of pre-competitive R+D covering the technologies required for the IBCN. This is the RACE programme.

- Promoting the introduction and development of advanced services and networks in the less favoured regions of the Community.

- Building up common European positions with regards to international discussions in this area.

But the searh of common positions in the complex field of future regulation of the telecommunication sector must take into account a number of major requirements, if it is to contribute to strengthening the European economy.

Firstly, differing regulatory traditions in the sector. Careful analysis of current reviews and debats in the Members States must identify those areas on which common positions can be reached.

Secondly, opportunities and obligations deriving from the Treaty, in particular regarding: the free movements of goods, the freedom to provide services, competition rules and the common commercial policy.

Thirdly, the external relations of the Community, in particular regarding its major trading partners, the EFTA countries, the United States and Japan, and the Thrid World.

Fourthly, the evolution of social perceptions in the Members States regarding the new technologies. This concerns the social consequences of the new technologies and associated regulatory policies, the conditions for the integration of these technologies into both private and work life, and measures to facilitate· the transition by generating new employment opportunities and protecting legitimate interests.

Following these lines, some facts have been made in the Community in the telecommunications sector. We are now to describe those relationed with the R+D programmes, the ISDN and the spacial communications policy.

3.2.- THE R+D COMMUNITY PROGRAMMES ON INFORMATION TECHNOLOGIES.

A priority for the Researh and Development on information technologies is clear in the R+D Community policy. In the last Community Frame Programme, launched in 1987 with a global budget of ECU 5.700 million, near the half, ECU 2.275 million, are destinated to programmes ralated with the R+D on information technologies.

The main programme in this field is the ESPRIT (European Strategic Programme for Reseach and Development on Information Technologies). Initially foreseen in two phases 1984-1988 and 1989-1993, the second phase has been advanced because the success obtained and the funds was finished two years before. At the moment, the second phase is going up, the ESPRIT II, with a budget of ECU 1.600 million.

But the most important programme specifically related with telecommunications is the RACE (R+D in Advanced Communications Technologies in Europe). The aim of this programme, launched in 1985, is the implementation of the Integrated Broadband Communications Network (IBCN) with optical fibre, all around Europe in the first half of the nineties.

The definition phase 1985-1986 covered the initial work needed to improve the definition of the functional requirements of the IBCN, together with exploratory research and development in key areas of agreed urgency. The current phase 1987-1991 tries to develop the needed technologies for the netwok design. After, the second phase 1991-1996 will try the network implementation.

The STAR programme (Special Telecommunications Action for Regional Development) is a five years programme (1987-1991) aimed at making use of advanced telecommunications services to promote the economic development of the less favoured regions of the Community. Its budget is ECU 780 million.

The STAR programme is active in seven Member States: France, Greece, Ireland, Italy, Spain, Portugal and the United Kingdom. For some countries, only certain designated regions are eligible for assistance, how the Mezzogiorno in Italy, Corsica and the overseas departaments in France and Northern Ireland in the United Kingdom. The programme tries to help set up the kind of telecommunication infraestructure necessary to provide advanced services to business users in the less favoured regions.

3.3.- THE INTEGRATED SERVICES DIGITAL NETWORK.

The coordinated introduction of the ISDN in all the Members States is one of the objetives assumed by the Community for the next years. The stablishment of the digital network is the aim of the community policy a mediun term, before arrive to the Integrated Broadband Communications Network foreseen in the RACE programme around 1995.

.The dates of introduction, however, are very different from one country to another. Certain countries are already launching experiments today, others do not foresee the introduction of ISDN before the 1990s and others again not before the first mid-1990s. The figure 2 shows the calendar for different countries.

But the delay in the ISDN implementation in Europe is near two years with reference the horizon foreseen in 1986. The reason for that is the lack, not only for services but for terminals as well, of a definition of standards which allow the european network conectivity.

Community action on ISDN standardization is focused on the need to produce standards as early as possible in the evolutiona-ry stages of ISDN, in order to neutralize the development of non-standards solutions in individual Member States. Till next year, it seems not posible a global agreement in this field.

3.4.- SATELLITE COMMUNICATIONS

The Commission has a mandate from the Members State to develop a coherent policy in order to ensure the integration of future satellite techniques with the overall European telecommunications network.

This implies close coordination with the European Space Agency (ESA), as the organization developing European space technology, Eutelsat, as the operator of European regional satellite systems and the RACE iniciative.

For the medium to long term, discussions are underway between the Commission and ESA, wich is currently clarifying its new 10 years programme for development of future satellite communications technology.
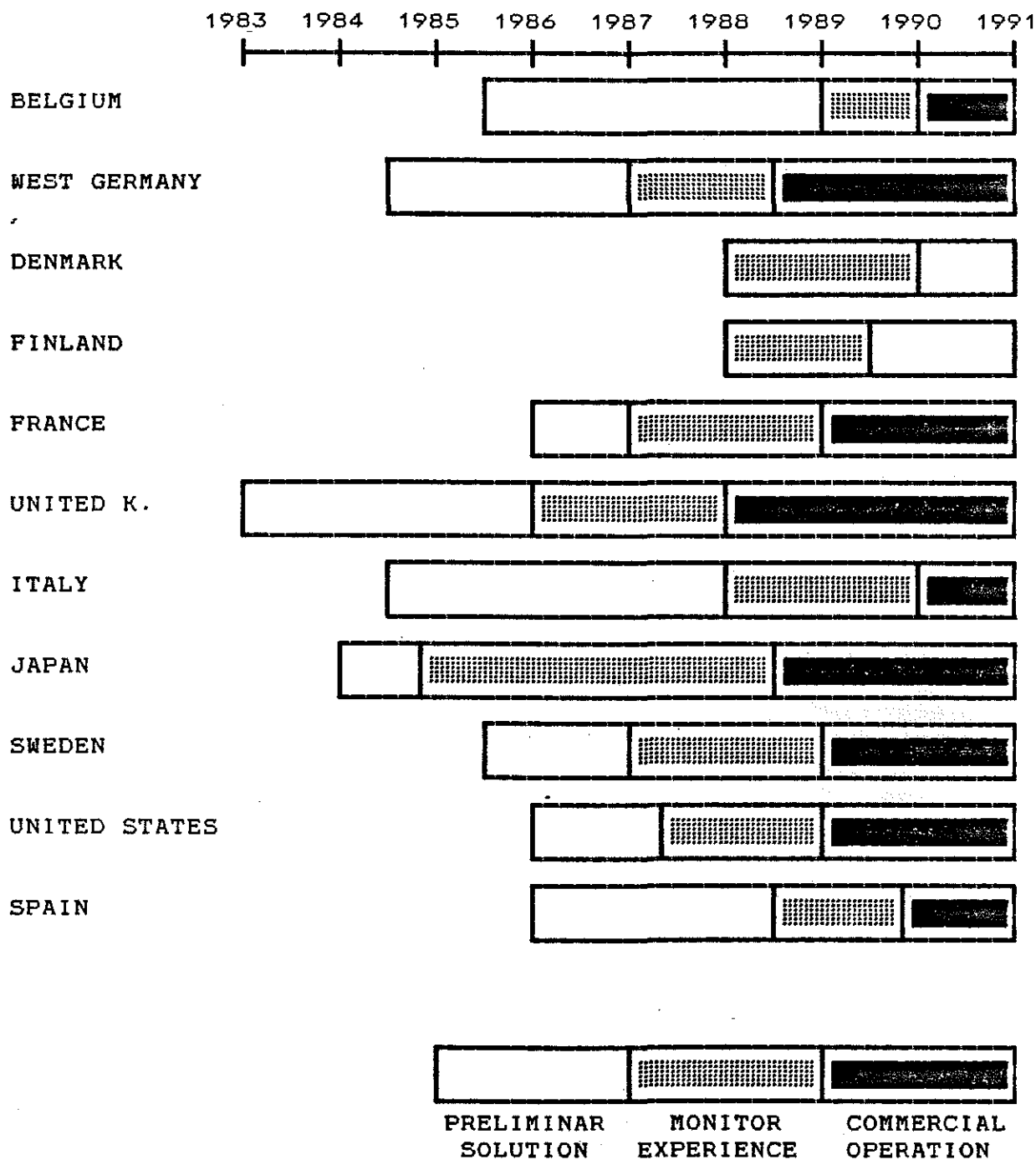
FIGURE 2: ISDN IMPLEMENTATION TIMETABLE

SOURCE: Computerworld España

3.5. OTHER PROGRAMMES.

The Community has developed several programmes in the information interchange automation area through telecommunications technologies. The most important of these are INSIS, CADDIA and TEDIS.

The INSIS programme (Inter-institucional Integrated Services Information System) tries to facilitate the interchange of bureocratic information between the Member States Administrations and Community Institutions through the use of new technologies. It was formally launched in december 1982.

Community Intitutions are in daily contact with Member States Administrations separated by considerable distances. Such daily communications involves the mailing of a large amount of documentation. The "paper mountain" is aggravated by the nine community languages. Information technology can reduce the amount of documentation and save time and money.

The CADDIA programme (Automating European Data and Documentacion Exchange) launched in 1985 aims the cooperation in automation of data and documentacion for imports/exports and the management and financial control of agricultural markets.

The TEDIS programme (Trade Electronic Data Interchange Systems) approved in 1987 is devoted to solve the specific problems of users, in particular small and medium-sized enterprises, in the field of electronic data interchange, trying to avoid a proliferation of local systems in the different countries.

4.- SPANISH TELECOMMUNICATIONS POLICY.

4.1.- PERSPECTIVES IN SPAIN.

The data for the spanish telecommunication sector shows that the sector output has represented in 1988 about the 1,5% of the GPD, that is, near pts. 800.000 million. Most of this data corresponds to the Spanish National Telephonic Company, with pts. 600.000 million gross sales.

In spite of the above mentioned percentage, which is similar to the community one, Spain remains in the european last places in terms of the telecommunication services using level, only higher than Ireland and Portugal. Although in the last ten years, the investment has been similar to the medium level of the

european countries, should have been larger in order to remove the differences with other countries.

For example, the installed telephonic lines per 100 habitants in 1987 in Spain was 25 lines. In other countries like Italy, Belgium and Grece it was more than 30 lines, United Kingdom, Holland and Germany, more than 40 and the U.S.A., Sweden and Denmark more than 50. At the end of 1988, Spain has increased this ratio to 27,5 lines per 100 habitants, but is still far away from the main european countries. In the facsimile field, the spanish situation is better, with 48 telefax per 100.000 habitants, but still is a long way from countries like Germany and Italy with 73,5 and 83,5 units installed respectively.

In the last years, this delay has prompted an important development in the spanish telecommunications sector. Figure 3 shows the evolution of the spanish telecommunication equipment market between 1983-1988.

	Production	Import	Export	Consumption
1983	75.273	13.887	12.861	76.299
1984	80.042	15.288	13.905	81.425
1985	92.173	22.152	14.097	100.228
1986	104.187	22.031	15.584	110.634
1987	131.444	34.289	13.559	152.173
1988	180.000	72.000	14.000	238.000

FIGURE 3: SPANISH TELECOMMUNICATION EQUIPMENT MARKET

Source: ANIEL.

The future of the sector is quite favourable due to various reasons. One of them is the proximity and importance of the facts which will be celebrated in Spain in 1992, Olympic Games in Barcelona and the Universal Exposition in Sevilla. These developments will produce an increase in information transmission needs and therefore the sector will have to be prepared in order to cope with these future requirements.

There is a second reason: the passing in December 1987 of the Telecommunication Regulation Act, and the project of the Telecommunication National Plan, like the regulation framework for the sector activities. These events, surely will increase the sector's development.

4.2. THE TELECOMMUNICATIONS REGULATION ACT AND THE
TELECOMMUNICATIONS NATIONAL PLAN

Spain is the second community country, after United Kingdom,
who has launched a sector regulation act. This act tries to
stablish a basic juridical framework, including the main lines
for the telecommunication services development. At the same time,
the functions and responsabilities of the Public Administration
and the public and private sector, are clearly defined.

The objectives of this act mirrors the aims of the Green
Paper for the countries of the european community, and the
following may be emphasized:

- To grant the quality and universality of the network
infraestructure in the short and long term, through a
monopolistic regime. In this sense, we are going to the
technological convergence with the ISDN.

- To reorganize the current basic services -telephone and
telegraph- , still in monopoly regime.

- To open to the free market the new telecommunication
services. A large increase in its demmand is expected in the
next years. These new services -based on the basic ones-
will bring new other utilities or will satisfy the new
specific needs.

- To open to the competition the terminals market. The user
could choose the terminals among the homologated and
certificated ones.

- To commision the Public Administration to the definition,
management and development of the R+D sectorial programmes
and to promote the spanish participation on the
international R+D programmes in the telecommunication
domain.

Like a complementary instrument, the act foresees the launch
of the Telecommunications National Plan. This Plan will stablish
a timing for the previous objectives. It also foresees other
specific actions in the following fields: limits to the public
telecommunications services in rural and urban areas, time tables
for the introduction of the new services, forecasts for the
introduction of digital techniques in the networks, spacial
telecommunication and introduction of the ISDN.

Specifically, the plan will try to put the telephonic lines
per 100 habts. rate, in 1990, in a similar level to the one which
will be shared by Germany and United Kingdom at that moment, that
is, 60 lines.

The national plan, that according to the act, should have been approved one year later, is nevertheless being discused at this moment. It is foreseeable its publication by the end of 1989. But in spite of this delay, some interesting facts in the spanish telecommunications sector are taking place currently.

4.3.- THE R+D ON INFORMATION TECHNOLOGIES IN SPAIN

Firstly, it can be emphasized the publication in the summer 1988 of the I National Plan for Scientific Research and Technological Development, proposing a background for the spanish R+D.

Figure 4 shows the plan priority areas. Among them it may be outlined the Production and Communications Tecnologies area. This programme takes about half of the total funds. In this field, it mirrors the community policy.

Inside this area, some programs closely related to the telecommunications migth be clearly identified. These programs receive more than half of the total area budget. This proves the official interest for the future development of the information tecnologies and specifically for the telecommunications.

It may be also outlined that the spanish participation on the R+D Community programmes, analyzed before (ESPRIT, RACE and STAR) on which our participation matches with our economic development, within the community countries group. Furthermore, on the ESPRIT programme the spanish participation began before our official integration in the Community in january 1986.

4.4.- SOME SPECIFIC FACTS.

We are going to comment some actions which have taken place in relation the ISDN, the satellite communications and the use of the optical fibre.

As to the implementation of the ISDN, in 1989, there has begun a monitor experience in order to analyze and realize the basic elements which will configurate the future spanish ISDN. In this way, the new services to include and the terminals and basic equipment to use, have been defined. A fitter labour qualification and a market research are other goals of this experience. The experience is totally developed in Madrid.

	1.988	1.989	1.990	1.991	TOTAL	%
Horizontal Programmes	2.100	4.630	5.087	5.645	17.462	6.7
Natural Resources, Food and Agriculture	11.635	17.417	18.480	15.323	62.856	24.0
Production and Communication Technologies	22.622	25.003	32.903	38.303	118.831	45.3
Robotic	2.158	2.958	4.059	5.259	14.434	12.1
Fotonic	1.148	1.596	2.646	3.646	9.036	7.6
Spacial Research	3.289	3.389	3.389	3.389	13.457	11.3
Microelectronic	2.371	2.533	3.533	4.833	13.270	11.2
New Materials	5.316	5.896	8.946	9.546	29.704	25.0
Information and Comm. Technologies	8.340	8.630	10.330	11.630	38.930	32.8
Quality of Life	10.558	11.703	12.718	13.353	48.332	18.4
Special Programmes	611	901	971	1.331	3.814	1.4
New Actions	160	906	1.859	8.003	10.928	4.2
TOTAL	47.687	60.559	72.018	81.957	262.223	100

FIGURE 4: THE R+D NATIONAL PROGRAMMES

Source: National Plan for Scientific Research and Technological Development.

In april 1989, the construction of the first spanish satellite communications, called HISPASAT, has been adopted by the spanish administration. It will cost Pts. 43.000 Millions and will have 20 television channels: 5 for military use, 3 for commercial television and 12 for advanced telecommunications services for business. It is a gouvernmental objective to use it for the transmission of the Olympic Games and EXPO'92.

Related to the optical fibre, in december 1988, 4.500 kms of optical fibre have been implemented in Spain by the Spanish National Telephonic Company, having a current installation plan that will equal 11.000 kms in 1989 and 33.000 in 1992. Land and submarine connections to the spanish Islands are both integrated in the plan. Specially remarkable is the installation, already available, that links Madrid and Barcelona and allows the simultaneous transmission of 61.500 telephone calls and 128 television channels. This system multiplies by 6 and 15, respectively, the possibilities from the current network.

5.- CONCLUSIONS.

We have tried to analyse the perspectives for the European Community and Spain in an important sector for the future like the telecommunications one.

The telecommunications sector must be considered as an strategic sector, because it is going to be one of the basis for the future economic development for most of the countries in the next years.

The telecommunications policies in the Community and in Spain are oriented to achieve a more free and competitive market without some of the nowadays monopolistic situations. Despite some disadvantages, we think that those policies are appropiated and a balanced development in the sector can be expected in the next years.

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