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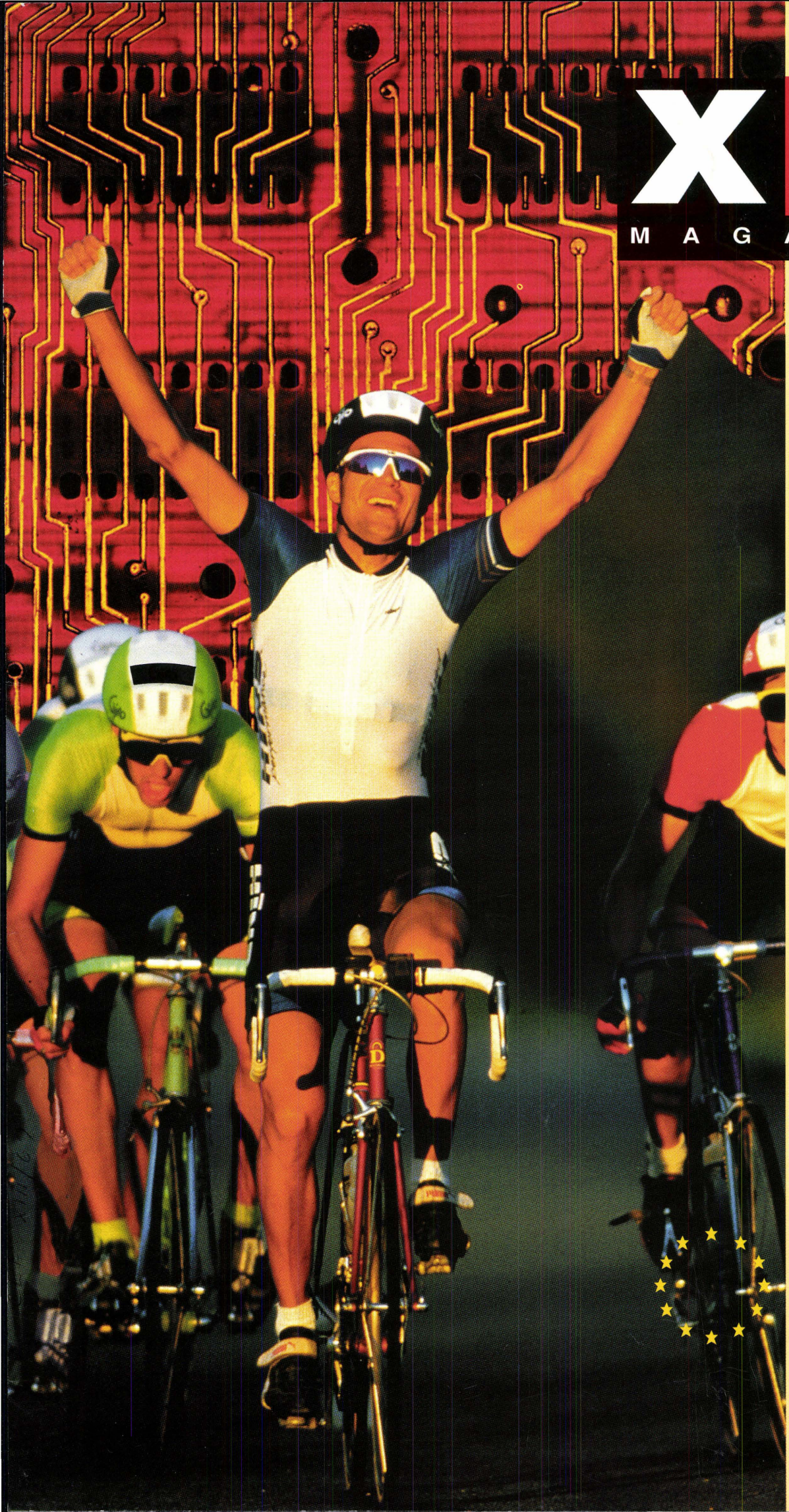
XIII MAGAZINE

EUROPEAN COMMUNITY POLICY FOR TELECOMMUNICATIONS, INFORMATION INDUSTRIES AND INNOVATION.



GEARING UP FOR EUROPEAN MOBILE COMMUNICATIONS

COMMISSION OF THE EUROPEAN COMMUNITIES
DIRECTORATE-GENERAL XIII.

XIII MAGAZINE

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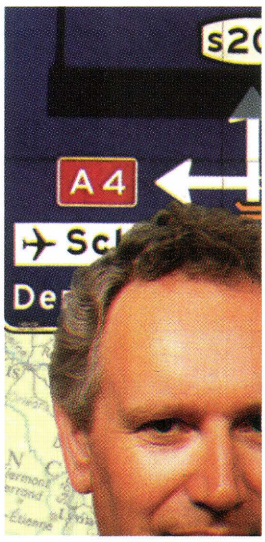

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Editor: Michel Carpentier
Art Director: Jim Ludden
Designer: Tony Green
Production Manager: Guido Hutsebaut

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EDITORIAL

SINCE THE 1970s telecommunications have been undergoing wide-ranging technical changes. With the reduction in costs, these changes make available to users an impressive array of services, at a reasonable cost, which can provide tailor-made answers to their needs.

In a bid to derive the maximum economic and social benefits for the European Community from this, the Commission submitted to the Council in 1983 a Community action plan for the telecommunications sector. This plan has been extended over the years to cover all the major aspects of the sector and has now become a Community telecommunications policy worthy of the name, covering network evolution, the telecommunications terminals and equipment market, the development of and market for telecommunications services, Community cohesion in this sphere and external relations.

In the equipment and telecommunications terminals sector the idea is to counter market fragmentation in the Community by taking strong action to promote standardization and applying specific measures to open up markets. These aims have been pursued by taking steps to ensure greater standardization of the sector, in the framework of the European Telecommunications Standards Institute (ETSI); holding consultations with a view to launching new pan-European services; and the adoption of a directive designed to organize the Community terminal market on the basis of common specifications. A directive on opening up telecommunications markets has also been adopted, while the RACE R&D programme has laid the common foundations for the industrial development of advanced communication services, in particular broadband services.

At the same time, in line with the Green Paper on telecommunications, a balanced piece of legislation has been introduced which links the opening up of telecommunications services with their harmonization(the establishment of Open Network Provision, ONP, which regulates the availability of network resources to suppliers of services).

Community cohesion has been taken into account in the STAR and TELEMATIQUE programmes, which draw on resources from the structural funds to contribute towards the development of advanced telecommunications networks and services in the less-favoured peripheral regions of the Community.

Finally, coordination ensures that the Member States show a united front in international organizations dealing with telecommunications at the technical level (INTELSAT, International Telecommunication Union), while the Community uses its powers to represent the interests of the Member States in multilateral (GATT) or bilateral trade negotiations (in particular with regard to the United States and Japan).

These various activities have led in 1991 to a situation where the major part of Community legislation designed to achieve an internal market in the telecommunications sector is now in preparation or foreseen.

However, this does not mean that the 'European Telecommunications Area' is already at hand - or that it will be a fact of life as soon as the latest measures adopted enter into force at the end of 1992. European networks and services must now be added to the legislation, regulations and standards which have been put in place to date.

The lack of compatibility occasioned by the fragmentation of national telecommunications networks and services is taking time to remove, and this at a time when the impending single European market calls for the availability of trans-European services.

Community action can draw on a catalyst in this area, the 'European Nervous System' (ENS), a communication system designed to facilitate the exchange, between national and Community administrations, of information related to the management of the internal market. The implementation of this system should lead to the adoption of solutions which can be used by a wide range of businessmen who have a need for trans-European communications.

This action should be amplified and strengthened by measures dealing with standardization, type approval and pricing policies.

Essential though it is, this application of 'telematics' will not be the only one of its kind. The promotion of telematic services is planned as regards the development of services of public interest in areas such as health care, transport and flexible and distance learning.

As a sequel to the types of action already taken, the anticipated huge extension of mobile communications needs to be bolstered through a common development strategy and by managing the resources of the frequency spectrum in a way which takes account of the Community dimension.

The use of satellite communications in Europe has so far failed to develop its full potential, mainly as a result of an unfavourable regulatory context. This situation is about to be improved by suitable draft legislation, which should lead to the implementation of such services at Community level.

These are the directions of the future development of Community policy on telecommunications. The Community will be primarily active in encouraging network operators to cooperate, with the aim of making their contribution to trans-European solutions. The Community should also create the right conditions for the European telecommunications industry to establish a solid foundation, within the new European competitive area, to enable it to compete on equal terms with its competitors and ensure that the latter operate under equitable conditions of competition and market access.

The success of this policy is vital for the Community, and for its partners in the wider European Economic Area. ■

Michel Carpentier *Director-General DGXIII, Commission of the European Communities*

MOBILE COMMUNICATIONS

By Pieter Weltevreden

Director of telecommunications policy, DG XIII

THE STRENGTHENING OF European telecommunications is a major condition for the development of economic activities and a competitive market throughout the 12-nation European Community. In the field of mobile communications, two key objectives are to provide a Community-wide market for mobile equipment manufacturers and Community-wide services for users and operators.

This will be possible only if common frequency bands are available throughout Europe. But as it is very difficult to find common frequencies for new systems, a rationalization in the number of competing standards becomes necessary. At the same time, the standards must allow sufficient flexibility to enable manufacturers to differentiate their products and introduce innovative features. The European Commission has therefore given initial priority to action in the two areas of harmonization of standards and of frequencies.

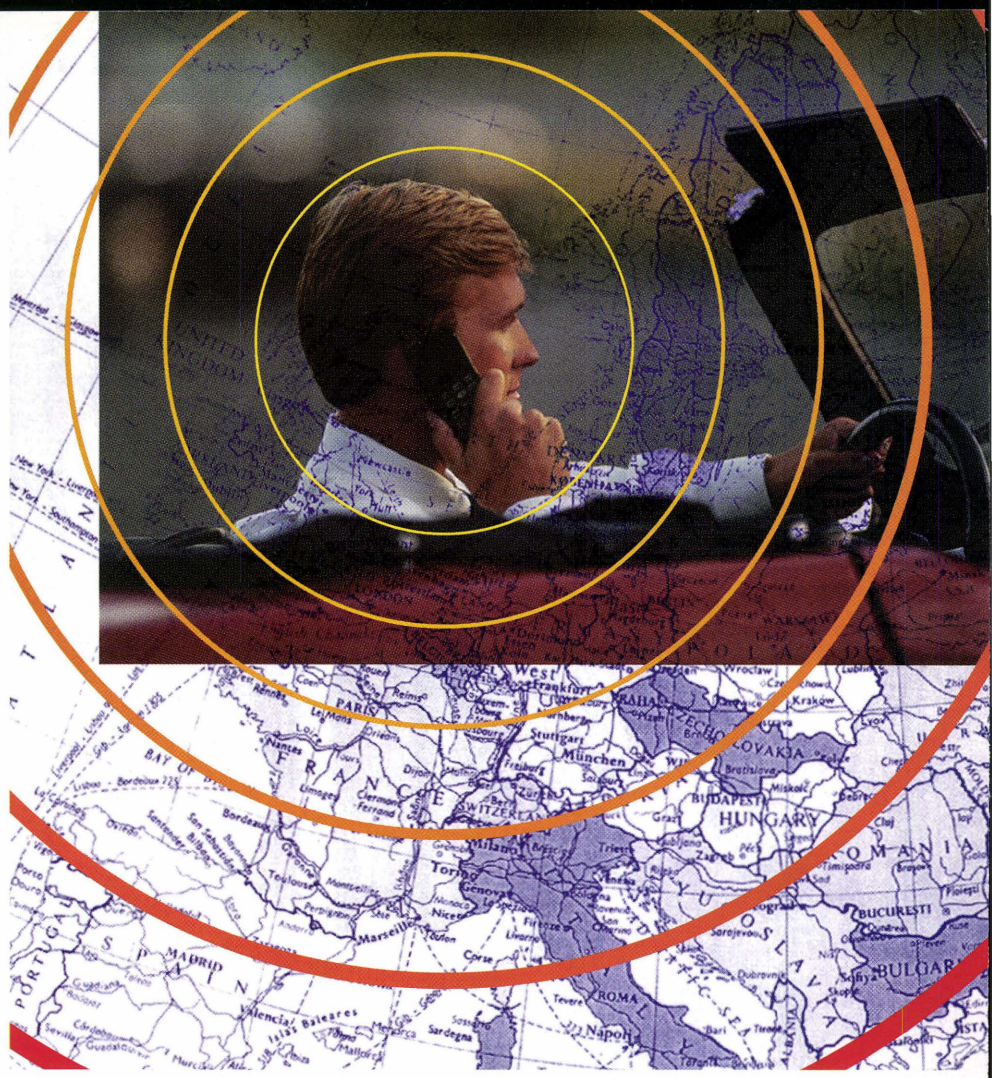
The shape of the European mobile communications industry is changing meanwhile. Until recently, public telecommunications operators had a monopoly on mobile telecoms services, but a wave of deregulations has changed all this and in many cases new mobile technologies are being used as a vehicle to introduce competitive services. Britain has had a competitive market since cellular radio started in 1985; France introduced mobile competition in 1987, while Germany has used GSM technology to bring competition to Deutsche Bundespost with Mannesman.

Pan-European Digital Cellular GSM

Nearly all European countries have analogue cellular radio services in operation, but with the exception of a few limited geographical areas they use incompatible technical standards. As a result, subscribers are unable to use their equipment in countries other than their own. A common European mobile telecommunications standard (GSM) has been developed to overcome this.

A Council recommendation (June 1987) dealt with the coordinated introduction of GSM in the Community, with emphasis on the following : stimulating the process for the creation of technical standards for GSM infrastructure and associated terminals; obtaining fully coordinated approval for the implementation of GSM; and promoting the use of GSM hand-held

"With growing public expectation for communications on the move, some 100 million radio handsets are likely to be in use in Europe by the end of this century"



terminals. The recommendation has helped implement a commercial service in the Member States during 1991.
Under the associated Council directive of June 1987, Member States were required to reserve specific frequency bands for the digital cellular service. The 905-914 and 950-959MHz frequency bands or equivalent parts in the 890-915 and 935-960MHz range were to be reserved exclusively for a public pan-European cellular digital mobile communications service by 1 January 1991. The public cellular digital service will occupy the whole of the 890-915 and 935-960MHz bands as quickly as possible, according to commercial demand.
A report submitted to the Council and the European Parliament at the end of 1990 pointed to progress in the implementation of GSM as well as to issues still to be resolved. Many of these issues are being tackled in the context of the work of ETSI and the working parties set up under the GSM Memorandum of Understanding.

Critical areas in which coordinated action is required include implementation of mutual recognition of licences for the operation of GSM
terminals in all Member States; development of the system in higher frequency bands, in order to create new mass markets; and promotion of the use of the GSM system in central and eastern Europe.

ERMES : pan-European paging

The Commission initiated the concept of a truly pan-European radio paging service, called ERMES, to provide a full roaming capability for potential subscribers and access to a volume market for manufacturers. Any such paging system should be suitable for operation in the frequency band 169MHz, with 25KHz radio channel spacing; permit an increase in the number of paging users; and permit simultaneous operation of two or more independent systems in the same geographic area, and of several independent systems in areas where several national boundaries meet.
The relevant recommendation and directive prepared by the Commission provide for the coordinated introduction of ERMES as from 31 December 1992 in all EC countries.

It also recommends an MOU between operating companies and the possibility of using financial instruments from the Community (STAR).
The directive designates four frequencies to be released in all the Member States by the end of 1992.
Administrations are asked to prepare plans for the bands 169.4-169.8MHz to be released for ERMES.

DECT : Digital European Cordless Telecommunications

The DECT standard being developed by ETSI defines a radio access technique for connection to the PSTN and ISDN. The three major applications are residential cordless telephones; business communications, for both voice and non-voice radio LAN applications; and public access, a radio means of extending public and private networks into customer/user premises. DECT will provide high-capacity communications to low-cost handportable units throughout the EC in 1992. It will also provide a wireless connection between PCs and LAN backbones, and could provide the final "drop" into customers' premises from the public fixed network.
The Council of Ministers has approved a draft directive on the 1880-1900 MHz frequency band to be designated for DECT and an associated recommendation on its implementation.

DSRR : Digital Short Range Radio

This service will meet the demand for personalized telephone services which are not connected via the public switched telephone network (or ISDN) and consequently do not attract line charges. The specification is nearing its final form in ETSI and an I-ETS is anticipated before the end of 1991. A Commission proposal for a Council directive will designate two spectrum slots for DSRR, at 888-890 MHz and 933-935 MHz.

Frequencies

All the commercially interesting part of the spectrum having already been allocated, it is necessary either to reallocate some part of the spectrum or to migrate to higher technologies, in order to accommodate new devices or services.
There is a general trend towards greater mobility, helped by new technologies, and it applies to communications systems also. With growing public expectation for communications on the move, some 100 million radio handsets are likely to be in use in Europe by the end of this century. The new technologies require additional spectrum, while the new equipment accesses higher frequencies.
Use of digital technologies will alleviate the pressure, as will sharing the frequencies between different services. DA (Digital Audio) broadcasting will be three times more efficient than FM broadcasting, while CDMA technology will enable better use to be made of the frequency spectrum.
Frequency spectrum is a finite resource and there are physical limitations on radio frequencies because of their propagation characteristics. Frequency planning is not harmonized in Europe and there is a waste of frequencies due to different usages. The multiplicity of actors complicates the system of frequency management, while frequency allocation at national level is more technology- or policy-oriented than market-driven.
Spectrum allocation requires international coordination, a lengthy process. Equipment standards must be agreed, at least on a European basis, which takes time.
A Council resolution (28 June 1990) on strengthening European frequency coordination set the following goals : to provide for a sufficient frequency spectrum for new services and promote its efficient use; to develop common European positions for the ITU administrative radio conferences and encourage frequency harmonization in Europe through ERO; to cooperate with ETSI and undertake research into long-term requirements.
ERO now employs six full-time experts and is supported by the Commission. All interested parties will have the possibility of working with it.
The Council also adopted three key directives on frequencies, as mentioned above. They deal with the cellular, paging and cordless telecommunications sectors of the mobile market. The release of frequencies under the EC directive will give operators and the industry the confidence needed to invest.
The Commission supports the views of CEPT and ETSI to use the 1880-1900 MHz band for cordless telecommunications, as it will provide enough spectrum for even cordless PBXs and radio LANs.
Although PCN will develop first in Britain, bands have been designated in Europe for such a service and will therefore be available when needed.

A fully harmonized European mobile telecommunications system will offer private individuals and businesses a new degree of mobility and provide a cost-effective solution for residential, business and public access applications. It will also provide fully integrated communications for the EC, thus ending the present fragmentation and incompatibility of mobile systems. The benefits to Community residents will be not only economic but also cultural and social. ■

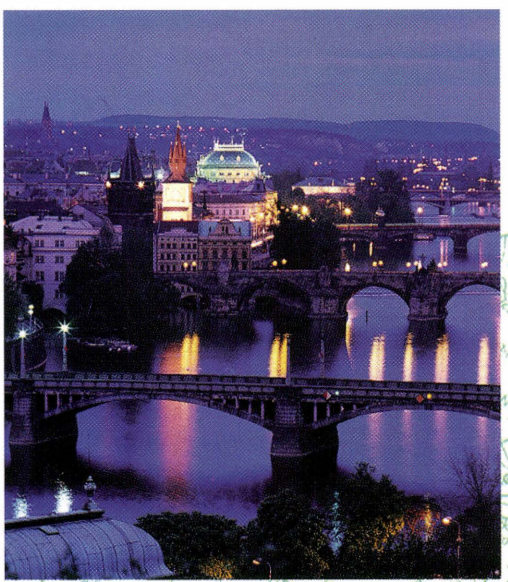
THE OTHER EUROPE
CZECHOSLOVAKIA

Fast-moving telecommunication developments get EC support

BRIDGING THE ECONOMIC GAP which separates it from its neighbours in the West – this is the current which underlies every reform being attempted in Czechoslovakia today.

The industrialized countries have not been slow to answer the calls for assistance from the states of eastern Europe, at times in a coordinated manner; but more often than not the aid has been fragmented, depending on the interests at stake.

The Community's PHARE programme, and the impending association agreement between the EC and, in particular, Czechoslovakia, will help to establish a new free trade area which will help to redirect the Czechoslovakian economy towards a market economy.



Whether under programmes of assistance or framework agreements, special importance has been attributed to telecommunications, which is the focal point of the Czechoslovakian economy. Modernization of the country's telecoms network has been accorded priority status by the government. It goes without saying that the success of this endeavour calls for a restructuring of the post and telecommunications authority (PTT).

The Czechoslovakian telecommunications network is similar to that of its neighbours: it is outmoded, unreliable and insufficiently extensive to meet the needs of a contemporary integrated economy.

And yet Czechoslovakia is at the forefront of eastern European states as regards the number of telephone lines installed. Figures for 1988 reveal that the country has 250 lines per 1000 inhabitants, somewhat less than Bulgaria, with 288, but well ahead of the Soviet Union and Poland (130), and almost three times as much as in Romania. However, such figures pale in comparison with the United States (750) or Sweden, which holds the current record, with 890 lines per 1000 population.

The Czechoslovakian authorities have set themselves the goal of installing an extra 5-6 million lines over the next 10 years. Such an objective can only be achieved if the telecommunications service is completely overhauled, and this is at the heart of the new strategy drawn up by the government. Taking its cue from the reforms in Hungary - a leader in the field - the Czechoslovakian plan proposes to hive off the postal sector from telecommunications services within the PTT. This restructuring should be effective by the beginning of 1992.

Telecommunications, which are currently under state control, would become an independent entity, probably having a Czech unit in Prague and a Slovakian unit in Bratislava, to take account of the current political structure in the country. A central body would oversee the structure at federal level. As is the case in Hungary, foreign investors have been invited to take part, in return for a novel form of revenue-sharing.

The Czechoslovakian authorities are fully aware that without foreign financial and technical assistance the modernization of the network will remain a dead letter. Even if (despite the restrictions imposed by Cocom on the export of some types of technology to eastern Europe) efforts have been made to modernize - such as the prototype digital exchange which has been tested at local level - most of the country's equipment is obsolete and falls far short of current standards and requirements.

Czechoslovakia will have to attend to the most urgent things first. To meet the country's immediate needs, two contracts have been signed. The first is for a cellular network and the second covers the supply of a data communication network. Both contracts have been awarded to a consortium of two US companies, in exchange for a 20-year licence and exclusive rights, for 3 and 5 years respectively. The total cost of these two "minor" contracts is 60 million ecus. This is part of a wider project which foresees an injection of 280 million ecus over the period 1991-92 to modernize the telecommunications network, and a total of 8.5 billion ecus over a 10-year period.

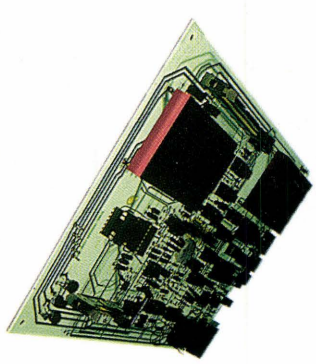
The focal point of this plan comprises two very ambitious projects to link central Europe from north to south and east to west. More than any other country, Czechoslovakia has a keen interest in this project, given that these two links meet on its territory.

There is no shortage of enterprises expressing an interest in taking part in these projects. The list of potential bidders includes several European companies. Although they were not involved in the first contracts, these European companies should be well placed for the latest projects. Indeed, this is borne out in statements made by the Czechoslovakian authorities, who are at pains to indicate their willingness to comply with European standards and the proposals drawn up by the European Commission in its Green Paper on telecommunications.

While awaiting the participation of European companies, the EC has decided to make its own contribution to the plan to restructure the Czechoslovakian PTT. Six million ecus have been allocated as an aid programme under the PHARE initiative. The funds will be mainly spent on providing technical assistance to the Czechoslovakian authorities. It will enable an initial programme, which is already operational in Bratislava and Prague, to be reinforced and extended. The experts sent to Czechoslovakia will assist with the modernization and diversification of the telecoms sector, and implementing standards and procedures.

This limited measure will no doubt be integrated into the wider cooperation under consideration between the EC and Czechoslovakia in the framework of the association agreement currently being negotiated between the two parties. ■

Marie-Martine Buckens, *journalist*



SUPERNODE

Building low-cost parallel supercomputers based on Esprit research

" The flexibility offered by Supernode computers, allowing more interactive working methods, gives them a major advantage over conventional supercomputers "

The development of the software and applications which are essential to consolidate the outstanding success of the general purpose parallel computers developed by Supernode I (Esprit project 1085) is the basic aim of Supernode II (Esprit project 2528).

In the overall context, Supernode II is important because it fulfills two very important objectives of the overall Esprit programme. Firstly, it involves very small companies (none of the major EC IT companies) and secondly, it is building on a competitive advantage the EC currently enjoys to establish a Community presence in a strategically important area.

The specific goal of the project, which began in March 1989 and is due to run until March 1993, is to make the use of parallel computers for scientific and business applications as easy as the use of conventional computers.

The strategy pursued by both Supernode projects to develop low-cost supercomputers is highly ambitious in two ways. First, it rests on the use of parallel as opposed to convential vectorial architecture (in other words, such computers can undertake a number of different calculations in parallel instead of having to do them in sequence).

Supernode computers are in fact capable of two types of parallel operation. Either each processor is allocated a different task when processing common data (algorithmic parallelism) or the data can be divided up into packets, each of which is processed separately.

Secondly, the strategy is based on transputers (i.e. processors with a built-in memory) as opposed to processors sharing a common memory.

Currently, the Community has a comparative advantage in the development of transputers over US and Japanese firms. Both Supernode projects revolve around the use of the T.800 transputer, which is made by Inmos (now a subsidiary of SGS Thomson).

Two further Esprit projects, PUMA and GP-MIMD, have been launched more recently based on the Inmos T.900

transputer. PUMA is concerned with both hardware and software as a preparation for GP-MIMD, which involves all EC-based manufacturers of transputer-based machines (Meiko, Parsys, Telmat and Parsytech), and aims to develop a single parallel computer.

The use of transputers brings several advantages. It means that parallel computers can work much more quickly than if based on processors with a common memory. Moreover, the transputers can be scaled up into matrices in an unlimited number of dimensions, giving an almost infinite potential capacity.

However, a potential disadvantage of parallel architecture computers based on transputers is that they are more complicated to program.

The crucial importance of Supernode II stems from its objective of overcoming this complication, thereby allowing the widespread use of transputer-based parallel computers on the marketplace.

A number of transputer-based parallel computers developed with technology from the first Supernode project are commercially successful. Examples include Telmat's T. Node and MEGA Node systems, which can be used for a number of applications including computer graphics, image recognition, stimulation, structure calculations and teaching.

However, many of the customers are research centres and users who are themselves prepared to innovate. Supernode II aims to allow transputer-based parallel computers to be used in a wide range of scientific and business applications. In particular, Supernode II is defining additional software components based principally on existing environments, tools and languages but modified appropriately for parallel systems.

In addition, the project is designing and implementing specific tools and numerical libraries required to use parallel architecture effectively.

CAD for VLSI chips

To provide a test-bed for the major software components, four applications are being implemented. The first of these is developing computer-aided design (CAD) tools for designing complex silicon-based very large scale integrated (VSLI) circuits. Specialized parallel Supernode machines are being used to provide the high-performance necessary to run silicon compilers, which are tools for generating the layout of a circuit from high-level behavioural specifications. The language used for designing the VLSIs is ELLA (developed within another Esprit project called SPRITE).

Heterogeneous systems simulation

The second application being tested is simulation of heterogeneous systems. Current methods of computer simulation, using an event list approach, are only suitable for very regular situations such as hydrodynamic flow. Supernode computers can be used to develop new simulation methods needed to partition problems, synchronize processes avoid deadlocks and balance loads. So far the project has successfully developed prototype software for both 'conservative' and 'optimistic' synchronization of discrete event stimulation. For example, the stimulation of 4000 vehicles moving on a 15,000 km2 area of the UK road network has been demonstrated at faster than real-time rates.

Lighting simulation

The third test application is the development of software packages running on Supernode computers which produce accurate and fast simulations of an architectural lighting environment, incorporating basic radiosity software. A problem with existing software packages for lighting modelling, designed to run on conventional computers, is that the level of simulation detail is generally low and they can take many hours to run. Software based on Supernode computers should not only improve the speed of such programs but also give results previously obtainable only with very expensive hardware. Results so far have been very promising.

Oil reservoir simulation

The final application tested concerns oil reservoir simulation for calculating pressures, masses and properties of all fluids throughout a given reservoir over time with production and/or injection of water or chemicals. Reservoir simulators model production control methods to facilitate optimum production strategy (such as where to drill wells for production and injection).

As reservoirs can cover several kilometres and include strong variations in geological characteristics, simulation methods require high computing power, which until now has only been available from very large computers. As a result, excessive cost has until now tended to limit simulation to very few cases.

However, more efficient Supernode-based computer power should allow wider use of simulation techniques, possibly even in the field and on-line. Moreover, it might allow more interactive use of simulation (i.e. changing the data on which the simulation is based whilst the program is running).

Interactive working methods

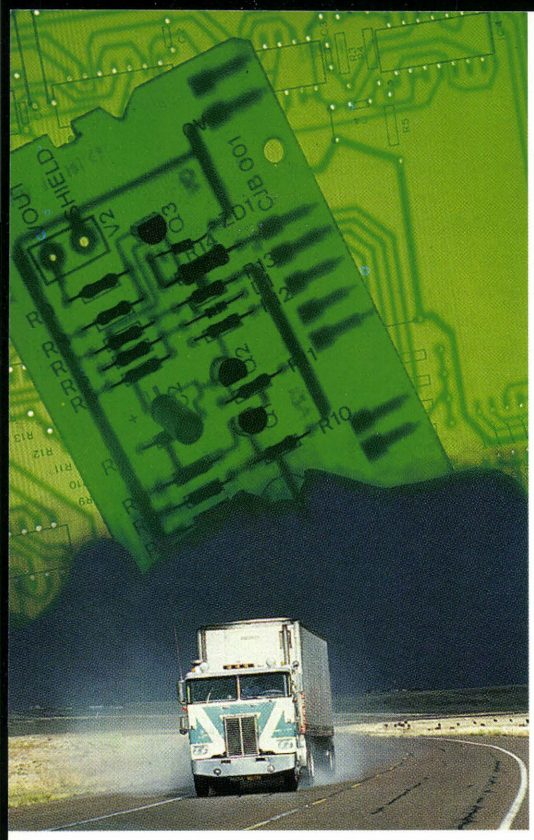
The flexibility offered by Supernode computers, allowing more interactive working methods, gives them a major advantage over conventional supercomputers, quite apart from their lower cost. Once a mammoth vectorial number-cruncher has been set off on its way, you cannot change the target mid-way through, so that expensive and time-consuming reprogramming is necessary if new data becomes available. However, Supernode computers are more adapted to interactive use, making them ideal for applications where the data is constantly changing.

With this in mind, an ideal application is meteorology, according to Gilbert Dudkiewicz, chairman of Telmat Informatique. "However, people have some difficulty adapting to new methods", Mr. Dudkiewicz recognises.

Mr Dudkiewicz is also fiercely critical of "European and especially French users' discrimination against European manufacturers and in favour of US equipment".

On the other hand, Mr. Dudkiewicz welcomes "EC countries' willingness to have a presence in the field of supercomputers and their realisation that small companies can make a major contribution in this area."■

Jonathan Todd, *journalist*



INTERVIEW

with Hanja Maij-Weggen, the Dutch transport and telecommunications minister chairing the Council of Telecommunications Ministers

As transport and communications minister in the Dutch government, Hanja Maij-Weggen has been chairing the EC Council of Ministers for telecommunications since 1 July. A Member of the European Parliament for a number of years, she was subsequently given a ministerial post in the Netherlands coalition government. In the European Parliament's plenary sessions, this Dutch Christian Democrat was known for her campaign on behalf of Canadian seals, and prior to that for her work in the EP's social affairs committee. XIII Magazine asked about her plans for the six months of the Dutch presidency of the Council of Ministers.

What are your priorities for the Council presidency as regards telecoms?
I have already held detailed discussions on this with EC Commissioner Pandolfi. Progress has been rather hesitant of late. The top priority must naturally be the proposal for a directive on future HDTV broadcasts. We must lose no time in clarifying the timetable for the introduction of the DMAC standards and for phasing out the PAL standard. In this respect the commitment at the Eureka conference in The Hague to introduce MAC standards for new broadcasting equipment is a step in the right direction and also lends support to Commissioner Pandolfi.

Will the directive be adopted before the end of 1991?
As a result of the excellent contacts which I have maintained since my time as a Member of the European Parliament, I managed to arrange with the chairman of the European Parliament's committee on economic and monetary affairs and industrial policy, Bouke Beumer, a member of the same political group as myself, for the appointment of a rapporteur by the committee before the Commission adopted the proposal for a directive. The proposal will be debated during the first October plenary session of the Parliament and can be sent to the Council in early November for a first reading. After the second reading in November, a supplementary Council of Telecommunications Ministers can be convened. If all goes according to plan we should be ready before the end of the year. I feel there is broad support in the Council for a change-over to MAC as soon as possible. The 500 million ecus financial package which Commissioner Pandolfi has pledged should enable the PAL standard to be phased out relatively quickly.

As a minister in the Dutch government you have lobbied in favour of D2 MAC. Will your position as chairman of the telecoms ministers be any different?
As have Prime Minister Lubbers and Minister Andriessen, I have written letters to the Commission to clarify our viewpoint. I gather from Mr Pandolfi that there was also hefty lobbying from the other side. He has every right to seek a solution which tries to meet everyone's demands. As chairman, I shall be doing my utmost to gain acceptance for the most favourable decision possible. Given all the fuss in the preparatory phase, I should hope that it will be somewhat easier to have the directive adopted by the Council.

With Open Network Provision (ONP), is the EC telecommunications sector sufficiently deregulated?
No, the specific ONP directives will be important in the months ahead. It must be possible to introduce value-added services via the open network. This must be solved in a more flexible manner. At the same time, the conditions in which this takes place must be harmonized. I anticipate that we shall reach an agreement on the protection of personal data in digital telecommunications networks, in particular as

regards ISDN. There are also directives covering packet-switched data services.

In 1990 the Commission published a Green Paper on satellite communications. Has anything happened since then?
Since the publication of the Green Paper there has been a worrying silence on this subject. The idea was to set out the recommendations in a tangible programme. At the outset, Mr Pandolfi wanted to have a widespread discussion on the matter. Hopefully we may be able to adopt a resolution before the end of this year containing indications as to what form the programme should take

What about postal services? Will the post offices come in for any changes?
We are waiting for a Green Paper on this subject from the Commission. It is expected to call for limited deregulation, and, in guarded terms, for privatization. I am curious. Apart from the United Kingdom, the Netherlands is the only EC Member State to have privatized its PTT. This makes us one of the most deregulated countries. It would be a very welcome step if the Council, under the Dutch Presidency, could hold an initial discussion on a more deregulated system in the other Member States. Indeed this problem has strong international overtones, if one thinks of countries such as Hungary and Czechoslovakia. It may be possible during the Council of Ministers meeting of 7 November to agree on a concrete programme of action.

Do you have any other particular hopes during this six-month period?
Although quite far down the list of priorities during my presidency, the Commission has submitted to the Council a proposal for a decision to adopt the "00" code as the single code for access to the international telephone network throughout the Community. It would be satisfying if we could reach an agreement on this in the months ahead. ■

Interview by **Henri de Jacht**, *journalist*

"Apart from the United Kingdom, the Netherlands is the only EC Member State to have privatized its PTT"

FOTOPERSBURO DIJKSTRA BV

OPEN NETWORK PROVISION (ONP)

CATALYST FOR CHANGE

A report by Cor Berben, responsible for Open Network Provision in DGXIII's directorate for telecommunications policy

THE EUROPEAN COMMUNITY'S vision of a market without obstacles to the free movement of goods, services, capital and people, to be achieved by the end of 1992, needs to be supported by a flourishing Community-wide market in telecommunications services.

In its Green Paper on the development of the common market for equipment and services, issued in 1987, the Commission of the European Communities outlined a programme of regulatory change meeting the challenges of the single market of 1992 and of technological development. The Green Paper launched a wide debate, involving all interested parties, resulting in consensus on the majority of its proposals.

The Green Paper argues that there must be an opening up of the public telecommunications infrastructure to allow equality of access of both private service providers and the public network operators, and that equality of access should be based on clear common rules and principles.

The common principles regarding the general conditions for the provision of networking infrastructure by the telecommunications administrations to users and competitive service providers, in particular for transfrontier service provision, have become known as Open Network Provision (ONP).

The proposed new regulatory framework as proposed in the Green Paper was aimed at combining liberalization and harmonization in a balanced way.

Consequently the EC Commission issued a directive on competition in the markets for telecommunications services, and the Council of Ministers adopted a directive on the establishment of the internal market for telecommunications services through the implementation of ONP. The entering into force of both directives establishes a clear regulatory environment for the provision and use of basic telecommunications transport and services throughout the EC.

Leased lines

Leased lines have become an essential part of the public telecommunications infrastructure. They are now a major building-block in the communications networks which companies operate for their own use and for the provision of services to others, in particular value-added or competitive services.

Supply and usage conditions of public telecommunications services such as leased lines were based on the assumption that the user is the end user, i.e. not offering services to third parties, and these conditions varied according to different national regulatory arrangements. The control, by the public telecommunications organizations, of interfaces to the network infrastructure by way of regulatory and technical restrictions discouraged the connection of certain kinds of terminal equipment and the provision of new services, while tariffs have developed in an unbalanced manner where cost orientation has not been the main consideration.

Packet-switched public data networks (PSPDNs) have also developed into a major transport medium for the operation of value-added services throughout the Community. Suitably expanded and with advanced features adhering to European standards, they offer the best mechanism to meet one of the objectives of the single market, i.e. the availability of value-added services necessary to support Europe-wide industry, trade and administration.

By 1984, when the new and revised CCITT recommendations (Red Book) became available, packet-switched public data networks were already operational in most European countries on the basis of different implementations of the 1980 versions of CCITT recommendations. The first international gateway interconnections

between networks established at European level were based on bilateral arrangements, without administrative or management functions.

All these factors led to national variations of the basic service, which have made full international interworking difficult to achieve.

The Council directive on the establishment of the internal market for telecommunications services through the implementation of ONP is a "framework directive" setting out the principle of ONP. The directive also describes the procedure for the development of ONP conditions for present priority areas, such as leased lines, voice telephony, packet data services and ISDN; proposes future areas of application; and defines a work programme.

A work programme up to the end of 1992 is set out in the ONP framework directive. Within this period, directives are to be prepared for leased lines and for voice telephony service.

In parallel, standards will be published and recommendations issued for public data networks as well as ISDN.

In addition, consideration will be given to areas where ONP may be applied, such as access to mobile services, new types of access to local networks and intelligent network functions, and access to broadband networks.

ONP conditions

ONP conditions will be devised successively for each specific area with regard to technical characteristics, for supply and usage conditions and for tariff principles.

Technical characteristics

These define the access to ONP offerings and network terminating points (NTP), together with the service features available with these offerings. They will generally be concerned with functional requirements between systems and services, not the internal working of systems and networks.

Wherever possible the technical characteristics will be based on existing international (ETSI, CEPT, CCITT) standards. As progress is made in the definition of ONP, new types of interfaces with enhanced capabilities may be required. Where no suitable international standard exists, standards may have to be developed. In this case ETSI, the European Telecommunications Standards Institute, will be requested to develop appropriate interface and performance specifications.

Supply and usage conditions

These may include the following attributes as applicable in specific telecommunications areas: the provision time (delivery period), the contractual period, quality of service parameters (including repair time), maintenance and fault reporting arrangements, conditions for resale of capacity and shared use, and conditions for interconnections with public and private networks.

Tariff principles

In competitive markets, the setting of tariffs is a normal function of supply and demand. This is also the case for value-added services. However, since many of these services are built 'on top of' public network resources which may only be provided by public network operators, there is a need to define tariff principles which will ensure fair and open access by all users of these resources.

Tariffs must be guided by the general principles applying to ONP:

They must be based on objective criteria and not impose, directly or indirectly, unfair purchasing or selling prices.

They must in particular be cost-based.

They must be transparent and be properly published. With regard to service elements, tariffs must be sufficiently unbundled, in order to avoid obligations and charges for users which have no connection with the subject of the uses sought.

They must be non-discriminatory and guarantee equality of treatment.

The application of these principles in relation to ONP offerings does not imply any harmonization of the absolute levels of tariffs, which may differ for the same services from one supplier to another, depending on prevailing costs and market conditions.

The way ahead

The further definition of ONP in concrete measures is a staged process, based on studies, analysis and consultation (of interest groups and at the political level).

This must be a dynamic process which takes into account the continuous change in technology and in markets. In this respect, new developments in intelligent networks, broadband communications (with special regard to the Race programme), mobile communications and optical fibre communications (e.g. FDDI) need to be followed.

The regulatory environment is also changing, as can be observed in the UK, with the White Paper, in Germany, with the recently introduced competition in mobile and satellite communications, and elsewhere.

How does ONP relate to such liberalization initiatives?

For the Commission it was clear from the start that harmonization at European level and increased competition must go hand-in-hand.

The market for basic telecommunications transport is dominated by a limited number of players. This is also the case in the US and Japan, where network competition is in place. Open and fair competition does require a basic level of harmonization, interoperability and the right to interconnect. In that sense, a change of emphasis in ONP can be observed.

Interconnection will be an issue of major importance and great complexity. It deals with interconnection at harmonized network termination points, and also at specialized network termination points which are needed for access to essential resources in networks - for billing purposes, for maintenance and for service development in an intelligent network environment.

The role of the regulator will not diminish, but it will change: regulatory oversight will be needed more than ever, to allow open and fair competition at both the national and international levels. ■

EUREKA

18-19 June 1991, The Hague

Conference Report

The fifth anniversary of the annual ministerial conference saw a chance to assess the development, strengths and weaknesses of Eureka

ENHANCING THE COMPETITIVENESS of European enterprises: a shared objective of the research and development policy of the European Community and the Eureka initiative. The two approaches are different, but complementary, and should result in synergy. A concept which has yet to be precisely defined.

The relevant ministers of the Eureka programme's 19 member countries (the 12 EC Member States, the six European Free Trade Association countries and Turkey), met in The Hague for the Eureka annual ministerial conference in June, together with Commission vice-president Pandolfi. The conference marked the fifth anniversary of Eureka, providing an opportunity to take stock of what it represents in tangible terms and to assess its positive or negative aspects, as well as setting out a number of options.

One of the highlights of the conference was the unveiling of the Dekker Report. The Eureka ministerial conference in Rome in 1990 had commissioned an assessment report from a panel of experts, chaired by the then chairman of Philips, Dr Wisse Dekker, with a brief to highlight the strengths and weaknesses of Eureka and to make recommendations on the procedures and functioning of the system, as well as on the quality of the projects. The report emphasises the advantages of the "bottom up" approach adopted by Eureka (by leaving the initiative to enterprises), compared with the approach of the European Community: two different but complementary approaches, in as much as each of the two structures preserves its specificity. The experts feel that the EC should be more actively involved in certain Eureka projects.

Complementarity and/or synergy: "There is a fundamental synergy for good cooperation between the Community and Eureka", according to Mr Pandolfi. The debate is now open and should continue over the coming year.

Vice-President Pandolfi undertook to submit a report to be drawn up on this point by the Commission's services, to be submitted to the next Eureka ministerial conference in May 1992 in Finland. Directorate-General XIII will be a major contributor to this report, given that it is responsible for a large part of the Community's contributions to Eureka projects (Cosine, Jessi, HDTV, Prometheus ...), on formal matters and standards, as well as on the financial aspects. DG XIII has made available 100 million ecus for the Jessi programme alone, and contributes indirectly to other projects via Community programmes–Drive (60 million ecus, of which the Prometheus programme is an indirect beneficiary), Race, Esprit – as well as via measures carried out to promote high definition television (standardization, acquisition of equipment ...). DG XII (research) is also involved, through direct funding for 13 projects, for the most part covering the environment, energy and biotechnology, totalling some 20 million ecus.

In practical terms, what does Eureka mean? In the five years since its inception some 470 projects have been financed, involving a total outlay of 8 billion ecus. In qualitative terms Eureka is an undeniable success. However, the Dekker Report points out that the emphasis has been placed on quantity to date, and that greater emphasis could be put on current efforts concerning the quality of the projects. Far from being negative, the report highlights the advantages of the system: giving the initiative to enterprises, which feel fully involved from the beginning to the end of the procedure; the flexibility of an "informal structure, or even the absence of a structure," which is attractive as regards the avoidance of high administrative overheads; an undeniable movement in favour of an inter-enterprise "dialogue". This company-to-company cooperation nevertheless remains more modest under Eureka than with Community programmes. Given that Eureka projects are primarily oriented towards their commercial outcome, the exchange of information and know-how is necessarily more succinct.

The Dekker Report also indicates the weaknesses of an unstructured system: eligible projects are selected 'nationally' according to criteria set out in the Eureka Charter, but which are often applied in a different manner from one country to another. The report points to the financial difficulties of projects; a lack of synchronization of procedures for national financial decisions; and the absence of a requirement to submit reports on the state of progress, all of which still pose a real problem. Other shortcomings identified in the report include the absence of new proposals covering major strategic programmes (the latest proposals, including Jessi, date back to 1986), and the difficulties concerning support measures. Few projects lead to standardization measures, for instance.

"There is a fundamental synergy for good cooperation between the Community and Eureka"

The experts call for an enhanced definition of and stricter compliance with the selection criteria, greater transparency, improved concertation between national officials, in particular during the selection and financing procedures, the possibility of withdrawing the Eureka label from non-viable projects, a general requirement for a common state of progress report and strengthening the services provided by the Eureka Secretariat.

The Dekker Report devotes a chapter to relations between Eureka and the European Community, emphasising the latter's role in providing accompanying measures (regulations and standardization). Such relations continue to be vague, and the report endeavours once again to provide the outlines. Getting closer to the market is what Eureka is all about, according to the Dekker Report, which invites the Commission to encourage participants in its own programmes to continue their work, after the pre-competitive stage has been reached, in the framework of Eureka, and to assist them in submitting their projects, or even to part-finance them, as a follow-up to Community programmes.

But should it be the role of the Community and its structures to mitigate the Eureka deficiencies, as highlighted by the Dekker Report? Deficiencies linked to the limitations of the "bottom up" approach, the lack of structures and excessive flexibility in the application of Eureka rules. This question is at the heart of the debate raised by this report, as is the fundamental issue of ascertaining what Eureka can bring to Community programmes and vice versa. Whatever kind of cooperation is involved, complementarity or synergy, it is a "twin track route", in the phrase of Vice-President Pandolfi. ■

Anne Eckstein, *journalist*

Greece

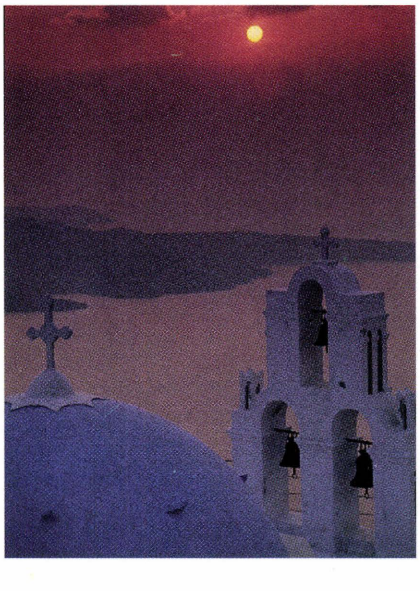
Crash programme for tele

THE EUROPEAN COMMISSION is actively participating in the programme initiated by the Greek authorities for the modernization of the country's telecommunications infrastructures and services. Community policy for contributing to the creation of a single European telecommunications area also aims at eliminating regional disparities in this field by supporting the upgrading of infrastructure and improving the quality of services.

This joint effort was initiated in July 1990 when the Greek authorities (the Ministry for Communications and the operator - OTE) asked for Community technical support for the establishment of a development plan for Greek telecommunications by the year 2000. One of the principal objectives of this programme is to propose a business plan for OTE. A crash programme for the years 1991-1993 is now being discussed and the first major implementation actions will be undertaken by the end of the year.

The agreement reached between the Greek government and the Commission, following discussions between Prime Minister Mitsotakis, his Secretary of State for Communications Mr Kratsas and Commission Vice-President Pandolfi, provides for Community support for the design of such a development plan. The overall objective of this joint action is to provide the best possible services to all users at reasonable cost. More particularly, all parties concerned recognize the fact that the present state of Greek telecommunications is an insurmountable obstacle to the full participation of Greece in the single European market and, consequently, the crash programme is paying special attention to needs which have to be satisfied by the end of 1993.

In carrying out these tasks, the Commission has called on a multinational team of experts led by a major consultancy firm, Coopers and Lybrand. Other partners in this team



are the European telecommunicationsconsultants ETCO, the London-based firm IBEX, the Athens-based ICAP and a number of leading experts from Greece and from other European countries. The consultants report to a Joint Steering Committee comprising representatives of the Greek authorities (ministries and OTE), of the Commission, the European Investment Bank and several major users' organizations. The areas covered by the consultants' study are the present state of Greek telecommunications (infrastructure and services), the legislative and regulatory framework, the management and organizational structure of the operator and OTE's policies and financial operations, as well as the technology implications of policy options. The primary purpose of the study is to propose specific policies and business actions aimed at bringing Greece into the emerging competitive environment for European telecommunications.

Among the many reforms that must be undertaken, several have already been identified. They concern the scope ofthe OTE monopoly and relations between the operator and government. The present monopoly is allencompassing and contravenes current Community regulatory provisions. Moreover, the separation of operational and regulatory functions is overdue. The exclusive rights of OTE in relation to infrastructure and voice telephony will be maintained and proposals put to the Joint Steering Committee aim at enhancing its ability to carry out its tasks. At the same time, measures are proposed to enable OTE to extend the services it provides and introduce new services, while ensuring that other service providers will enter the Greek market in a truly competitive environment.

At a first stage, the areas which have been identified as requiring an immediate liberalization are mobile communications, satellite services, private networks and paging. As for the regulatory aspects, taking into account the specificities of the Greek environment, the following proposals have been put forward:

- the elimination of all legislative and regulatory measures limiting OTE's independence as an operator, with a view to enabling it to act in the new competitive environment;
- the establishment of a new independent regulatory body assuring continuity in the implementation of telecommunications policy;
- the strengthening of the structure of the telecoms ministry to enable it to carry out its policy functions;
- the establishment of a widely-based telecommunications policy advisory body, representing users and other actors.

The crash programme also provides for a number of innovative actions expected to improve dramatically the state of the network and the quality of services. The implementation of these urgent proposals should take place before the end of 1993, and they represent the first steps of the development plan leading to the year 2000.

These joint actions are evidence of the Community's determination to make the single market a reality for all its Member States. ■

Costas Deriziotis, *journalist*

"The present state of Greek telecommunications is an insurmountable obstacle to the full participation of Greece in the single European market"

communications

DELTA

Distributed learning systems

A report by Alan Huyton of DG XIII's Delta team

LEARNING TECHNOLOGIES and systems will be a key asset of the Community in the future: the development of skills and know-how will be crucial to the maintenance of economic growth and employment in the Community. DELTA *(Development of European learning through technological advance)* was one of a number of initiatives aimed at encouraging progress in this area.

Research on telematics systems for flexible and distance learning is part of the Community's research in the field of telematics systems in areas of general interest. EC action is expected to contribute to both the successful completion of the internal market and to the improvement of the public services facing the challenge of European integration.

At the time of going to press, external evaluators are busy analysing project proposals which have been submitted by international research consortia in response to a public call for proposals.

The call for proposals was also based on the findings and recommendations made by other external assessors towards the end of the Delta exploratory action and which have been condensed in two reports. Both reports formed part of the policy that went into the background information for potential proposers, put together by the Commission's services and more specifically the Delta team.

Report on performance and results

As an exploratory action, a basic feature of Delta was the need to investigate the viability of collaborative research in the domain. The existence of specialists, products and theory was not in question; the possibility of bringing disparate groups and interests, ranging from university academics to big manufacturing industries, operators of telecommunication networks and small and medium-sized companies, was an unknown quantity. The objectives of the action reflected this concern, whilst simultaneously providing concrete research targets as both a catalyst for collaboration and as a way of judging the likely activities for any future EC funded work.

Following the end of the action and the outcome of the final auditing of the 30 Delta projects, a group of high-level independent assessors was appointed. Its brief was to produce a concise statement on 'if and how well' the exploratory action had met its policy objectives and in how far it had led to tangible technical results.

Generally speaking, the assessors found an uneven but rather encouraging pattern. By its nature, an exploratory action could only produce preliminary findings.

Some terms used in the Delta exploratory action:

Flexible and distance learning – flexible learning means that people learn when they want, how they want and what they want. When this is done at a distance, via correspondence, video, computer conference etc, it becomes distance learning, i.e. where they want.

Advanced learning technology (ALT) is the result of combining flexible and distance learning techniques with advanced telecommunications and new technology.

In their report the assessors highlighted several areas:

1. Functional specifications: This covered learner stations (i.e. the hardware and/or software which the learner needs to access a training course) and the equipment and software required for efficient training course authoring and production. It was felt that whilst some progress had been made, particularly in the development of prototypes, time constraints and, in some cases, unrealistic ambitions had meant there remained work to be done in this area.
2. Use of artificial intelligence in training applications. In the assessors' own words, "while the use of AI tools has potential applications, there are significant basic research problems still to be solved."
3. With regard to standards, the assessors found that the exploratory action was successful in drawing attention to the issue. The conclusions drawn from the research and studies made it clear that standards are determined by wider market forces. In this sense, the topic is now seen as less significant than was originally envisaged. This conclusion is a positive outcome of the exploratory action.

A number of key issues for future work were identified. Firstly there is a need to look at how advanced learning technology could be applied to areas of critical skill shortages; this would be an area with scope for significant added value. Secondly there must be a focus on the needs of education and training and the effective application of ALT in this sector rather than on the pure technology aspects of research. In other words, future work could be prioritized by focusing on the users' needs and the channelling of resources to 'useful' or demand-oriented work.

Final technical report

The technical work concentrated on the global level. The assessors felt that a more detailed and transparent analysis of the technical findings would form both a useful commentary on the action and a guide to work in the domain. The major areas of research which show promise for the future are, on the one hand how to present, organize and manipulate course material to the learner, and on the other hand, how to use advanced telecommunications and satellites to transmit, or deliver, the courses at a distance.

The wide range and diversity of people involved in the Delta operation meant that any market study and the ensuing orientation of resources to marketable products would require a clear analysis of the users' different training needs and habits. A number of studies were carried out to identify trends, various types of producers and to look at certain specific problems affecting SMEs and peripheral regions.

Multimedia training courses using a combination of PC, video and audio techniques, operating through artificial intelligence, could transform the effectiveness and attractiveness of distance learning. Such courses would have a built-in method to assess the ability and progress of the trainee and, thus, be able to manipulate the training material in an intelligent way.

As part of the Delta exploratory action a number of prototypes were developed which allowed easier organization of course material by the author. Simulation techniques, where a model or real-life situation is presented to test and develop a learner's reaction and logic, were adapted, leading to an architecture for intelligent simulation learning. Once the methodology of the course and the choice of medium have been developed, the ability of the learner to use the system and find a way through a large volume of data needs to be considered.

The collation of data and its format, video, audio and text, is one aspect of training systems. The other, equally important to the user, is how the data can be accessed easily. Database browsers, sometimes in combination with learner modelling aspects, allow the learner to build his/her own curriculum. Other work included the production of prototypes of multimedia databases of units of learning material.

As regards training services, the research was concerned with the user's

CD-I's tremendous potential has been harnessed in the workshop. Worldwide, car mechanics are learning how to service and repair cars through interactive instruction.

access to training materials, covering a diverse range of topics including the security aspects of closed user groups or subscription services. The research also looked at a computer-mediated conferencing system which effectively simulates a classroom at a distance, acting as a link between the teacher and remote students.

Once the courses have been developed they need to be distributed to the learners. This can be as simple as posting a floppy disk or as complicated as simultaneous video and audio-links between different learners, or groups, in different countries. Often a combination of methods will be used, depending on the nature of the tutor, learner and course.

As Delta is a Community venture, research has been done into the essential pre-requisites for trans-European cooperation. This research has included looking at the cultural aspects of producing courseware for people of different nationalities. Work in Delta has shown that educational material can be successfully and economically transmitted by satellite.

One project has experimented with an encryption device and undertaken pilot experiments to broadcast programmes dedicated to one particular type of audience, in this case GPs who have a clear need for life-long learning to remain abreast of developments in treatment and medicines. The same project has also looked at practical aspects and in particular the use of the printer port for communications. Other work has used pilot experiments to examine the feasibility of video-conferencing, through either satellite or ISDN links, for training. The particular advantage of this approach is that it allows interaction between the students and the tutor, thus making possible the implementation of the 'virtual classroom'.

A method of satellite retrieval of multimedia material using a knowledge base system was developed, as was a review of the standards for transmission of this type of material by satellite. This area of work focused on aspects of teaching cardiology at a European level and adapting the system to cope with the cultural differences in both treatment techniques, diagnosis and other practical issues.

ISDN and satellite transmissions have been used for the production of training courses by geographically isolated enterprises. One of the methods used was the development of a database of video sequences.

The pedagogic and organizational aspects of the delivery or distribution of training was the subject of various studies. In particular, the educational value of the interaction between the tutor and students in audio and video conferencing, and the didactic strategy and content of ALT-based distance learning courses have produced useful results on which further work can be based.

Summarizing their assessment of the Delta technical achievements, the experts state:

"The programme has produced a number of significant results and even led to development of products or services that are at the point of immediate exploitation on the market.

It has furthermore played a decisive role in focusing the future research and development effort in the area of learning technology on the most significant issues and thereby fulfilled the central role of an exploratory action."

The future

The results of the Delta exploratory action will form an important base for further developments under the Community's third Framework Programme for research and technological development. Using the results as a starting point, a major consultative exercise was launched in 1989/90 on the basis of which a workplan for future R&D action was drawn up.

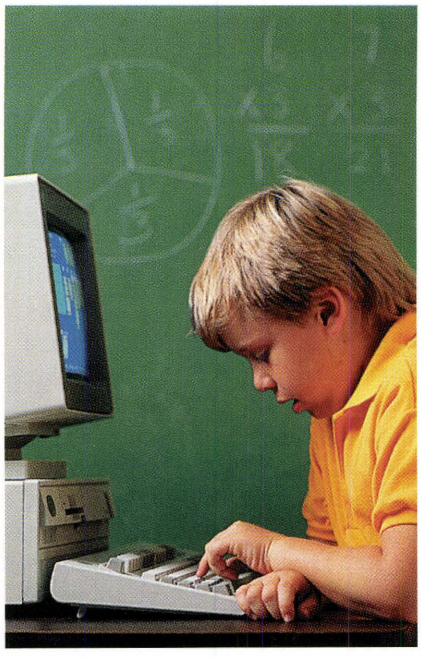
The new workplan, which is given as background material for the call for proposals, details a full R&D cycle from technology development to pilot-testing and evaluation, with further market studies to orientate the research in a practical manner. Long-term goals are to:

- Improve the access and performance of learning services in Europe through the use of new technologies.
- Improve the market competitiveness of the training industry through economies of scale, cost effective services and learning materials.

The research tasks aim at providing the basis for trans-European flexible and distance learning services based on telematic infrastructures. While the proposed work is both pre-normative and pre-competitive in character, there are three interdependent strands.

1. Implementation strategies and scenarios

Whereas the exploratory action tried to identify the possibilities for collabora-



tion, the follow-up action seeks to set a framework for consistent evaluation, dissemination and the likely market impact of ALT products. Emphasis will be placed on raising awareness about the technologies, the assessment of the use of this technology in real-life conditions and the drawing-up of scenarios for large-scale implementation of telematics-based service infrastructures for distance learning.

2. Technologies and systems development

The initial work done during the exploratory action on course authoring, training servers and databases will continue, with the objective of achieving interoperability and portability of learning materials and the definition of the standards needed for each level of user of the technology, i.e. courseware producer, trainer, learner. The work should bring together the various aspects of technology, course production and delivery to produce what is known as the common training architecture (CTA).
The CTA will have a number of different components:
- a workbench for the design and production of courseware, including the use of simulation techniques;
- training information systems to allow access to a wide range of educational resources;
- the development of flexible delivery of education and training;
- the integration of direct broadcasting and terrestrial feedback links.

The end result will be prototypes of products which have a similar look and feel about them, thus making them easier to use.
As telecommunications-based means of distributing distance learning are potentially both efficient and rapid, further work will be done to investigate and test the systems, tools and networks required to convey distance learning.

3. Validation and integration experiments

As the ALT domain expands and matures, the questions of usability and cost-benefit become more relevant. If ALT products are to be taken up by industry, they must be seen to work. A range of pilot experiments will be set up in the areas of joint production, information and delivery of learning materials. The pilot projects will seek to assess the cost-effectiveness, educational worth and market uptake of the flexible and distance learning services. Emphasis will be put on the European character of such experiments. The result should provide an invaluable real-life evaluation of flexible and distance learning techniques and effectiveness.

Conclusion

In mid-June 1991 a call for new project proposals was published and early indications show great interest from both the academic and business communities. Flexible and distance learning has long been seen as socially desirable in the sense of giving people a second chance: allowing people to pursue academic studies at a more mature stage in their lives, to upgrade their professional skills and expertise. The wider use of distance learning techniques, combined with new information and communication technologies, has the potential for a major breakthrough in the search for solutions to the problem of skills shortages and training requirements.

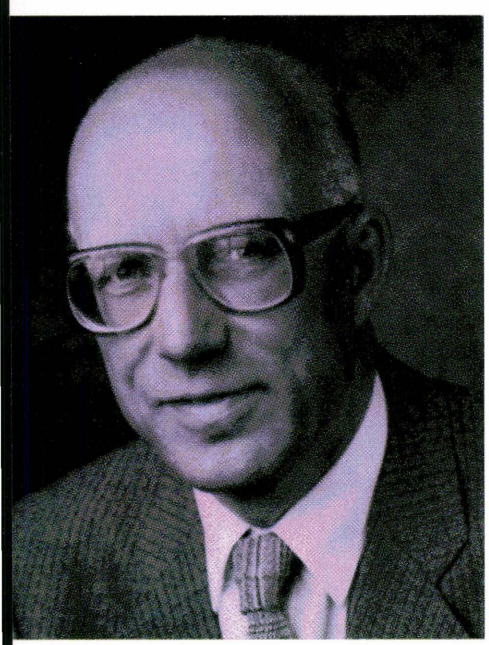
The Esprit and Race programmes were launched by the EC to strengthen the technological base of industry and the public services and to provide information and communication techniques. Delta forms part of the process of, on the one hand, bringing industry and education together to cooperate more and, on the other, to stimulate investigation into the use of new information and communications technology for training. In a way, Delta can be viewed as a bridge between the technology and the social and human aspects of training. ■

The DELTA Exploratory Action was launched by the Council Decision of 29 June 1988 as a pre-normative and pre-competitive technology exploration in the field of learning technology. The budget was ECU 20 million and the duration 24 months. In total, 28 R&D projects and 2 studies were launched. All projects were completed by March 1991.

" The wider use of distance learning techniques, combined with new information and communication technologies, has the potential for a major breakthrough in the search for solutions to the problem of skills shortages and training requirements"

Who cares about the users?

The European umbrella organizations of the national user associations in the areas of information technology (CECUA) and telecommunications (ECTUA) recently decided on the formation of a joint User Forum which they hope will enable them to represent their interests more fully. XIII Magazine spoke to the chairmen of the associations, Erwin H. Schäfer (ECTUA) and Tilo Steinbrinck (CECUA), about the current problems and expectations of European users.



T. Steinbrinck, CECUA

E. Schäfer, ECTUA

From the users' point of view, what are the major problems in the area of IT and telecommunications?
Steinbrinck: Users of information technologies in Europe are a long way from the ideal world presented to the public at fairs and exhibitions. Technical progress has been enormous. However, technical variety makes hardware, software and applications more and more complicated. The dilemma is that manufacturers and suppliers often ask too much of the user. Often what they are selling looks very interesting from a technical point of view, certainly, but is not what users are asking for. For example, when the Macintosh, All-in-one and other user interfaces as they are called were introduced, they were a runaway success because they met the justified demands of users. But now there are too many user interfaces, and they are not compatible.

Do you see a solution to that?
Steinbrinck: I'm afraid very few suppliers have yet realised that a shift is taking place towards a demand-led market. We need simple, unified operator and user interfaces for small, medium and large IT systems that can be used Europe-wide. We need simple, powerful and wherever possible multilingual word-processing and office automation systems. It is important to have easy-to-use communications systems for data and information, as well as the safest possible systems for data protection and data security. The same goes for unified operating and communications systems. There is also a demand for standardization and compatibility in hardware, software, applications and data. Manufacturers and suppliers will have to focus themselves on the user, otherwise how are they going to satisfy the developing mass markets?

What is the state of relations between suppliers and users in the telecommunications field?
Schäfer: The people we talk to are postal authorities and what are called service providers. Many postal authorities are still inflexible and monopolistic, which makes for poor service at enormously high prices. It is only in the United Kingdom and Germany that service providers can compete against the postal authorities without a licence. In Great Britain, competition is now even allowed in network provision and in the telephone service. The user needs a variety of suppliers of transmission services for data, graphics, text and speech. Then he can make a choice on the basis of price and performance. People who are not satisfied must have the option of changing to an alternative supplier.

So have European users got a bad deal compared with users in North America or Japan?
Schäfer: The American corporate networks, for example, could be taken as a model. Large businesses need comprehensive networks for all types of telecommunications. Networks of this sort cannot be operated here at present by users or even service providers. This results in a quite definite competitive disadvantage for most European users as compared with their American competitors.
Steinbrinck: The general requirements of users of information technology will be largely identical in Europe, Japan and America. But European users still have to battle with markets, telecoms structures, data protection and security regulations at different stages of development, with a variety of languages, and with a multiplicity of cultural, commercial, legal and administrative traditions. The process of integration in Europe is many-sided and is only taking place in fits and starts.

CECUA and ECTUA have now decided to set up a European User Forum to intensify their collaboration and introduce a tauter organization. What do you hope for from this?
Steinbrinck: By providing a focus for our activities in representations to the European Parliament, the Council of Ministers and the EC Commission, but also in addressing the public, IT users will gain a better hearing. Jointly organized congresses, seminars and workshops will bring together interested specialists, manufacturers, software houses, telecommunications companies and, not least, large and medium-sized users, so that current European topics can be discussed and taken forward.
Schäfer: We also anticipate a better representation of user interests in relation to suppliers and especially the EC Commission. They now have an opportunity to reach the entire spread of IT and telecommunications users, and to consult with them.

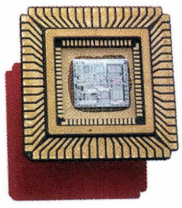
CECUA, ECTUA and the Forum are not the only organizations representing users' interests. What will be the stance of the Forum towards organizations and associations which did not take part in setting it up, but would still like to contribute to its work?
Steinbrinck: In the near future, the coordinating committee of the User Forum will be making contact with associations such as OSITOP, EMUG, CEPIS and manufacturers' organizations like GUIDE, Datuse, SAVE and others, to find out what types and areas of cooperation are suitable.
Are you also considering cooperating with independent larger users, which, after all, are generally not organized into associations or user groups?
Steinbrinck: Several thousand large, medium and small firms and institutions are represented in CECUA's national member organizations, and these take part to varying degrees in CECUA's activities and in the Forum. How far the larger European multinationals or institutions can be granted a special status is something which still needs to be looked at.
Schäfer: In our field, larger users are generally organized in associations. ECTUA alone has over 50 associate members, which are mainly in the area of larger users. If a large user is interested in direct participation in the Forum, the members of the Forum will need to look into it and reach a decision. ■

Interview by **Michael Stabenow**, *journalist*

"Users of information technologies in Europe are a long way from the ideal world presented to the public at fairs and exhibitions . . . technical variety makes hardware, software and applications more and more complicated. The dilemma is that manufacturers and suppliers often ask too much of the user."

The European semiconductor industry

Learning from the past 40 years



An overview

by Gérald Santucci,

DG XIII

THE SEMICONDUCTOR INDUSTRY dates from 1947, when Bell Laboratories announced the development of the first point-contact transistor. Since then this industry has seen a remarkable rate of technological progress, the two other major innovations being the integrated circuit (in 1961, by Texas Instruments and Fairchild) and the microprocessor (in 1971, by Intel). Although the semiconductor industry employs only about 300,000 people worldwide, its "strategic" significance is enormous in terms of its widespread influence on the whole economy through the large amount of vertical linkage. Innovations in semiconductor technology affect, and will increasingly affect, virtually all areas of economic life: in information technology (IT), telecommunications, process control, transport infrastructure and road safety, medicine, learning and many other areas of application. In view of the almost universal uses to which they can be put, and because of their vast impact on products and processes, semiconductors have become key products.

In this context, Europe's competitive performance has been poor. The European share in world semiconductor sales fell from 16% in 1980 to 11% in 1990. European consumption of semiconductors has been satisfied largely by imports (the trade deficit of the European Community in semiconductors reached almost ECU 2.5bn in 1989) and by inward investment from the United States and more recently, Japan. Of the total European semiconductor market of $10.7bn in 1990, US firms supplied 42%, European firms 39% and Japanese firms 17%. Europe has only 5 companies among the top 40 worldwide semiconductor companies ranked according to their sales revenue. The reasons for Europe's poor performance in semiconductors have to be sought in past corporate strategies and government policies with respect to emerging science-based technologies.

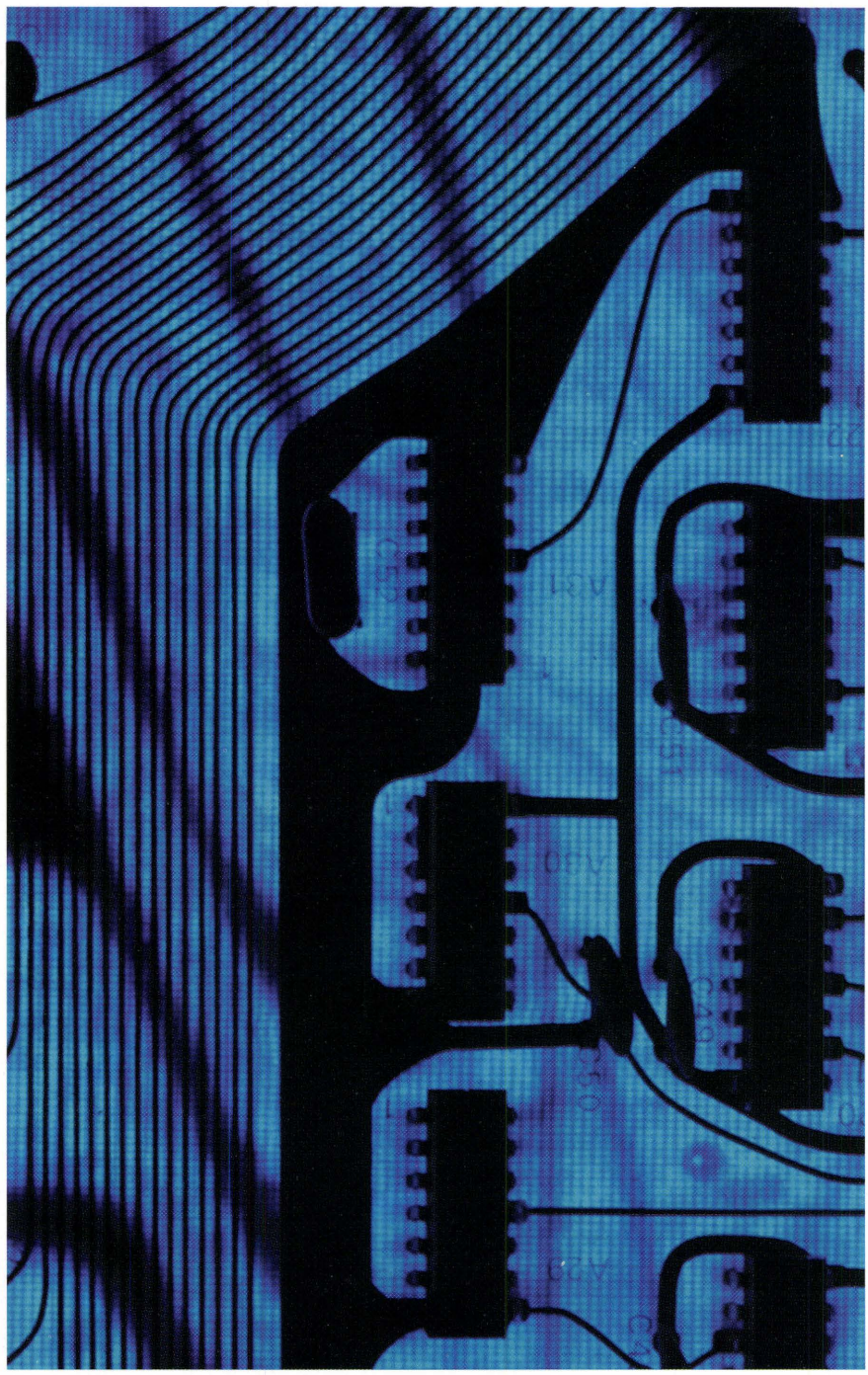
An industry with unique economic features

It should first be noted that the process of production of semiconductors can be subdivided into several stages involving various intensities of labour, capital and technology: research and prototype development, design, mask-production, wafer fabrication, assembly and final testing. Not surprisingly, the different characteristics of these stages of production have important implications for the location of activities and for the division of labour.

The most important and characteristic features of the semiconductor industry concern its extraordinary market development and the historical pace of integrated circuit (IC) price/performance improvements. Over the past 40 years (1950-1990), demand for semiconductors has grown worldwide at an average of 15% per annum, which is three times more than the overall industrial production growth rate. Despite the rapidity of its growth, the industry is exceptionally cyclical, with "chip gluts" succeeding "chip famines". The cycles can be explained by reference to the cost and price structure of the industry. The rate of technological change is so high that, if companies are to stay in business, they must introduce new generations of more powerful products at regular intervals (i.e. every three to four years). For each new range, R & D and capital costs increase steeply and with them optimal economies of scale. Consequently, firms spend on average a fifth of their sales revenue on new plant and equipment.

Once volume production of a new chip begins, costs plummet and firms (especially the Japanese) pursue aggressive pricing policies to keep out competitors who are on the same learning curve. Thus, the gains from being a year ahead of competitors are considerable, but so are the risks of operating in this market. When IBM and Siemens announced recently that they were joining forces for joint production of 16-megabit dynamic random access memories (DRAMs), the German group indicated that without the agreement the cost of getting a chip on the market a year or more later than competitors would have been about 400 million dollars.

In memory chips, the highest profit margins come in the first year or so of a new chip generation, when supplies are tight and demand high. It is these gains, together with the strategic significance of semiconductors, which lead firms to commit such resources to the industry. However, as each firm hopes that it will be the first one on the market with a new generation of products, periodic and sometimes severe crises of overproduction occur. When overproduction leads to margins being cut, investment in the next generation of products often has to be postponed with the result that, when demand catches up with supply again, capacity is stretched, thereby triggering another flurry of investment in new capacity. In the chip industry's short life there have already been seven slumps, in 1960-1, 1966-7, 1970-1, 1974-5, 1981-2, 1984-5 and 1989-90.



The amplitude of these cycles has also widened, the penultimate recession being the first to record an absolute fall in demand (- 17% for 1984-5) which forced companies to merge, to restructure, to laid off staff and even in some cases to cut back on R & D. However, since the mid-1980s, the industry has been much more circumspect about adding capacity. The growth rate of capital spending was much less in the second half of the 1980s than in the first half. Just-in-time deliveries and closer supplier/vendor relationships have resulted in much better inventory management compared with 1985. In short, the industry has matured. The large investment costs and technology intensiveness lead to substantial economies arising

from experience in producing the integrated circuits. This is often referred to as the "learning curve" effect. The learning curve concept states simply that as cumulative volume of a product increases, the cost decreases due to the experience gained in the course of production. This, combined with the short product life, has contributed to creating a very competitive business environment.

Rapid technological change has made it possible to increase the number of functions per unit by a factor of four in each new generation of product, constantly reducing the cost per function. Consequently, semiconductor devices now have a functionality which is at least 10,000 times that of a comparable device produced 20 years ago. Also the unit prices tend constantly to decline, due to the increased volumes of production, the consequent economies of scale and the progressive manufacturing experience. The ever-increasing miniaturization of circuits has meant that chips have become progressively less like components and more like systems, thereby encouraging a convergence between the components industry and the downstream systems producers in consumer electronics, computing, telecommunications, military and industrial electronics, and automotive electronics.

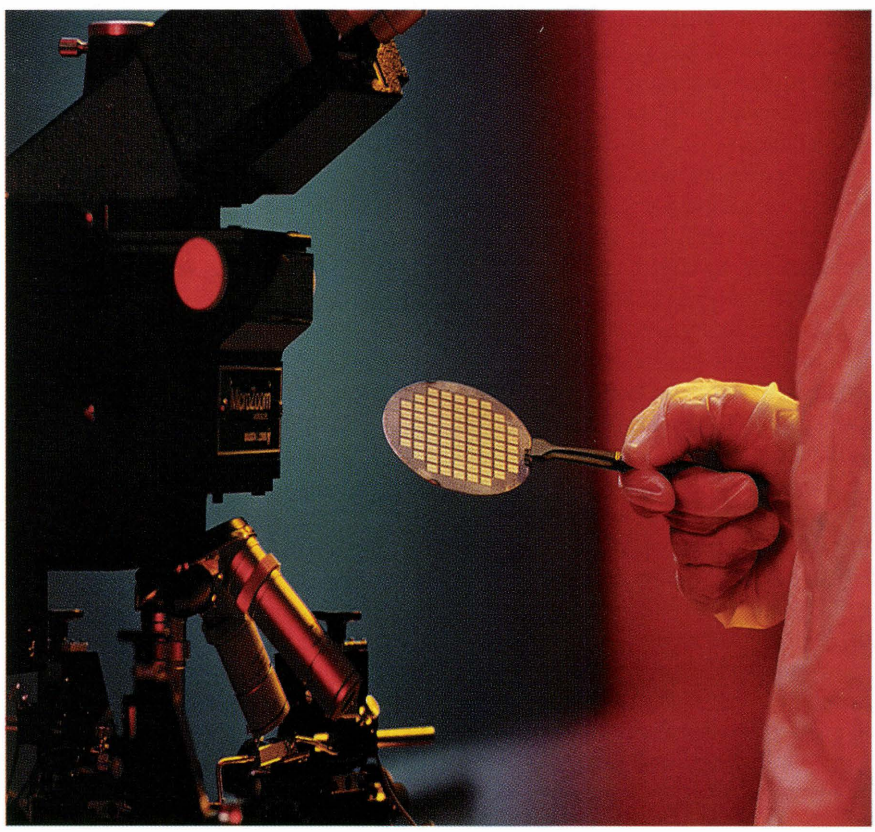
The European semiconductor industry: past performance

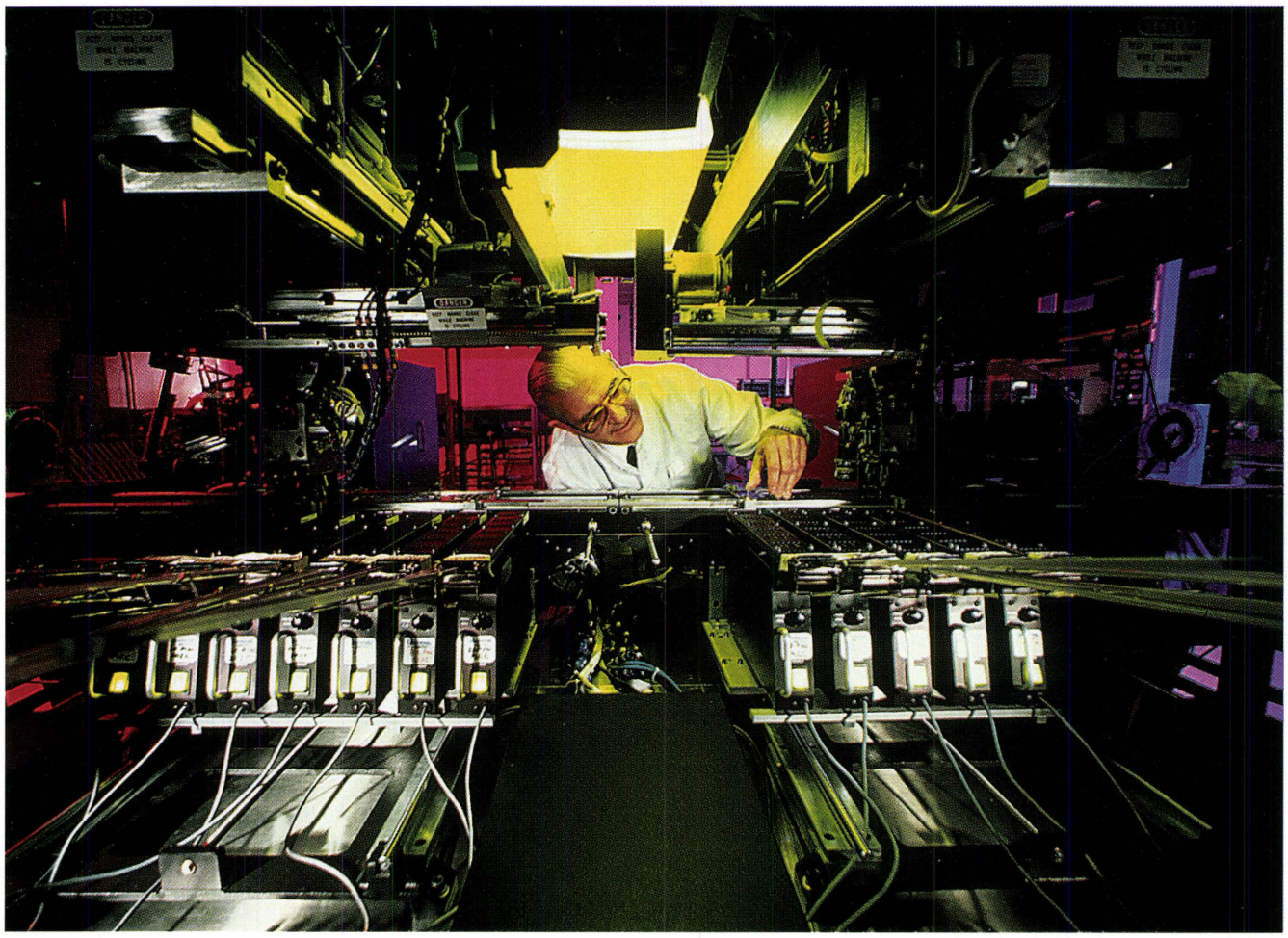
Until the late 1960s, only a few possible technological directions were explored in Europe and in some of these progress was slower than in the US. Although there certainly were in Europe companies and other institutions with a scientific and technological level comparable with their American counterparts, these were lagging in the state-of-the-art technologies and were led to maintain their position by imitating and licensing the more advanced US products. An overview of the European industry during that period suggests that it was generally following a pattern of technological imitation with a significant but not increasing time-lag with respect to US innovations.

Table 1
Top 20 worldwide semiconductor companies
Estimated market share ranking
(factory revenue in millions of US dollars)

Company	*1990 Revenue (Millions of US dollars)*	*1990 Market Share (%)*
NEC	4 898	8.4
Toshiba	4 843	8.3
Hitachi	3 893	6.7
Motorola	3 694	6.3
Intel	3 171	5.4
Fujitsu	2 880	4.9
Texas Instruments	2 574	4.4
Mitsubishi	2 319	4.0
Philips	2 011	3.5
Matsushita	1 942	3.3
National Semiconductor	1 719	3.0
SGS-Thomson	1 463	2.5
Sanyo	1 381	2.4
Sharp	1 325	2.3
Samsung	1 315	2.3
Siemens	1 224	2.1
Sony	1 146	2.0
Oki	1 074	1.8
AMD	1 053	1.8
AT&T	861	1.5

Source: Dataquest, May 1991





The break-up of this situation began with the introduction of integrated circuits by existing and new US firms. The more cumulative nature of the learning process in ICs widened the technology gap, and hence the imitation lag in Europe. Indeed, it revealed the existence of considerable structural differences.

First, the companies able to undertake such uncertain efforts were fewer in Europe than in the United States: in terms of size, only Siemens and Philips could compare with the biggest US companies. Whenever a radically new science-based technology is emerging with several possible directions of development, the number and size of the companies has relevance if a national industry is to keep pace with innovations, or even to be a quick imitator.

Second, another factor related to size was that European companies could not achieve the minimum R & D threshold which allows technological innovation and imitation; nor could they commit the required level of new capital investment. The semiconductor industry is so capital-intensive that many new companies have chosen to go without their own manufacturing facilities and to use foundries for their lower-margin product lines.

Third, European countries suffered from the distance between universities or public research laboratories, on the one hand, and private enterprise on the other. Such "decoupling" has been a major impediment for the selection and translation of scientific knowledge into feasible technological paths of application.

Fourth, Europe lacked the dynamic start-up firms with capable and creative engineers and managers which characterized the development of the US semiconductor industry. When successful, these small, dynamic firms force larger firms to become more efficient and innovative. Some have grown to become large multinational companies.

The situation was exacerbated by the fragmentation of the production base in Europe, with each country being supplied by a separate plant producing according to national technical standards and marketing constraints. In contrast, US companies were able to

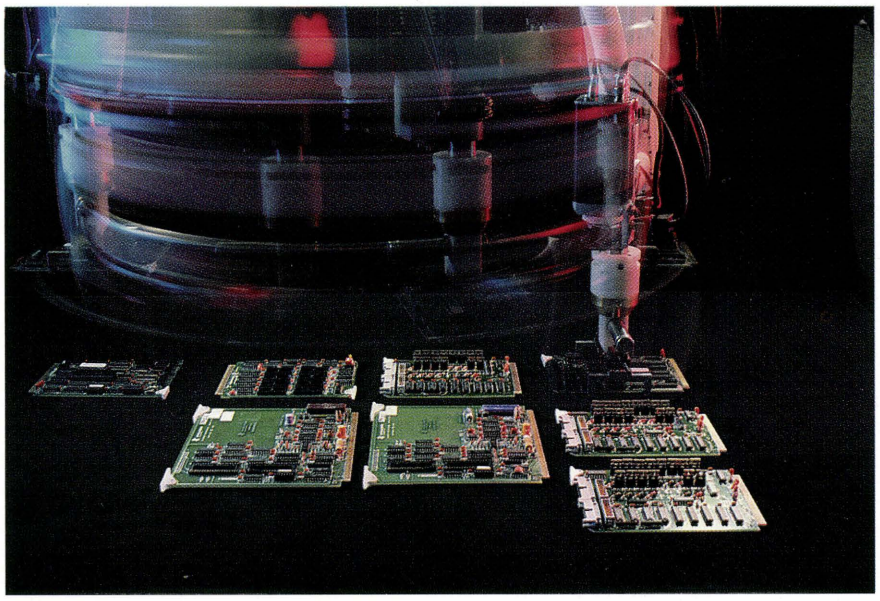


Table 2
Final estimated
1990 market share analyses
(millions of dollars)

		REGIONAL MARKET			
PRODUCTION					
Company Base	*North America*	*Japan*	*Europe*	*ROW*	*World*
North America	11,942	2,402	4,492	2,701	21,537
% of Regional Market	69%	11%	42%	35%	37%
% of Company Sales	55%	11%	21%	13%	100%
Japan	3,777	19,825	1,814	2,961	28,377
% of Regional Market	22%	88%	17%	39%	49%
% of Company Sales	13%	70%	6%	10%	100%
Europe	1,074	164	4,117	851	6,206
% of Regional Market	6%	1%	39%	11%	11%
% of Company Sales	17%	3%	66%	14%	100%
Rest of World	593	117	238	1,157	2,105
% of Regional Market	3%	1%	2%	15%	4%
% of Company Sales	28%	6%	11%	55%	100%
World Consumption	17,386	22,508	10,661	7,670	58,255
% of Regional Market	100%	100%	100%	100%	100%
% of Company Sales	30%	39%	18%	13%	100%

Source : Dataquest, May 1991

establish pan-European technical standards and use a set of new plants geared to producing for several countries. In other words, the small size of the European domestic markets was a disadvantage, though more to the indigenous, inward-looking firms than the US-owned firms. As a result, most of the European firms withdrew from the fiercely competitive mass markets for commodity products, concentrating instead on low-volume domestic niche markets and in-house production. In the end, Philips and Siemens were the only European firms large enough to retain a competitive position in the markets for standardized semiconductors.

Revitalizing the European semiconductor industry

Experience has shown that the relationship between innovative leadership and a favourable market environment (e.g. mobility of scientists and engineers, availability of venture capital, size and sophistication of the market, existence of mechanisms pushing the accumulation of knowledge) are key factors in producing a virtuous circle. From the mid-1980s onwards, Europe's semiconductor industry has shown clear signs of revitalization. Since the present specialization may not be sufficient for the individual centres of competence to obtain the volume production capability necessary for achieving a critical mass in their market sectors, the European microelectronics industry is undergoing tough restructuring in the form of mergers, acquisitions and/or strategic alliances. There are many instances of collaborative agreements between European and non-European companies both in the semiconductor user and producer sectors, either at a technology or product level. In addition, closer cooperation between the user industries and the semiconductor vendors is developing, notably in order to take account of the fact that the development of electronic devices and systems is increasingly dependent upon the development of application-specific integrated circuits. Other positive signs of revitalization include pan-European initiatives in electronics and IT, corporate strategies to integrate backwards into semiconductor manufacturing and design technology, and the emergence of European start-up firms capable of addressing new demands for engineering services, design supplies and customer training in ASICs and other custom semiconductors. ■