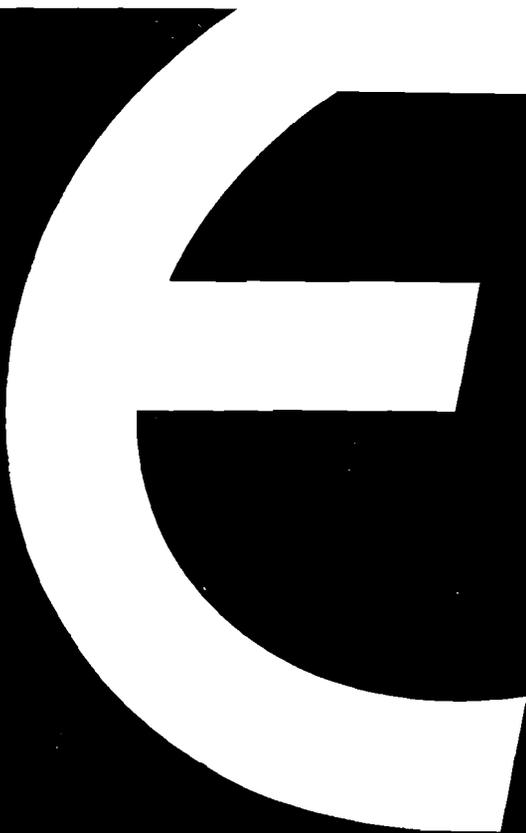


FROM ESPRIT TO THE 'BIOSOCIETY'

# The European Community and new technologies



## European File

Commission of the European Communities  
Directorate-General for Information,  
Rue de la Loi 200 – B-1049 Brussels

**8/84**  
April 1984

The rise of the new technologies can be seen either as a cause for anxiety or a source of hope:

- Anxiety, if Europe allows its Japanese and American rivals to extend their lead and capture the whole market. Sooner or later, the European Community would be forced by competitive pressure to embrace the new technologies. It would do so under the worst possible conditions, with impaired competitiveness, increased unemployment and an insidious degeneration from technical dependence to industrial, economic and cultural subservience.
- Hope, if Europe faces up to the challenge, reconquers the the market, generates new jobs and transfuses all its economic activities with renewed innovation and competitiveness.

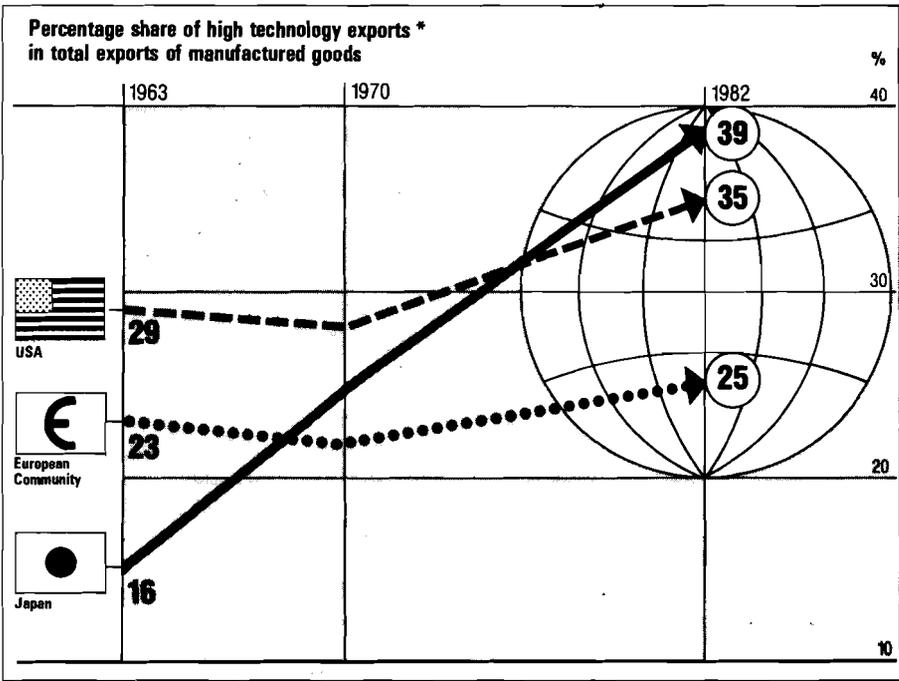
With only 15 years remaining before the millenium, the time has come for the Community to play a bigger role in the development of new technologies and to give them comparable attention to its policies for agriculture and steel. This must be one of the key factors in the relaunch of the Community and the creation of a 'second generation Europe' which will face up to the economic problems of the day. Only the Community can effectively take on the challenge of the new technologies. It offers scientists and industrialists the kind of large-scale mobilization of manpower, finance and market opportunities which are needed to encourage innovation. Three examples and priorities for Community action are information technologies, telecommunications and biotechnology.

### **Esprit: the reconquest of information technology**

Information technology covers the electronic processing of information, as well as office and factory automation (robotics), process control and telecommunications. This industry is already as large as the car and steel industries. In manufacturing alone, it employs five million people or 5% of the working population of the Community. Its influence extends to half the workforce and two-thirds of all economic activity. In the long term this influence will be felt in all sectors of the economy. It could be a major factor in the rolling back of the recession. Information technologies have enjoyed a spectacular growth-rate in recent years, despite the general economic stagnation. With a growth of between 8 and 10% a year, their worldwide turnover is expected to climb from 237 billion dollars in 1980 to 500 billion dollars in 1990. For the European Community, vital interests are at stake here:

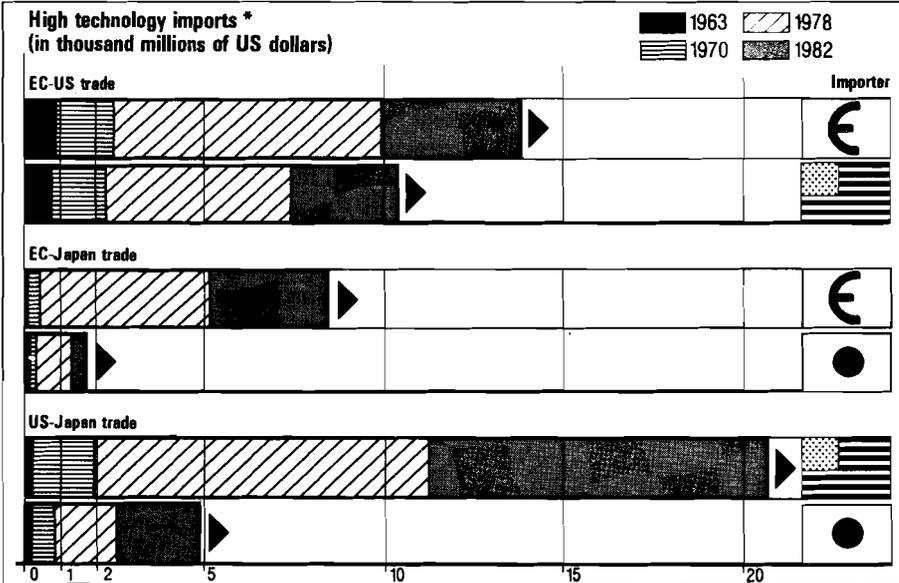
- The development of information technologies will improve performance and reduce costs in almost all sectors of the economy. Even agriculture will be transformed by computer analysis of satellite information and the automatized control of animal feeding. High technology equipment has a large 'value-added' factor and enormous export potential. It requires large quantities of brain power, in which the Community is rich, and little energy or raw materials, in which the Community is relatively poor.

**Percentage share of high technology exports \*  
in total exports of manufactured goods**



**High technology imports \*  
(in thousand millions of US dollars)**

1963
  1978
  1970
  1982



\* The 28 products enjoying the highest research and development expenditure. Source: Brendan Cardiff in 'European Economy', No 16, July 1983.

□ Despite outstanding performances in certain favoured areas, European industry is falling behind its principal competitors. Of every 10 personal computers sold in Europe, eight were manufactured in the United States. Of every 10 video-recorders, nine were made in Japan. European manufacturers of integrated circuits control only 30% of the Community market and 13% of world sales. In the industry as a whole, the Community supplies only 10% of the world market and 40% of its own market, which accounts for about one-third of world sales. European firms complain that their sales volume and profits are too small to permit the investments which are vital to guarantee their future. Their relative position is therefore declining. All European main-frame computer manufacturers have been forced to enter agreements with American and Japanese rivals to take advantage of their technological expertise. In 1975 the Community's balance of payments in this area was positive. By 1982 it was in deficit to the tune of 10 billion dollars. The long-term implications for employment in the Community are all too clear. The collapse of Community firms will mean that very few manufacturing and service jobs will be created in Europe. At the same time large numbers of jobs will be destroyed in other sectors through the spread of imported new technologies, necessary to maintain competitiveness.

Disjointed national efforts have proved incapable of meeting this challenge. The Japanese Government is investing 500 million dollars in research into fifth generation computers. The major American manufacturers of semi-conductors have formed a research cooperative. Community research must now also be coordinated in order to:

- Reduce the duplication of national research and development efforts which weigh heavily on the manufacturing stage;
- Create research teams which are large and stable enough to concentrate on the key areas and obtain valuable results;
- End the delays caused by dependence on imported technology.

In 1979 the Community began a limited research programme in the information technology field, concentrating on micro-electronics. This was bolstered at the end of 1982 by the pilot stage of Esprit (European Strategic Programme for Research and Development in Information Technology). The experiment was a conclusive success. A nucleus of 15 projects linked 200 research ideas and 638 businesses and universities in all 10 Member States.

The launch-date for a larger-scale Esprit programme is 1984. This is to last for 10 years with a budget of 1 500 million ECU<sup>1</sup> in the first five-year stage. Half will be

---

<sup>1</sup> 1 ECU (European Currency Unit) = about £ 0.59, Ir.£ 0.73 or US\$ 0.87 (at exchange rates current on 8 March 1984).

provided by the Community and half by the industry. The programme was drawn up after detailed consultations with industry, university and national governments. Its basic aim is to lay the foundations for a fully competitive European industry in the next decade.

Five fields for priority action have been identified. Three deal with essential building blocks of any Community strategy for high technology. Two are concerned with the application of technology to specific developments in the market place, notably the huge growth in the number of customers for the new technologies and the consequent need to increase both the power and the usability of the equipment available:

- Advanced micro-electronics: the aim is to develop circuit technology – smaller, more powerful and more reliable circuits – to give greater capacity and flexibility to complete units. The Community consumes one-fifth of world production of integrated circuits but manufactures only 6%, it must develop a unified concept of production and quality control of circuits with a very high degree of integration (VLSI).
- Advanced information processing: the objective is to achieve new forms of direct communication between man and machine – through words or pictures – by processes which duplicate the functioning of the the human brain.
- Software technology: the advanced processing of information requires a new generation of software as well as hardware or machinery.
- Office automation: research will concentrate especially on new forms of intelligent dialogue between man and machine, using both words and pictures. It will also cover the production and distribution of documents, as well as machine translation (clearly important to a Community with seven official languages).
- Computer-control in manufacturing: the automation of factories requires research into the construction of integrated systems, and robots in particular. New developments in micro-electronics and software are needed.

In each of these areas the European Commission will select the best of the projects suggested by research centres and businesses both large and small. The selection will be carried out with the help of management and consultative committees, including representatives of Member States, the industry and research scientists. Applications will only be accepted from Community-based firms and institutions and – except in special cases – more than one Member State must be involved. The key factor in Esprit is the creation of an information network to ensure that the results of the research are diffused to all interested parties and as widely as possible.

## **Telecommunications: an industry as important as coal or steel in 1950**

Within the information technology field, special problems are posed by telecommunications:

- The development of this sector is largely determined by the regulations and purchases of public authorities;
- Enormous technical changes are taking place: numerization (the use of computer code languages), optical fibres (with vastly increased transmission capacity), micro-electronics (allowing miniaturization and cost saving). New services and devices include the tele-transmission of written texts, the scanning of databases, the exchange of files between computers, long-distance surveillance of buildings, assistance to people living alone, radio-telephones, video conferences and digital television.

The state of affairs in the Community is as follows:

- Telecommunications is a priority sector for the relaunch of productive investment. Although accounting directly for only 1% of the added value of Community gross domestic product, the sector influences 55% of total value added and 62% of all employment. The potential, on the European market and in the Third World, is enormous. The Community industry needs to make huge research and development efforts to hold on to its place as premier world exporter. International competition is growing and benefits from the size and unity of domestic markets in the United States and Japan.
- Europe's weaknesses include: the fact that a large proportion of exports comprises equipment which will soon be out of date; the fact that the European market is divided into national markets, dominated by local producers who enjoy local monopolies but lack the large-scale production and economies of scale needed to finance innovation; uncertainties for would-be customers, caused by the higher costs created by the fragmentation of the European market, doubts about the nature of future telecommunications networks and the constraints imposed by national regulations. These uncertainties account for the fact that the European market is forecast for only a 5% growth between 1980 and 1990, compared to 8% on the world market.

A Community strategy is needed to ensure that European-produced equipment and services, competitive on the world market, are available to Community customers, notably small and medium-size enterprises and firms in the less-favoured regions. Production must be stimulated by encouraging cooperation between firms at the pre-competitive research stage. Esprit is a perfect model. Public procurement markets must be opened up to stimulate competition and provide the benefits of large-scale production. The nature and contents of future telecommunications networks must be clearly mapped. New equipment and services, far more complex and varied than those they replace, must be compati-

ble from the outset from one end of the Community to the other. A common telecommunications infrastructure must be provided, across national boundaries, to create an integrated system for communication by voice and picture, the transmission of data and the use of satellites. Cooperation of this kind could be entrusted to a new Community body. It should lead to the dismantling of part of the jumble of telecommunications regulations in Member States. It would allow national investment in this sector to be used more effectively.

### **Biotechnology: a Community action programme**

The progress of the life sciences has made an increasing volume of molecules and cells, of both vegetable and animal origin, available for use in agriculture, food-processing, the chemical and pharmaceutical industries, the production of biomass energy and the recovery of waste. Economically, the stakes are enormous. About 40% of manufactured goods are biological in origin. By the year 2000 it is estimated that the world market for biotechnology could top 100 billion dollars. The Community must be able to compete effectively for this market with its principal international competitors. Biotechnology will also enable the Community to attain a number of political objectives. These include permitting the Third World to become self-sufficient in food and the reduction of public expenditure on agriculture and health care. A wealth of potential applications of biotechnology in these areas is still unexplored.

All the great industrial powers of the world are already moving towards a 'biosociety'. But American expenditure in this field is twice that of the Community in research work and even further ahead in industrial uses. Japan has also launched an ambitious development programme. Meanwhile, European researchers are emigrating to the United States and the Community is increasingly dependent on imports of both biotechnology products and patents. This state of affairs has been caused by the disparate nature of national research and development efforts, the compartmentalization of the Community market by differing national standards and regulations and a relative shortage of adequately trained scientists.

To combat these shortcomings, in this sector as in others, Community countries must combine their efforts in order to create the necessary 'critical mass' for development on a continental scale. The European Commission has presented proposals for a five-year action programme worth 200 million ECU. This programme will mainly consist of research and development projects and efforts to create a favourable environment for progress in biotechnology. Its main themes are:

- A 'horizontal' programme of research and training in basic biotechnologies, concentrating on the intermediate stage between pure and applied research. At present, many firms are reluctant to invest in research with lengthy lead times. The Community has already started a five-year programme (1982-86) in seven fields of biomolecular engineering, ranging from the study of enzymes and

genes to methods of evaluating risks. Research establishments have shared the cost of more than 100 projects which have helped to create research centres and disseminate information in key sectors affecting agriculture and food-processing (animal vaccines, micro-organisms for use in dairies, the transfer of genes for crops). But this programme is too small to systematically iron out the bottlenecks preventing the application of genetics, biochemistry and microbiology to agriculture and industry. Additional efforts are needed to upgrade training programmes and to encourage researchers to move between the best European laboratories. Biotechnology is multi-disciplinary and is rarely taught as such. Other measures are needed to create the infrastructure needed to disseminate and exploit this research: information networks, data-banks, advanced processing of information, the collection of biological materials.

- Specific research and training projects on sectors such as health (the prevention or rapid treatment of certain endemic diseases) and agriculture and advanced chemicals (the improvement of European competitiveness, the reduction of trade imbalances and lowering the costs of production and raw materials). Other demonstration projects could also help to smooth the transition from research to commercial application.
- New conditions for agro-industry. The growing interdependence of agriculture and industry has brought increasing exchanges of services and products, which must be managed more effectively. Access to raw materials of vegetable origin must be improved. The competitive edge of European industry can be sharpened by changes in the common agricultural policy for products such as sugar and starch.
- A Community policy for standards and regulations to complete the common market. In the absence of a truly united market large enough to offer reasonable profits, firms are often discouraged from making the investments needed to exploit scientific advances. An obvious case in point is the pharmaceutical industry, faced with a slowing down of public expenditure on social security. The root of the problem is the jumble of different national standards. The solution is not so much to replace them gradually with Community standards, which is already happening in some sectors. It is necessary to establish a framework for Community cooperation on the creation of common standards which will actually encourage the application of biotechnologies. The Community must also ensure that safety and health standards are maintained in order to preserve consumer confidence in the bio-industries.
- A European policy for intellectual property rights, in order to iron out problems which discourage the dissemination of research results and cooperation between Community firms. Wide differences exist between national legislations in this field. A European copyright convention exists, but has not yet been applied because it has not been ratified by all Member States. It remains unclear whether it is possible to patent a micro-organism. Common standards must also be created for the publication of the results of public-funded research.

- The creation of a special Community body to coordinate national policies for biotechnology. Areas to be covered would include the creation of internationally competitive research and training facilities, the effective exploitation of new land uses, the application of biotechnology to agriculture, health care and Third World development and rules governing standards, safety and intellectual property.



So far we have considered only three, albeit crucial, aspects of the new technologies. Other areas to be taken into consideration include:

- The need to establish a European dimension for new markets created by the new technologies. The European Commission, following the success of the Euronet Diane programme<sup>1</sup> has called for a five-year, 40 million ECU programme to encourage the use and development of data-banks and other equipment and services on the specialized information market. At the same time, the Commission has suggested the creation of a genuine Community policy for the information market.
- The potential benefits of strengthening links between Community action proper and inter-governmental agreements in other areas of advanced technology such as the aircraft industry (the European Airbus) and the aerospace industry (the Ariane rocket and Spacelab).
- The desirability of encouraging basic technological research and the use of the new technologies in traditional industries. The Community is already financing research in fields such as agriculture, steel, textiles and industrial ceramics. A new series of research programmes, both general and for specific sectors, is being launched as part of the ambitious 1984-87 Community framework programme for science and technology.
- The need to accelerate technological advance in the energy sector, in order to reduce European dependence on energy imports. The Community, through its various funds and the European Investment Bank, is supporting research and demonstration projects in almost all forms of energy, including new sources of energy and energy-saving. These efforts must be continued and extended.
- The need to create a legal and financial environment favourable to innovation. The European Commission has proposed measures to stimulate investment, 'Europeanize' public procurement and financial markets and encourage competition between Community firms. The Community has launched a programme for the development of cross-frontier infrastructure to aid innovation

---

<sup>1</sup> See *European File* No 18/82 'Euronet Diane: towards a common information market.'

and the transfer of technology (especially for small and medium-sized businesses and poorer regions). The Community's financial instruments – the European Regional Development Fund, the European Investment Bank and the New Community Instrument – assist the modernization of the economic fabric of the Community and place a growing emphasis on aiding innovative projects. The New Community Instrument may shortly have favourable loans available for innovative small and medium-sized businesses.

- The need to prepare society to live with and draw the maximum advantage from the new technologies. As the report from the FAST <sup>1</sup> group pointed out, the stakes are enormous, both economically, socially and culturally. The European Commission will extend its existing programme of studies and dialogues, involving both sides of industry, on subjects such as worker participation in ways of introducing new technologies into their workplaces, health and safety standards the impact of technology on employment, the organization of working time and living and working conditions. Community Ministers for Education and Social Affairs have agreed to give increased attention to the implications of new technologies in school and training curricula. The Commission plans increased efforts to raise public awareness and retrain technicians and specialists. The European Social Fund should also contribute in the years ahead by increasing its aid for the training or re-training of workers whose jobs – according to their industry, profession or rank – have been changed, abolished or increased in number by the advance of the new technologies. In the face of international competition, this advance is inevitable. But the way in which it is handled could decide the future shape of our civilization. The speed of the advance will be a deciding factor in the Community's worldwide competitiveness, its share of the world market and the number of jobs available to its citizens ■

---

<sup>1</sup> See *European file*, No 7/84, 'FAST: where does Europe's future lie?'.

---

The contents of this publication do not necessarily reflect the official views of the institutions of the Community. Reproduction authorized.

---

### Commission of the European Communities

Information offices (countries fully or partially English speaking\*)

**Ireland** 39 Molesworth Street, Dublin 2 – Tel. 71 22 44

**United Kingdom** 8 Storey's Gate, London SW1P 3AT – Tel. 222 81 22  
– 4 Cathedral Road, Cardiff CF1 9SG – Tel. 371631  
– 7 Alva Street, Edinburgh EH2 4PH – Tel. 225 2058  
– Windsor House, 9/15 Bedford Street,  
Belfast BT2 7EG – Tel. 40708

**Australia** Capitol Centre, Franklin Street, PO Box 609,  
Manuka 2603, Canberra ACT - Tel. (062) 95 50 00

**Canada** Inn of the Provinces-Office Tower, Suite 1110, 350 Sparks Street,  
Ottawa Ont. K1R 7S8 – Tel. (613) 238 64 64

**USA** 2100 M Street, NW, Suite 707,  
Washington DC 20037 - USA – Tel. (202) 862-9500  
– 245 East 47th Street, 1 Dag Hammarskjöld Plaza,  
New York, NY 10017 - USA – Tel. (212) 371-3804

---

\* Offices also exist in other countries including all Member States.