I&T

MAGAZINE

More competitive industry through research
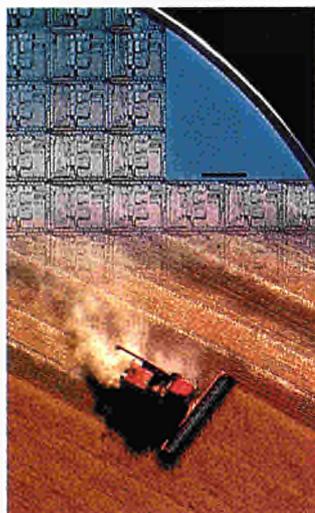
I&T MAGAZINE

I&T Magazine is available free of charge in five languages: English, French, German, Italian and Spanish. It is accompanied by a News Review, in English only.

The text of all issues of the magazine and news review is also accessible online, free of charge, on the database server ECHO (European Commission Host Organisation), using the public password ECHO (NUA: 0270448112). A menu for calling it up online will be available from 15 October 1994.

How to access I&T Magazine electronically on the ECHO server:
- By telephone + 352 42 03 47
  (automatic detection of speeds from 300 – 19,200 bits per second)
- Packet switching data network connection (X.25 or X.28): Network User Address (NUA) 270448112
  NB: Although 0 (zero) is the usual NUA prefix, X.28 users, eg those in Great Britain, should use the prefix A9
- Via Internet: telnet echo.lu
- Via Europanet: NUA 204 370 310099
- Via the French Minitel: 36.19 code ECHO

How to obtain copies of I&T Magazine:
If you wish to be added free to our mailing list or amend an existing subscription* please write with full details to:

EUR-OP
MER 193/195, I&T Magazine
2, rue Mercier
L-2985, Luxembourg

To receive back numbers of the magazine and news review (if available) and for all other enquiries, please write to:

The Editor, I&T Magazine
European Commission
200 rue de la Loi, (BU 24 -1/11)
B-1049 Brussels
Belgium

* For any amendments please send back to EUR-OP the address sheet enclosed with your magazine and news review, or quote your subscriber number (which is printed next to your name and address) on your correspondence.

Editorial

"The wealth of nations is increasingly based on the creation and exploitation of knowledge. The best possible advantage must be taken of this new form of progress available to Community firms since it is an area in which the Community enjoys a substantial lead."

THIS STATEMENT, taken from the section on competitiveness in the Commission's White Paper on growth, competitiveness and employment, is particularly important in the context of the Commission's policy initiative to promote industrial competitiveness.

Global economies and markets are emerging for a growing number of goods, services and factors which are subject to mounting international competition. The effect of this trend is to make business performance ever more dependent on competitive edge and less on traditional comparative advantage.

The latter is directly linked to the regional socio-economic and cultural environment and is therefore inflexible, whereas the former hinges on individual expertise, knowledge, imagination and dynamism.

It is up to the public authorities to create an environment in which businesses are able to make the best possible use of these competitive advantages on which their success depends.

The Commission set out its thinking on industry in the 1990 communication *"Industrial policy in an open and competitive environment,"* echoed by the White Paper's analysis of the issue of industrial competitiveness.

And public authority action in this area now has a legal basis, in the Maastricht Treaty's title on industry.

The global context is changing rapidly – geopolitical shifts, accelerating industrial change and a new world trade order being just some of the developments – and we need to respond accordingly.

With this in mind, the Commission will shortly be adopting a communication calling for an EU policy of industrial competitiveness. The aim of the document will be to assess the potential for increasing industrial competitiveness in the Community and to identify ways of exploiting it.

The communication will show how a policy of industrial competitiveness can be implemented by coordinating the main Community policies which have an impact on industry.

The new Framework Programme for research and development recently adopted by the Council of Ministers and the European Parliament (see article on page 6) is one example of this.

Following the successful implementation of the first three Framework Programmes, which were chiefly intended to establish a sound scientific and technological base, the Fourth Framework Programme will take the opportunity to focus on technological development and innovation, with the aim of making an effective contribution to competitiveness and sustainable industrial development and improving the quality of life.

The White Paper on growth, competitiveness and employment also calls for the effective implementation of the new framework programme, in line with the Commission's horizontal approach to industrial policy.

The priority objective is to build a modern economy in which information and communications play a key role. The White Paper defines the aims of the Fourth Framework Programme as being to stimulate dissemination of the results of R&D and technological know-how throughout European industry, to provide training for highly skilled staff and set standards.

Although small and medium-sized enterprises (SMEs) may be too small to invest sufficiently in R&D, small businesses working in high technology sectors or applying advanced technologies are nonetheless a significant source of creativity, growth and employment. One important objective of the Fourth Framework Programme is therefore to support small business development by facilitating access to and use of high technology.

Coordination, and consistency with other Community policy aims, will clearly enhance the effectiveness of both national and Community-level R&TD projects. Any initiative which helps to ensure that businesses are better informed about technical, technological and economic developments in the environment in which they operate must aid them to implement strategies which will take these new elements into account.

So the goal set out in the White Paper is to build a modern economy with an effective and dependable infrastructure, where still more powerful tools and methods – with a strong emphasis on information and communications – will be available to all industries, traditional sectors included.

In particular, the development of the "information society" will require continuous modernisation of the entire European economic fabric, to exploit the competitive advantages associated with the shift to a knowledge-based economy and reduce the time-lag between the pace of change in supply and the corresponding adjustments in demand, while at the same time helping European firms to adapt to competition in a new, globalised and interdependent context.

The *Report on Europe and the Global Information Society*, produced by the Task Force headed by Commissioner Bangemann and presented at the European Council meeting in Corfu, is an appropriate starting point for the development of an operational programme setting out the means and methods required for EU action in this area (see page 3).

In addition, the Commission is endeavouring to step up its information initiatives, with publications such as *I&T Magazine* and the *Panorama of EC Industry*.

The latter is an example of the kind of business guidance resource the Commission produces. The publication seeks to improve our knowledge of EU industries and is used widely as both a reference work and a practical tool in political, economic and academic circles. ■

Riccardo Perissich *DG III*

Europe and the global information society

Report of the High Level Group

AT THE MEETING of Heads of State and government in Brussels in December 1993, the Commission presented a White Paper on "Growth, Competitiveness, Employment." The document lays particular emphasis on the urgent need to develop a Europe-wide information infrastructure to help restore economic growth and competitiveness, open up new markets and create jobs.

The emergence of this infrastructure is made possible by advances in digital technology, a field which brings together such traditionally distinct sectors as computer communications, the audiovisual industry and consumer electronics. The digital revolution has paved the way for new data transmission services and applications based on multimedia technology – combining sound, image and text – and is set to power the gradual move towards an "information society."

Acting on the White Paper's recommendations, the European Council called on a high-level group to produce a report setting out practical measures for implementation by the Union and its Member States. The group submitted its report, which is expected to form the basis of an operational programme, at the European Council meeting in Corfu.

Members of the high-level group

Peter L. Bonfield, *Chairman and Chief Executive, ICL;*
■ Enrico Cabral Da Fonseca, *President, Companhia Comunicações Nacionais;*
■ Etienne Davignon, *President, Société générale de Belgique;*
■ Peter J. Davis, *Chairman, Reed Elsevier;*
■ Carlo De Benedetti, *Chairman, Olivetti;*
■ Jean-Marie Descarpentries, *Chairman and Managing Director, Bull;*
■ Brian Ennis, *Managing Director, Irish Medical Systems;*
■ Pehr G. Gyllenhammar, *Former Executive Chairman, Volvo;*

■ Hans-Olaf Henkel, *Chairman and Chief Executive Officer, IBM Europe;*
■ Lothar Hunsel, *Chairman-Designate, DeTemobilfunk;*
■ Anders Knutsen, *Administrative Director, Bang & Olufsen;*
■ Pierre Lescure, *Chairman and Managing Director, Canal+;*
■ Constantin Makropoulos, *Former Managing Director, ELSYP;*
■ Pascual Maragall, *Mayor of Barcelona, Vice Chairman, Polis;*
■ Romano Prodi, *President Director-General, IRI;*
■ Gaston Egmont Thorn, *President Director-General, Cie Luxembourgeoise de Télédiffusion (CLT);*
■ Jan D. Timmer, *President, Philips Electronics;*
■ Candido Velazquez, *President, Telefonica;*
■ Heinrich von Pierer, *Chairman of the Board, Siemens.*

Setting up a pan-European system for ground-to-ground and air-to-ground communications is one of the applications proposed.

processing, storage and transfer of multimedia information without space, time or volume constraints, these new technologies have changed the way we live and work together. They can also provide solutions to the problems of the modern world and improve the quality of life in Europe.

Although there is much to be gained in economic and social terms from the information society, it is not without its risks. Particular care must be taken to ensure that new technologies do not create a two-tier society, with an underclass who do not have access to the new products and services or are unskilled in their use.

Urgent action is required. Not only because nothing will happen on its own but, most importantly, because the first countries to enter the information era will be in a position to dictate the course of future developments to the latecomers. Moreover, the emergence of the information society is an all-embracing, transnational phenomenon which calls for ambitious action at European level. A plethora of individual measures with little or no coordination between them would be only of marginal use.

The report urges the Union and the Member States to trust to market forces and private-sector initiative to lead the way forward into the information society. No new public expenditure will therefore be required, although planned spending on education, health and research, for example, may have to be retargeted towards new priorities. The public authorities' primary task will be to see that the market operates smoothly. In addition, a new form of public/private sector partnership will be needed to implement the group's recommended action plan.

The group, chaired by Commissioner Bangemann, met at regular intervals over a period of three months. The report entitled "*Europe and the global information society*" was finalised at its meeting on 26 May.

Preparation of the report entailed discussions between the Bangemann group and their American counterparts at the National Information Infrastructure (NII) Task Force. There was agreement on both sides of the Atlantic that market forces have a key role to play in improving the quality of services and bringing costs down, that free market access is needed at international level, and that the public authorities have a responsibility to advance and promote the emergence of the information society. The two sides agreed to forge stronger ties and closely involve Japan in discussions.

The report's premise is that advanced information and communication technologies have triggered a latter-day industrial revolution. By enabling the

Recommendations

One of the key messages of the report is that the ongoing liberalisation of the telecommunications sector needs to move up a gear, in particular as regards infrastructure. This also means that the public operators should be freed of the budgetary constraints and non-commercial, political obligations they are currently subject to. Furthermore, the group is firmly of the opinion that a review of the regulatory framework is required in response to the emergence of new markets, to give competition a free rein.

The report sets out the means by which these goals can be achieved, including:
■ identification of the degree of regulation required at European level;
■ interconnection of networks and

interoperability of services to avoid the fragmentation of information infrastructure;
■ a reduction in tariffs, which should be brought into line with those of other advanced industrial regions;
■ a review of the standardisation process to increase its speed and responsiveness to the market.

Avoiding market segmentation

The group also recommends the following flanking measures, in particular to avoid segmentation of the single market:
■ protection of intellectual property rights, preferably at international level;
■ protection of privacy;
■ more rapid development of electronic and legal protection, and data security;
■ development of new rules on media ownership to safeguard pluralism;
■ implementation of a competition policy tailored to new market conditions. The report also stresses that competition policy should more accurately reflect the new environment of global competition and rapid market change.

Networks, basic services and applications

The group suggests three building blocks for the Europe-wide communications architecture of the future – networks, basic services and applications:
■ Europe must develop a "network of networks" to make the most of the respective advantages and complementary features of the various systems; this involves extending the European ISDN network, developing broadband communications, consolidating the mobile telecommunications sector and promoting satellite communications;
■ there is a need to promote the generalised provision of standardised basic services throughout Europe, in particular electronic mail, file transfer and video services; a European forum should be set up to hasten the adoption of uniform standards for these services;
■ the group has drawn up a list of 10 trans-European application initiatives for demonstration purposes and to jump-start initial supply and demand. The report recommends joint implementation of these measures by the public and private sectors. Several of the areas involved have already received years of attention from the Commission under R&D programmes. Now, however, the time has come to move on from pure experimentation to real-life application.

List of proposed applications
■ teleworking: promoting teleworking from home and in satellite offices to cut down on commuting to work;
■ distance learning: setting up distance learning centres and extending distance learning techniques to schools and universities;
■ a network for universities and research centres: developing a trans-European advanced communications network with open access to libraries;
■ electronic data transmission services for SMEs: promoting the use of new technologies by SMEs and networking between SMEs, the public authorities, professional associations, customers and suppliers;
■ road traffic management: establishing advanced traffic management systems and other road services (driver information, route guidance, road pricing, etc.);
■ air traffic control: setting up a pan-European system for ground-to-ground and air-to-ground communications;
■ healthcare networks: developing a network to link general practitioners, hospitals and the social services;
■ electronic tendering: introducing an electronic tendering network for public procurement linking public authorities and suppliers;
■ trans-European administration network: linking up European public authorities for information interchange on a network subsequently to be extended to ordinary citizens;
■ urban information highways: connecting households to multimedia applications and new leisure services.

At the European Council meeting in Corfu, the heads of State and government took note of the report and observed that the current unprecedented technological revolution in the area of information opens up vast possibilities for economic progress, employment and the quality of life, while simultaneously presenting a major challenge.

The European Council agreed that it is primarily up to the private sector to respond to this challenge, by evaluating what is at stake and taking the necessary initiatives, notably in the matter of financing. It added that the Union and its Member States will have an important role to play in backing up this development, in particular by providing the political impetus and establishing a clear and stable regulatory framework. The European leaders expressed general agreement with the areas of application set out in the Bangemann report and stressed the importance of linguistic and cultural aspects.

The European Council further considers that the importance and complexity of the issues raised by the information society warrant setting up a permanent coordination instrument to ensure that the various parties involved – from the public and private sector alike – work along the same lines. This coordination instrument should be set up as soon as possible and be based on the appointment in each Member State of a person responsible at ministerial level for coordinating all aspects of the subject (political, financial and regulatory) with a view, *inter alia*, to ensuring a coordinated approach within the Council. The Commission is to take similar action.

Furthermore, the European Council stated that the necessary regulatory framework should be established as soon as possible at Union level. With this in mind, the Council and the European Parliament should adopt measures in the areas already covered by existing proposals before the end of the year. The Commission, for its part, has been invited to establish a programme covering the remaining measures needed at Union level, as soon as possible. The European Council will assess the progress made at its meeting in Essen in December.

The relevant departments of the Commission have already started work. A communication to the Council and Parliament was approved by the Commission on 19 July, its main purpose being to send a clear political signal to all those involved that the information society is a priority issue which the Commission is addressing as fully and as quickly as possible.

The communication sets out a detailed programme of work in four key areas: regulation, applications, social and societal aspects, and the promotion of the information society. In each field, it lists the measures already decided or being adopted, and sets out the new measures required and the means of implementing them. ■

The Fourth Framework Programme
Making industry more competitive

The new programme will lend its support to training for highly skilled workers and human resource management in an environment of radical technological change.

THE CENTRAL AIM of the Fourth Framework Programme for Research and Technological Development is to develop an instrument which can help to improve the general competitiveness of the European economy, whilst at the same time laying the foundations for future growth. The programme builds on Europe's science base, which the first three framework programmes did much to strengthen. Now the focus needs to be on turning research findings into technological developments to boost the competitiveness of the industrial and service sectors. We need innovation in industry and in everyday life; we need innovation to revigorate economic activity and help us to move towards full employment, while safeguarding the environment and genuine quality of life. Competitiveness, growth and employment – the cornerstones of the White Paper adopted in December of last year, which lays strong emphasis on research.

The Fourth Framework Programme is part of a policy of promoting industrial competitiveness. The European economy needs to develop an effective and dependable infrastructure which will enable the whole of industry, including the mature sectors, to make use of new, more powerful tools and methods. Information and telecommunications will be crucial in this respect. A genuine "information society" calls for on-going modernisation of the whole European economic fabric. This must serve to reduce the time-lag between the pace of change in supply and the corresponding adjustments in demand and help the sustainable adaptation of European firms to ever fiercer competition. For this, as with EU industrial policy, a horizontal, non-sectoral approach to the implementation of the framework programme is needed.

The main challenge is translating research results into innovation in industrial products, processes, capital goods and management. This involves transfers of technology and expertise across the whole of Europe, taking in outlying regions and the eastern European countries. In this connection, the emergence of an integrated infrastructure with the development of large trans-European networks is a particularly ambitious goal which the framework programme must help to achieve. The new programme will lend its support to training for highly skilled workers and human resource management in an environment of radical technological change. Logically enough, it should also make a contribution to the establishment of the norms and standards which are vital both to the completion of the internal market and to the economies of scale industry needs to survive.

How can all the users, producers and players in the field be encouraged to increase investment in research and development? Only 2% of GDP goes to R&TD in the European Union, as against 2.8% in the US and 3% in Japan. And most of that is invested at national level, which often results in duplication of research activities.

The Fourth Framework Programme, perhaps even more than its predecessors, must serve as a catalyst for the optimisation of Europe's considerable research potential. The twenty or so specific programmes must focus activity on the needs of industry, the end user of the products of technological progress. Consultation of European industrial managers at the planning stage will allow work to be better tailored to shared needs.

Evidently, with a budget equivalent to barely 4% of EU research expenditure, the framework programme is essentially intended to promote cooperation with national activities and generate a leverage effect. A clear statement of the aims being pursued, the needs to be satisfied, and the Community dimension of each programme will help define a common development strategy for European industry and ensure better coordination of all research activities in Europe.

This will entail greater coherence not only between national and Community policies, but also between the strategies of the various players in the R&TD field, i.e. universities, research centres and the business community, including small undertakings. Small and medium-sized enterprises (SMEs), in addition to their employment potential, have clearly proved their worth as innovators. Yet all too often, they are prevented from participating in and sharing the benefits of Community research programmes by a range of financial and administrative obstacles. This is a shortcoming the Fourth Framework Programme will endeavour to remedy, making greater allowance for SMEs' specific requirements in a bid to facilitate their involvement in Community programmes.

With this in mind, calls for proposals for the specific programmes will be published on a set date as a means of keeping the R&TD community, and SMEs in particular, better informed. As part of a wider move to simplify procedures, this is intended to draw SMEs to the forefront of innovation and technological development under the Fourth Framework Programme.

The programme's effectiveness will also be improved by greater convergence with other Union policies, particularly in the fields of environmental protection, health and culture, where new needs are emerging. In its search for solutions to the socio-economic problems which are making an appearance in every region of Europe, the Fourth Framework Programme is a true mainstay of innovation in the EU. ■

Abdoul Mbaye *DG III*

A clear statement of the aims being pursued, the needs to be satisfied, and the Community dimension of each programme will help define a common development strategy for European industry and ensure better coordination of all research activities in Europe.
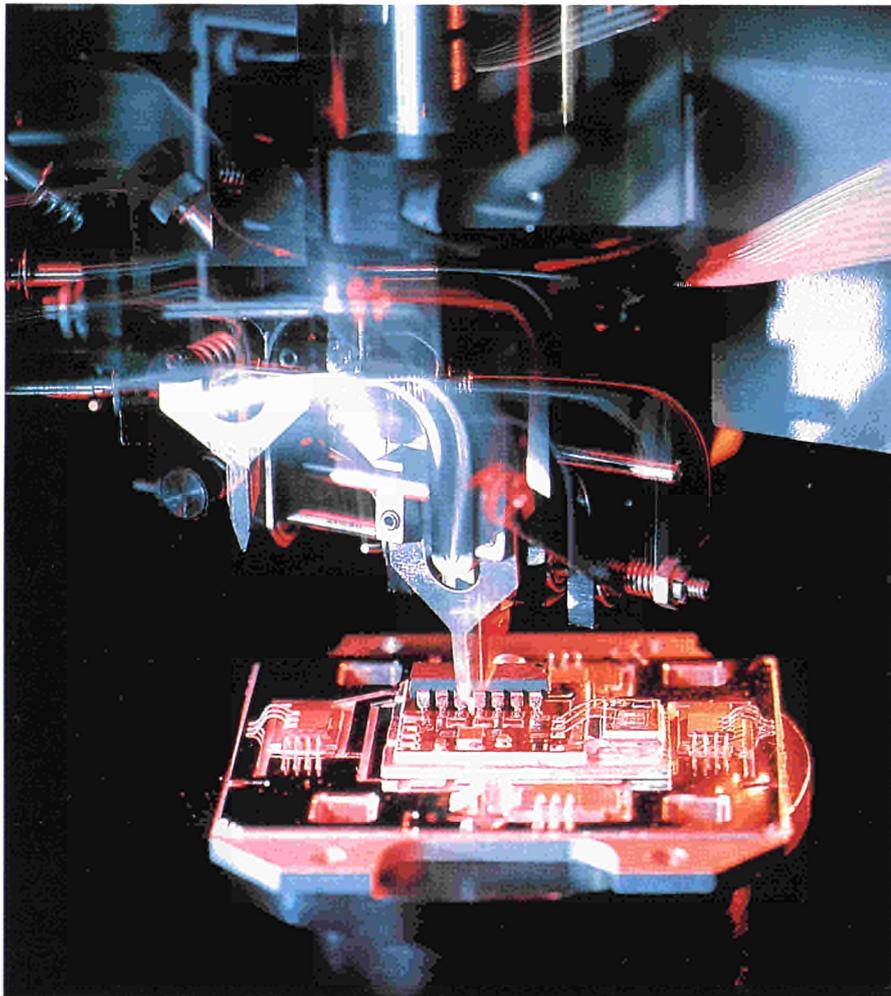
IT after ESPRIT

The new information technologies programme

THE NEW R&D PROGRAMME in the field of information technologies (IT) is to be launched later this year. It is intended to meet the needs of *today's industry as a whole*, and not just the IT sector. The new programme is partly inspired by the ESPRIT programme which, since its inception ten years ago, has done much to promote cooperation between industry and laboratories and strengthen the Community's technological base in this field.

From the very outset, IT has extended ever further into every area of industrial, economic and social life. Until the 1970s, computers installed in organisations were used for centralised operations, such as wage payments, invoicing and production management. Subsequent progress in telecommunications and the boom in personal computers triggered the development of a profusion of IT applications in a growing number of fields, forming "pockets of information," first in companies and then in the home. Today, IT underpins all production and services industries, from health to leisure. In addition to the large mainframes and the 140 million personal computers used worldwide, there are over 520 million computers installed in our telephones, televisions, toys, cameras, cars, etc. IT products have become part of our everyday life, whether at work or in areas such as sport, leisure, health, administration, education, etc. We are moving into the age of the information society. And at the root of these changes is a new information infrastructure, comprising all the services, products and technologies which open up easy access to information. And this information is available to any individual or any organisation, at any time and in any place!

Alongside this transition, we are also witnessing a fundamental restructuring of our industries. To be competitive in today's markets, industries must be active worldwide and switch from mass production to high value-added production. Production, management and marketing are becoming increasingly efficient thanks to IT and the integration it allows. In short, Europe's future competitiveness lies in easy access to knowledge, information and know-how. As stated in the analysis and set of proposals contained in the Commission's White Paper on "Growth, Competitiveness and Employment," the speed and success of this structural change towards an information society is a deciding factor in the speed with which we will return to full employment and a strong economy.

A water analysis system based on a disposable sensor incorporating sensing and calibration electronics has been developed in B-ASICS (project 6240). The system can rapidly measure concentrations of heavy metals in a few drops of water, enabling real-time on-site pollution monitoring.

In order to meet these demands, the new R&D programme seeks to contribute to the competitiveness of industry as a whole, placing particular emphasis on support for the technology required to set up the information infrastructure. The programme was developed in close cooperation with industry, IT users and experts from universities and research centres, and provides for major innovations in terms of both content and procedures. The emphasis is on access to information and technology for firms, public services and citizens. Particular attention has also been focused on the development of readily-usable information adapted to the needs of users. Another priority for the programme is the dissemination of best IT practices throughout all sectors of industry. Coordination with other Community schemes, such as the Industrial Technologies programme, is also planned; in particular close links will be established with the ACTS and Telematics programmes, given the increasing convergence of the IT and communications sectors.

Technologies and activities for the information infrastructure

Central to the Community's programme are the supporting technologies required to develop IT:

■ **software:** software programmes are increasingly integrated into such commonplace products as televisions and electric shavers in order to give them a competitive edge, i.e. a "plus" which will induce the consumer to buy that product rather than another. The emphasis is placed on techniques for developing software and the best practices in this field, including methods for increasing system quality, dependability and security.

■ **hardware:** the development of low cost, reliable and efficient integrated semi-conductors is essential for manufacturers of electronic systems. The programme concentrates on those fields where Europe can be competitive. These include liquid crystal display technology and application-specific integrated circuits, which form the basis of the information infrastructure products and services. The programme will also cater for microsystems. These are the miniature electronic systems which make it possible to build intelligence into CD players, cars, pacemakers, etc.

■ **multimedia**: this technology allows the user to create and interact with the information, which is usually a combination of animation pictures, sound and text. It forms the basis of new information infrastructure services, such as home shopping for clothes: the customer buys a suit after having seen it worn by a model in an office environment and in the colour of his choice. Another example is the disabled person who is able to "visit" museums in a virtual reality dimension without leaving his home, choosing and displaying digital reproductions of paintings and sculptures of a very high quality and accompanied by commentaries. Europe is very well placed in the multimedia applications market and the programme will further strengthen its position, in particular by developing technologies and systems which will provide the user with easy access to the information, whether in private firms, public services, or social or private life.

The programme also includes a major innovation: **focused clusters**. These are sets of activities covering a certain number of technological areas relevant to a specific interdisciplinary goal. The programme provides for four clusters which will allow it to manage the growing convergence between the different technologies and to target R&D.

■ **OMI: open microprocessor systems initiative.** The aim here is to develop European capability in microprocessor systems. OMI is intended to simplify the design of intelligent systems incorporating one or more microprocessors, as used in sectors such as aerospace, the car industry, telecommunications and consumer electronics. This simplification is based on the coordinated development of components and software programmes following a "Lego" pattern, i.e. providing for re-use and compatibility of a number of basic building blocks accessible in "libraries."

■ **HPCN: high performance computing and networking.** High performance computing allows, for example, the computer simulation of stock market or weather forecasts, car crashes, etc. Unpleasant, expensive or dangerous experiences are replaced by "virtual" tests which are both faster and less expensive. The aim of HPCN is to promote and accelerate the use of computing systems in solving problems in the financial, environmental or industrial field for example.

■ **TBP: technologies for business processes**. The aim here is to help boost firms' competitiveness by promoting optimal use of IT both within the organisation (electronic document management, modelling of decision-making process, etc.) and in the individual firm's interaction with the external environment (suppliers' and service networks, etc.).

■ **IIM: integration in manufacturing.** The purpose of this measure is to help boost the competitiveness of manufacturing industries by using IT to improve product quality and cut production costs, while taking environmental considerations into account.

The programme also provides for **long-term research** aiming to help sustain Europe's potential for innovation, notably through research projects involving a higher risk but which stand a real chance of improving future competitiveness.

The **networks of excellence,** an idea successfully developed three years ago, will of course play a major role throughout the programme in speeding up technology transfer and inter-disciplinary training. By allowing European research teams to work together – despite the fact that they may be thousands of kilometres apart – these networks are an important factor in bringing people together and pooling ideas.

Streamlined procedures

Easy access to the programme is a crucial factor. A number of practical measures are being studied to make the programme more accessible, in particular to SMEs. For instance, certain types of organisation have difficulty finding the resources they need to prepare a proposal and form a consortium. To help them spread the effort more evenly over time, calls for research proposals will be more frequent and specific, relating to just a part of the programme. Simplified contracts are also being considered. Another possibility is to assess proposals in two selection stages, and introduce CRAFT-type procedures (feasibility awards) for SMEs.

The IT programme therefore takes into account, on the one hand, the context of a newly emerging society based on information accessible to and able to be used by everyone and, on the other hand, the objectives of European industry in terms of competitiveness. The approach is applied to all sectors while promoting the knowledge and use of IT and its applications in people's everyday life. ■
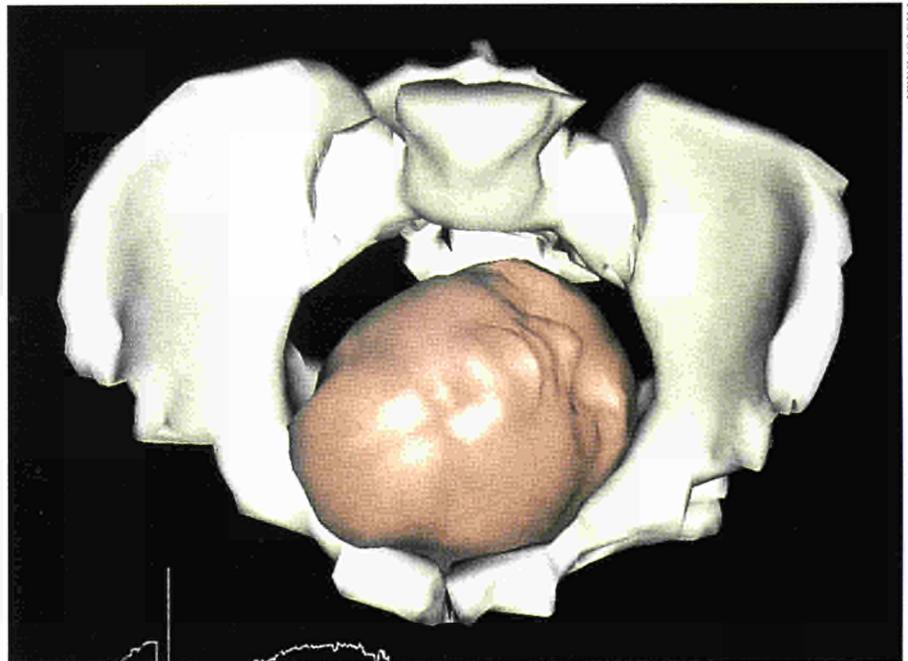
Nathalie Richier *DG III*

PHOTO: INRIA

Based on diagnostic scans, the twisting motion of a baby's head during birth can be simulated using the motion planning software developed in PROMOTION (project 6546), aiding obstetricians to assess the need for surgical intervention.

Telecommunications
Getting in on the ACTS

"Throughout the world, production systems, methods of organising work and consumption patterns are undergoing changes which will have long-term effects comparable with the first industrial revolution."
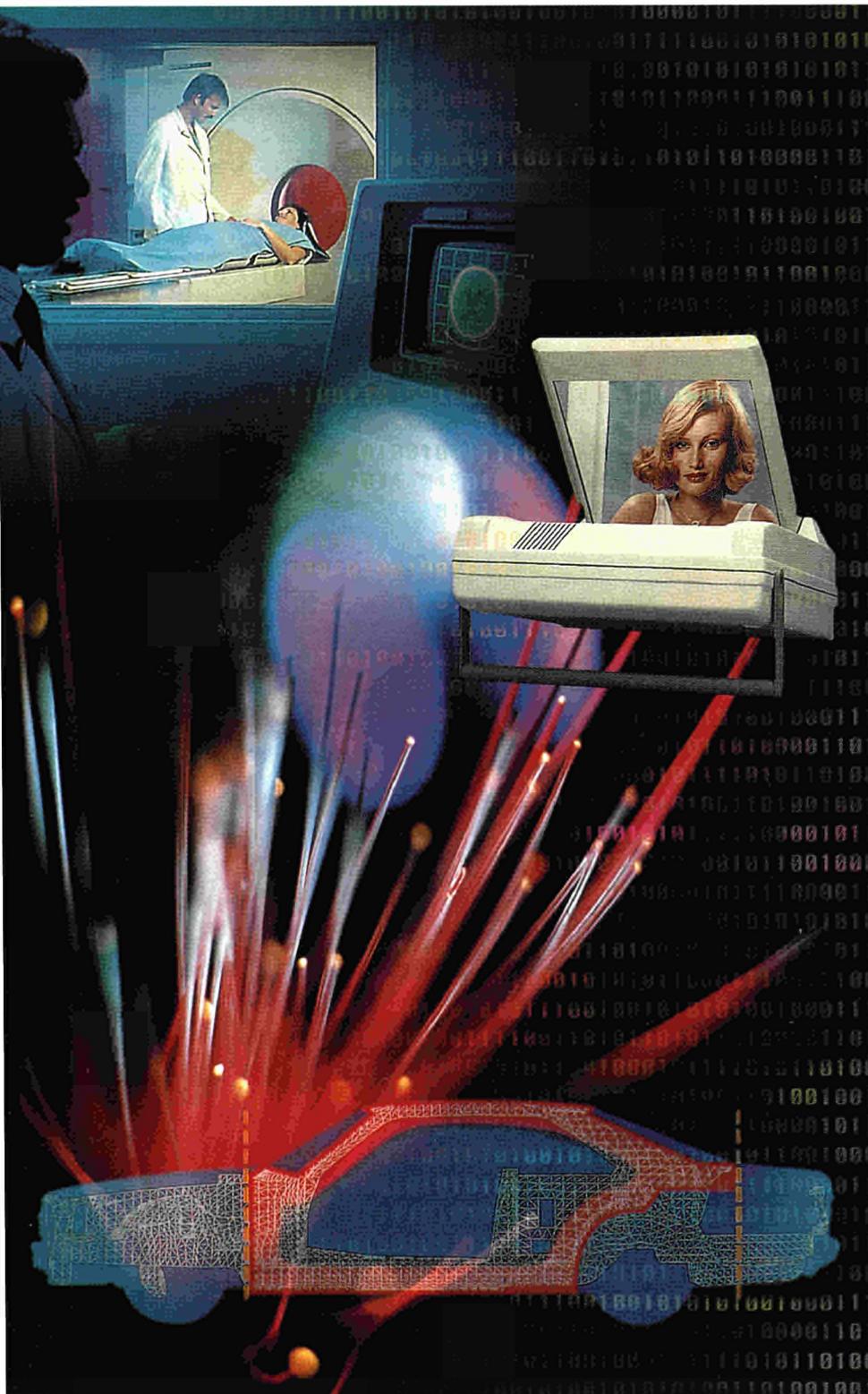
THIS IS THE RESULT of the development of information and communications technologies. Digital technologies, in particular, have made it possible to combine transmission of information, sound, text and images, in a single high-performance system. The dawn of the multimedia world."[1]

Building on the results achieved under the two previous RACE programmes, the new Advanced Communications Technologies and Services research programme (ACTS) aims to be equal to the challenge. If teleworking is to become commonplace, distance learning convenient and administrative tasks faster and more efficient, information highways need to be opened up. The necessary technologies are available and Europe is leading the field. Some of these technologies are more developed than others, but we need to improve, coordinate and above all apply them.

The primary objective of ACTS is to develop advanced communication systems and services which will contribute to Europe's economic development and social cohesion, taking into account the speed of technological advance and the regulatory changes required.

The programme will commit 630 million ecus up to the end of 1998 for a range of measures, mainly under cost-sharing contracts between the European Commission, research centres and companies in a number of Member States. The goal is to build up particularly close cooperation between equipment manufacturers, service providers, network operators and, naturally, the end users of these new means of communication. Feasibility grants may also be available to encourage small and medium-sized enterprises to take part in the programme. Nor, since telecommunications is a global business, is there any point in trying to build a "fortress Europe."

Instead international cooperation will be the order of the day: there will be collaboration with similar American and Japanese programmes, and measures to facilitate the transfer of know-how to the countries of central and eastern Europe and the former Soviet republics. Stimulating economic development in these countries and creating new openings for EU businesses is obviously in line with the programme's goal.

Advanced communications have a crucial part to play in consolidating the single market and improving business competitiveness. Information networks will soon form the nervous system of society. By eventually generating new jobs, they should contribute to balanced economic development. And by reducing the need for physical mobility, telecommunications look set to shift the balance of transport investment, encourage more efficient use of energy and promote environmental protection. The information society has arrived. The question is no longer whether we will be part of it, but how.

Light and speed

Research under the new programme will focus on six main areas: interactive, faster – thanks to optics and broadband networks – more mobile, better integrated, more reliable and higher quality communications. The emphasis will be on promoting new uses, but user access to the networks will also be a priority. The emergence of multimedia services will be an important element of the programme. In the field of television, digital systems will offer not only a better quality, higher-definition image, but will also make it possible to separate programmes and sound channels. This would allow one programme to be broadcast simultaneously in several languages for the viewer to choose from, for instance. A far from negligible advantage in a multilingual Europe... The other innovation is obviously the development of interactive services, with unlimited possibilities ranging from pay-per-view TV to airline reservations and from training programmes to video-conferencing.

With this in mind, work will include developing cost-effective digital technologies for transmitting and receiving images on a range of media, from the big screen to portable receivers. Advanced image compression systems will also be developed for image transmission on band-width limited media. And research will also cover advanced editing and image storage systems for use in three-dimensional video communications and virtual image production. Together, these lines of research should form the basis for the common standards and specifications for the whole of Europe which will produce the economies of scale the European telecommunications and media industries need to remain competitive.

Light is the key to progress on faster data transmission. Attention centres on the establishment of all optical networks throughout Europe by the year 2000. Most of the research in this area will concentrate on the introduction of photonic systems, optical switching, and optical processing and control of signals, with an eye to the next generation of technologies. In the 21st century, quantum optics and non-linear dynamics should pave the way for bandwidths equivalent to as much as one terabit (10^{12}) per second: the equivalent of ten thousand high-definition video signals.

But for the time being, the priority is developing high-speed integrated networks with a bandwidth of several gigabits (10^9), which are crucial for the development of videotelephony, corporate networks and personal services. Research will be in three

Adoption of ACTS

The ACTS programme is the first of the Specific Programmes of the 4th European Framework Programme to be adopted. Following the favourable opinions of the European Parliament in early May 1994 and of the Economic and Social Commities in June, the Council of Research Ministers reached an unanimous political agreement on the programme on 27th June 1994. This was followed by a formal Decision adopting the programme on the same day. The full text of the Decision will be published in the Official Journal.

At the initiative of the European Parliament, the programme will include research into the social impact of advanced communications (particularly on regional planning and the organisation of production and labour) and into the interaction between European citizens and the information infrastructure.
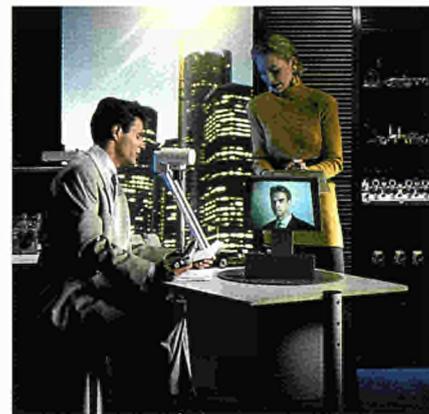
stages. The first involves analysis of user needs, systems planning and study of management and supervision problems. The second will integrate the missing links, in particular through further research into high-speed communications network management, access protocols and congestion control. ATM (asynchronous transfer mode), developed under the RACE programme, will be the starting point here. At the third stage, the networks will then be interconnected in full-scale tests to assess operating conditions, reliability, and flexibility.

Mobility and security

Alongside sheer speed, research is needed into mobility. The mobile communications sector is booming. Eight million Europeans now have a car phone or portable handset, and eight million more use radio paging systems (e.g. beepers) or digital cellular systems such as GSM. The figure is set to reach 40 million by the year 2000, and there will eventually be 200 million consumers with one or other of these devices – more than the present number of conventional telephone subscribers. Soon everyone will want a digital cellular telephone, and if European industry is to retain the lead in the field, work needs to start now on ways of integrating the various networks and services for mobile personal communications.

One area of research will be developments in miniaturisation, with the integration of components in low-power portable transmitter-receivers, alongside the development of cost-effective broadband radio technologies for transmitting and receiving multi-media information. Coding and data compression should enable fully reliable transfer of large volumes of data at speeds equivalent to those of fixed broadband networks. Another concern is naturally data authentication and protection. Voice recognition and smart card systems must be developed to safeguard privacy. Common operating procedures will also be established for access to services, the setting-up of communications and valid invoicing.

The link between network user and designer constitutes a whole new field of research in its own right. What are known as network intelligence and service engineering should not hinder flexible, real-time management of any form of communication. Solutions will have to be found which take account of the needs of all concerned, the development of the market and technological change. The watchword is "ever faster" and, where possible, "ever cheaper." This will require not only a shorter development cycle for services but also further ergonomic research to improve interaction techniques between the user and the services. After all, we may as well make full use of all these new toys...

Clearly, the precondition for all this is a fully effective flow of information. Quality, security and reliability are set to be the key concepts. The aim is data integrity for industry, confidentiality in administrative data processing, and security in financial transfers and the transmission of official documents. How can we guarantee that the information successfully reaches its addressee? Are digital signatures an effective safeguard against unauthorised access? Another problem is that protection mechanisms must not disturb the system. Self-repairing networks and early warning and fault reporting techniques need to be developed. Research under ACTS will take in new architecture of this kind as well, so that using these networks may eventually become as natural to us as switching on a light. ■

Mireille Andries *journalist*

National Hosts for European RTD

The research and technology development actions will be carried out in the context of trials of advanced communications applications on host infrastructures within the Member States. Possible "National Hosts" for co-operative European research are being identified by the national representatives on the ACTS Management Committees. Their characteristics, and opportunities for trials and research they offer, will be specified in the supporting documentation for the call for proposals, which will be published in the Official Journal on 15th September 1994. A major conference for potential participants will take place in Madrid on 19th-20th October 1994.

The Call for Proposals will close on 1st March 1995, and a first part of European funding will be committed to projects in mid-1995.

The Telematics Applications Programme

What is "telematics"? Telematics, the combination of information and communications technologies, is something we come into contact with at every turn. A hospital appointment, a visit to the library, taking a training course, a trip to the supermarket, a bus journey, and even paying your taxes – to give but a few examples – are increasingly likely to involve the transmission of data, sound and images over computer-based networks.

Genesis

Following the success of the pioneering ESPRIT and RACE programmes in promoting a transnational, collaborative approach to developing basic ICT technologies, the Commission was faced with the challenge, at the end of the 1980s, of how to help catalyse their application. It had become apparent that market forces, even in an increasingly deregulated environment, would not by themselves produce, or generate quickly enough, the critical mass needed to attract investment in new networks and services. The creation of a virtuous circle of supply and demand seemed likely to be accelerated if a significant number of telematics applications could be tested and demonstrated.

The Telematics Programme, designed from the outset to be user-driven, was the answer to that challenge. Growing organically from the convergence of several separate lines of activity fostered by the Commission, some of which had previously been the subject of exploratory actions or studies, its first full-scale phase, entitled "Telematics Systems in Areas of General Interest," began under Framework Three. This drew on the very positive outcome of three earlier exploratory actions: AIM, looking at the applications of telematics in health care, DELTA, dealing with flexible and distance learning, and DRIVE, focused largely on road transport. These actions had stemmed from the Commission's wish to follow up the technology-driven approach of RACE and ESPRIT with activities designed to encourage the use of technological innovations, with health, education and transport identified as priorities on social and economic grounds.
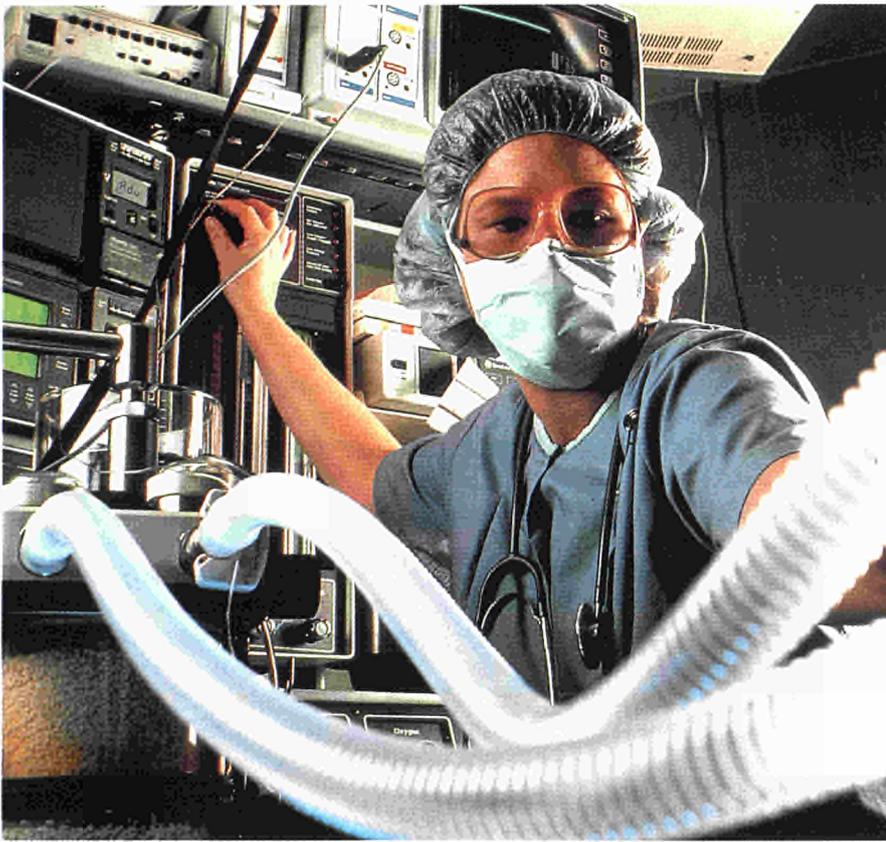
The push to complete the single market led to the addition of electronic data transmission networks interconnecting national and regional administrations as a key component of the first Telematics Programme. The creation of trans-European networks linking administrations was identified as a pre-requisite for the management of the integrated European market and the free movement of goods, services, capital and people.

Telematics for rural areas was included following extensive analyses of the socio-economic prospects for Union's rural population, where the introduction of telematics systems has showed promise in catalysing the provision of new employment opportunities and improved services.

Linguistic research and engineering emerged as part of the Telematics

User information post on trial in Brussels. Installed as part of the PHOEBUS project, the display gives waiting passengers travel information such as the number and destination of the next bus as well as the likely waiting time.

Programme following a long period of research, under the Commission's auspices, into machine translation, and the development of linguistic resources such as multilingual terminology databases and thesauruses, reference grammars for the major languages of the Union, and standards.

The need to manage ever-growing quantities of information and the potential for increasing the availability and accessibility of library holdings and services were powerful inducements for the Programme to encompass the libraries application sector. The programme also took under its wing the Technology Initiative for Disabled and Elderly People, or TIDE, action, launched in 1991 as the culmination of many years' support by the Commission.

Unity in diversity: the involvement of users

Although these application sectors are very diverse, their inclusion in one programme on the assumption that common factors would be identified in developing solutions to the particular issues addressed by each proved to be correct. All share the need for a strong user involvement in order to identify communities of interest and understand customer demands; in each case, systems engineering is the focus for the work, with most of the sectors concerned with systems development and market analysis rather that technology research; and all are concerned with the application of telematics, ie, the application of computing and communications, though the content and balance of the two varies from sector to sector.

Promising results

In 1993, a mid-term review of the programme, conducted by an independent board of industrialists and academics led by Brian Oakley, a director of Logica, recommended a substantial increase in funding based on the extremely promising results already achieved. The review board found that the Programme was succeeding in developing practical applications for the new technologies, noting that:

"...user involvement is not just desirable, it is essential if successful exploitation is to be achieved. This ensures that the work is embedded in the reality of working to a very real market requirement, and not just a hypothetical one. It is this factor that seems to give the whole programme an added lustre, an air of excitement, the feeling of working towards something that is self-evidently very important both for the end-users and for the industries that are involved."

Launching the information society

The Bangemann Group on the Information Society, charged with producing an action plan on how to implement the relevant aspects of the Commission's White Paper on growth, competitiveness and employment, has identified the following as priority sectors: teleworking, distance learning, university and research networks, telematic services for SMEs, road traffic management, air-traffic control, health-care networks, electronic tendering, trans-European public administration networks, and city information highways. The Group's selection, which is highly congruent with the scope of the new Telematics Applications Programme, was made on the basis of how likely candidate initiatives were to develop new applications and markets while also encouraging the creation of new jobs and businesses.

A key focus of the new programme will be integrating validation and demonstration projects on "telematics applications sites" – regions, cities, towns and rural areas that have well-identified needs for applications such as teleworking and teleservices, possess adequate telecommunications, enjoy the clear interest and commitment of potential user-groups (such as schools, transport companies, hospitals, etc), and are backed by the relevant public authorities.

Protecting the environment

When a freighter gets into trouble at sea, the search and rescue (SAR) centres involved, often based in several countries, need to have all available information about its cargo. This can be very difficult to obtain when, as is commonplace, different data formats are used in the record systems employed by each national authority, and the systems themselves are not linked or coordinated. In 1992 nine EU countries began participating in the EWTIS project on setting up an information network between European ports. The central database holds details of each vessel and its route and information about any hazardous cargo items. A contact point is given for further cargo details. Eight port authorities, nine SAR organisations and several shipping lines have been involved.

Better information for passengers on public transport

Many projects are working on improvements to passenger information systems. The EUROBUS project has been developing advanced computer aids for incorporation in street-sited terminals and information desks as part of a comprehensive system covering driver scheduling, passenger information, vehicle monitoring and fare collection. Prototypes have been tested in Madrid, Marseille and Thessaloniki.

Better treatment for diabetics

With Europe's citizens on the move more widely and more often, patient records need to be quickly transferable and readily understood anywhere in the Union. The DIABCARD project has brought together hospitals, medical research institutes and IT companies to develop a smart-card-based medical information system designed to improve the care of people with chronic diseases. The project has focused on diabetes, affecting about 20 million people in the Union. The treatment of diabetics is shared by general practitioners, hospitals, and the patients themselves at home. DIABCARD examined how treatment could be improved by developing a portable medical record for transferring essential data between these locales.

European Open University

Building on the success of open universities in a number of European countries, the JANUS project, directed by the UK Open University, aims to build a prototype of the telematics network that will be needed by the anticipated European Open University of the future. The partners include the European Association of Distance-Teaching Universities (EADTU), open universities, and IT and communications companies. Already nearly 50 "Euro-Study Centres" in 15 countries are using telematics for training. Over the next five years the network will be extended to cover 150 university-level institutions and a targeted 875 study centres.

Libraries link-up

The ION project has achieved the first implementation of the ISO standards for the Interlibrary Lending (ILL) protocol, interconnecting libraries in France, the UK and the Netherlands for interlibrary lending and online enquiries.

The new Telematics Applications Programme

A broader programme	
Third Framework Programme *(1991-1994)*	Fourth Framework Programme *(1994-1998)*
7 sectors	12 sectors
425.7 Mecu	843 Mecu
over 3 years	*over 4 years*

The new programme has a considerably wider scope and has shifted its focus from data to multimedia telematics, in line with technological advances and the development of new markets and user expectations. As well as playing its part in maintaining and increasing the competitiveness of European industry in both Union and global markets – the primary objective of the Union's industrial policy – the programme aims to support other elements of EU policy: the creation of new jobs, promoting new forms of work organisation, improving the quality of life and the quality of the environment, and improving the efficiency and cost-effectiveness of public services. With this in mind, twelve sectors will be covered, grouped as follows:

■ **telematics for services of public interest**, covering transport and administrations;

■ **telematics for knowledge**, covering researchers, libraries, and education and training;

■ **telematics for improving employment and quality of life**, covering urban and rural areas, health care, the elderly and disabled, and the environment;

■ **horizontal RTD**, involving telematics engineering, language engineering and information engineering.

Whether a telematic application is successful or not depends on several factors common to any sector, such as being able to employ your own mother-tongue when using a service, finding your way round a database easily, and encountering a well-designed user interface. It is precisely to tackle these types of issue that the programme also covers horizontal research and development in the techniques that can be used to develop successful telematics applications as efficiently as possible – **telematics engineering**; addresses how language-processing techniques can be incorporated into telematics applications to make them easier to use and more accessible – **language engineering**; and is working on improving electronic retrieval, dissemination and publishing techniques – **information engineering**.

Implementation

Turning to implementation, the new Telematics Applications Programme will pay even greater attention to the views of users and of those with responsibility for specifying, commissioning, funding and achieving the use of the systems that derive from the projects. It will be less driven by technological developments (though the burgeoning of multimedia applications will be reflected in a swing away from data telematics). The starting-point for all R&D work will be an analysis of user needs and market research studies, and users will be associated at each stage of a project's life, from initial planning right through to technical validation in a real-life environment. Validation itself will receive a greater priority, and more emphasis will be placed on publicising and disseminating the results of the programme, including standards, procurement recommendations, and "best practice" guidelines for designing, setting up and running telematics-based systems. The common factors, or generic content, of telematics applications will be maximised whenever possible, with the aim of building up a body of tools and techniques that can be re-used and economically deployed in a variety of sectors. With the programme concentrating its resources on fewer projects, priority will be given to those that are likely to produce generic results of this nature.

SMEs

The first Telematics Programme has an excellent record in terms of SME participation, with SMEs representing some 50% of the companies involved (though this is an average figure spanning a wide range – 29% to 63% – depending on the sector). In the case of TIDE, participation reached 75%. Measures for stimulating the use of telematics technology will be implemented to encourage and facilitate the wider participation of SMEs in those sectors where they are poorly represented at present; these will include feasibility study awards. ■

Stephen Rogers *DG XIII*

Why Europe needs to revalue through innovation

A CHARACTERISTIC HUMAN NEED is to improve ourselves. We learn, we buy new clothes, we renovate our homes and seek new experiences.

Why should we not think of our industries as the same? We can see the benefits for ourselves of new training: we have a better sense of worth, competence and earning potential. We also have a better sense of purpose.

We live in a competitive world. If we do not revalue and optimise our own worth and capacity, we stagnate. Others leave us behind.

Our continent is rich in invention and has a depth of culture unsurpassed in the world. Europe has itself been the research laboratory and often the manufacturing plant that has changed the face of the world. While this potential has often been dissipated in fratricidal war, the true capacity of the European economy and culture can now be expressed in the collaborative process of the European Community.

What the European Commission's White Paper on Growth, Competitiveness and Employment says.
Four overriding objectives must be pursued jointly by industries and the authorities if the Community's industrial competitiveness is to generate the highest level of employment:

■ Helping European firms to adapt to the new globalised and inter-dependent competitive situation.
■ Exploiting the competitive advantages associated with the gradual shift to a knowledge-based economy.
■ Promoting a sustainable development of industry.
■ Reducing the time-lag between the pace of change in supply and the corresponding adjustments in demand.

That is one reason why the Treaty establishing the European Union provided a new legal basis for the improvement of our industrial and scientific culture by fostering innovation, research and technological development.

"The Community shall carry out dissemination and optimisation activities in Community research, technological development and demonstration, complementing those carried out in the Member States." (Article 130 G C of the Maastricht Treaty).

The importance is underlined by Mr Giulio Cesare Grata, the new Director at DG XIII-D, responsible for innovation:

"Our purpose is to help the optimisation process for European Community's industry and research. We want to encourage best practice and best use of technology to support sound and forward-looking competitive industries and increased employment."

With its networks of industries, research centres and venture capitalists, the Community innovation directorate can provide the point of contact for organisations wanting to add value to Europe's industries. It can also help interpret the language of the research community in terms understood by industry and finance and vice versa.

The new emphasis is reflected in the Fourth Framework Programme, the budgetary and policy envelope for the Community's research and technological development (RTD) activities.

"For the first time in the Treaty and the Fourth Framework Programme, the process of optimising industry through the dissemination and exploitation of research results has been formalised in a set of complementary programmes with a stable budget," says Mr Grata.

Each of the specific programmes, in various fields as diverse as biology, energy and information technology, will devote about one per cent of its budget to the dissemination and exploitation of the results. Furthermore, a central action aims to coordinate these and provide synergy with national research centres and innovation infrastructures. The amount of money mobilised in this dissemination process now amounts to 400 million ecu during the four years of the Framework Programme. Some 300 million ecu comes from the central action and 100 million ecu is provided by specific programmes.

The new action combines the former programmes VALUE, aimed at the exploitation and dissemination of research results, and SPRINT which provides support to the innovation networks as varied as national and regional research centres, science parks, information brokers and venture capitalists.

The directorate sees the need for a proactive approach to encourage the use of new technologies and technology transplants in older industries. Mr Grata sets out three broad objectives:

1. Raising awareness: Europe needs to promote a culture open to innovation that will absorb new technologies more easily. Part of this is awareness but it is also a matter of creating curiosity.

2. Removing barriers: Europe needs to continue to improve the environment for innovation by removing barriers between firms, research centres, Member States and markets.

3. Demonstrating benefits: transfer of technology can be promoted through the demonstration of specific cases of innovation which show added value, cash flow and performance improvements.

The team in Luxembourg cannot, and has no intention of trying to provide all the answers to innovation in Europe. Only a minute percentage of research is done through Community research programmes. However, EC programmes have provided a new impulsion to collaboration across Europe, an effect that can be recognised through increased cross-company mergers, collaboration and agreements. It has earned its position as a focus of European research collaboration.

With its networks of industries, research centres and venture capitalists, the Community innovation directorate can provide the point of contact for organisations wanting to add value to Europe's industries. It can also help interpret the language of the research community in terms understood by industry and finance and vice versa.

"We aim to provide a clearing house system to the Union, to industries, research centres, end users, and customers to tell them where to go for help. This is the address," says Mr Grata.

New innovation mechanisms

Small and medium sized enterprises (SMEs) are the key to European growth and employment, says Jean-Noël Durvy, responsible for the Commission unit for strategic aspects of innovation and exploitation of RTD and intellectual property.

The Fourth Framework Programme attempts to integrate the previous VALUE and SPRINT programmes and draw on all organisations in Member States which can actively help them. It also foresees collaboration mechanisms to the new democracies in Central and Eastern Europe, the European Economic

Area and other third countries. The work plan to be released later this year should confirm the main thrust of activities as:

■ Dissemination activities, for example through the multi-media activities of CORDIS, the research information service.

■ Review of the effectiveness and strengthening of the innovation multipliers such as Value Relay Centres and other networks, scientific journalists and liaison groupings helping small and medium-sized enterprises and other industries.

■ Demonstration projects to encourage key research results.

■ Specific support to SMEs, in particular in conjunction with national and regional programmes.

■ Protection of know-how, identification of future markets, promotion and training.

■ Assistance and advice on the 'how' of technology transfer, including measures fostering financial investment and technological implants.

A stronger interaction will take place between Community services dealing with SMEs, regions and third countries and other programmes such as COST and Eureka.

The burgeoning interest in innovation is shown by the response to calls for proposals within the VALUE programme. Between 1993 and 1994, the number of proposals received increased nearly fourfold from 84 to about 310. But the available budget covered only 6 per cent of these proposals in the last programme.

Most of the projects (52 percent) relate to information and telecommunications technologies. This is scarcely surprising at a.time when a television has embedded software equivalent to what used to be the size of an industrial computer. Use of embedded software is increasing rapidly in everyday objects like electric shavers and vacuum cleaners.

Other areas of high interest are new materials (24 per cent), life sciences (14 per cent) and energy (6 per cent).

Customer needs

Innovation can only happen when information on available technologies, know-how and industrial capabilities is widely circulated.

Mr Mario Bellardinelli, responsible for diffusion research information through CORDIS and EuroAbstracts, sees a wide variety of customers for European research results.

"Our public includes industry for the exploitation of research results, research centres, intermediaries and technology brokers, documentation centres and libraries. They all need accurate, pertinent and fresh information. But different groups have also different requirements and quite often there is a need for customised services and products."

Innovation, like any other industry, requires constant review. Technology is there to help us solve problems. But what problems? Innovation without social participation becomes a blind technology-push that will fail in the market place.

Communication with the public is becoming essential. People need to know what the technical options are, how research can solve social problems. Today they are rather sceptical and negative.

The Fourth Framework Programme programme will therefore draw on socio-economic information to help define our future needs. Important trends can be established from the programme's Research/Society Interface. For example, environmental concerns predominate among the younger generation. One study based on four cities in the Netherlands, France, Greece and the UK has as theme the "sustainable city."

The Luxembourg directorate will be able to draw on research that assesses social impact of innovation, sets up a line of communication with the public and analyses public demand. ■

David J H Price *journalist*

The information technology market in Europe

The second edition of the European Information Technology Observatory (EITO) report was published in March 1994. EITO'94 has been produced with the support of DGIII in collaboration with Eurobit and the major European IT trade fairs (CeBIT Hanover, SIMO Madrid and SMAU Milan). Its objective is to provide a comprehensive overview of the European ICT industry. To this effect, EITO publishes annually an extensive report on the ICT market, including some in-depth studies concerning themes particularly relevant to the sector. A permanent committee, the EITO Task Force, has been created to carry out the work of the annual publication. This is composed of experts representing the major IT companies, the European associations, the EC and the most important European IT trade fairs.

The main features of the EITO grouping are first that the studies carried out in the report are checked direct by company experts and provide the industry's view on market trends; second, the EITO working groups are an important means of information exchange with industry and contribute to improving the dialogue between public authorities and the private sector.

The report represents the most comprehensive data, analysis and forecasts on Information and Communications Technologies (ICT) in Europe: its industry, ICT use and special European features. The EITO'94 report includes statistics and studies on the ICT market, on mobile computing and communications, on the use of IT in public administrations, on the key technological trends, on the software and services market and a monograph on market developments in Central and Eastern Europe.

The main results of the study on ICT market carried out in the EITO'94 report are as follows.
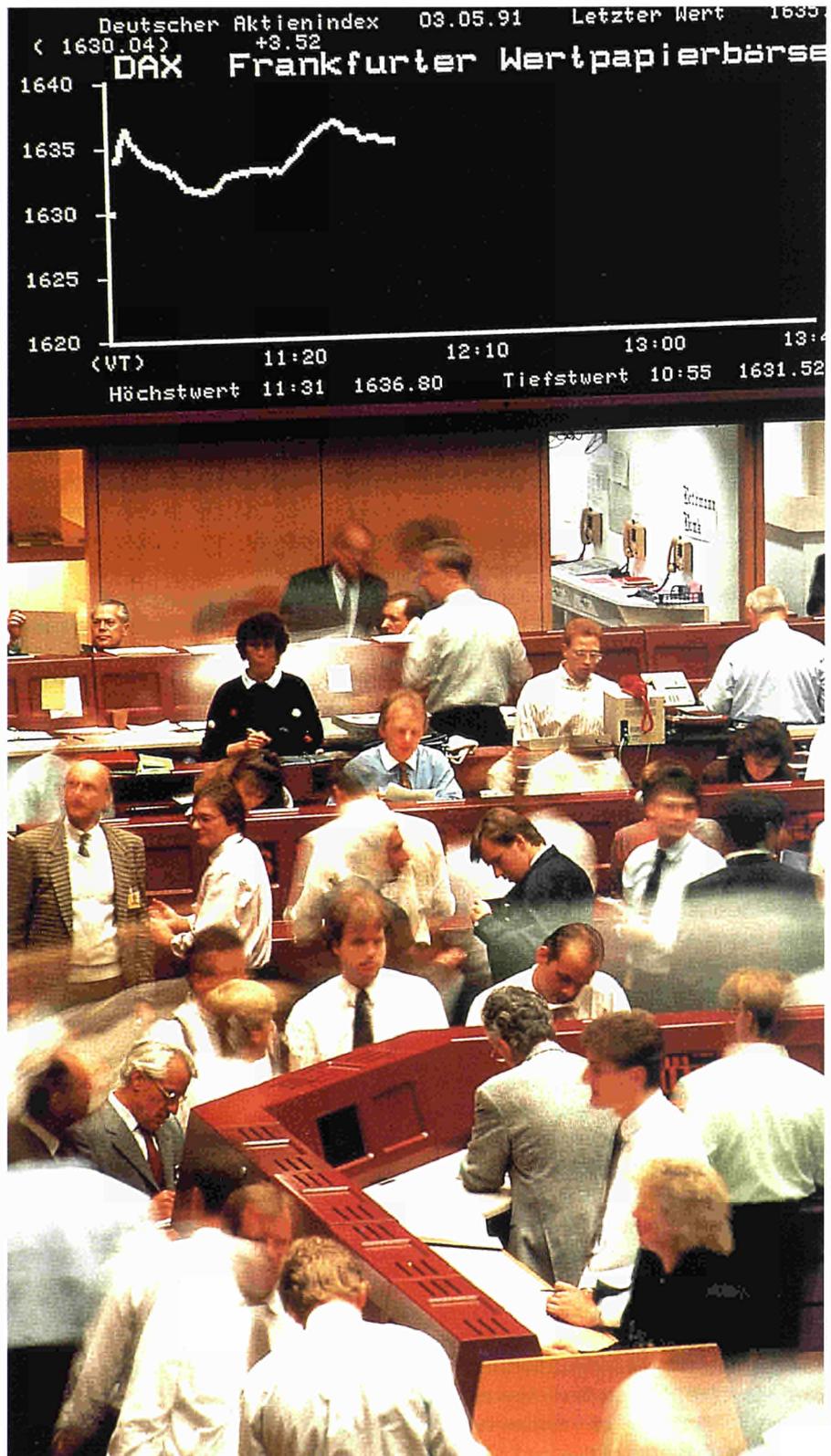
ICT market trends

1993 was a key year for the European Information and Communications technology industry, for the following main reasons:
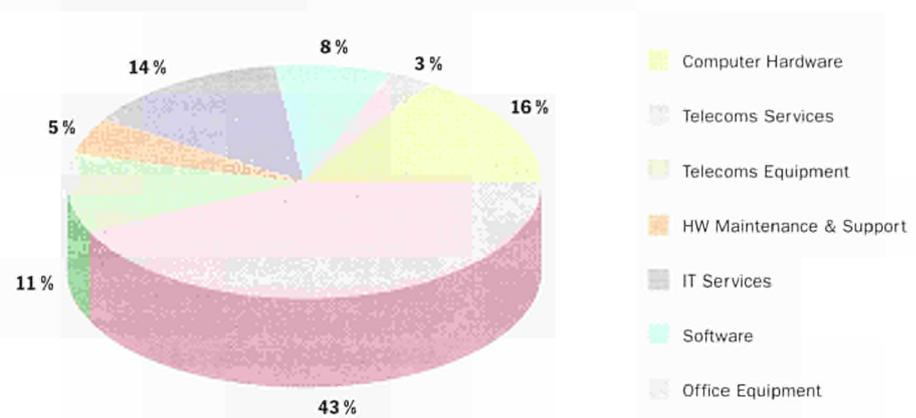
■ The worsening situation of the industry and the market crisis. Market trends and corporate results confirm that 1993 was the worst year in the history of information technology in Europe.

■ There are growing signs that a new ICT industry and market growth cycle is slowly beginning, from a strong new basis. The convergence between information technology and tele-communications is the new trend which will be creating new markets and new applications. This trend has already pushed companies to enter alliances and mergers. Telecoms infrastructure constitutes an essential element for a successful penetration of many new products, services and applications.

■ The ICT industry itself is adapting to these changes. Computer companies have thoroughly restructured their production and distribution organisations to be in line with the new market conditions: mass distribution, low margins, and price competition. This encouraged the ICT industry to concentrate on high-value applications and solutions to re-establish conditions of higher profitability.

■ The industry model based on vertically integrated companies that used to design and build their proprietary hardware, software and communications architectures, has been replaced by a model where vertical integration is the result of complex alliances between companies. Players have moved gradually to concentrating on specific segments of the value chain.

Chart 1: Western European ICT Market by Product, 1993
Total value = 262 Billion ECU

- Computer Hardware
- Telecoms Services
- Telecoms Equipment
- HW Maintenance & Support
- IT Services
- Software
- Office Equipment

## ICT market size by regional area

In 1993, the European ICT market was worth 262 billion ECUs. Of this, 121 billion came from core information technology categories – office equipment, electronic data processing equipment, software, professional services, processing services, network services, hardware maintenance and support. Telecommunication equipment and services represented 141 billion ECUs, 54% of the world ICT market. With recession freezing growth, the weight of Europe's ICT market within the worldwide ICT total has fallen slightly. In 1993 western Europe (EU plus EFTA) accounted for 34% of the total world market, against 37% for the USA and 16% for Japan.

Five consecutive years of a falling market together with unfavourable currency variations reduced the European ICT market size compared in homogeneous currencies to the other world-wide regions, with the exception of Japan. By contrast the ICT markets of the US and the "Four Tigers" (South Korea, Taiwan, Hong Kong, Singapore) continued to gain a share of the world-wide market.

The US IT market recovery shines in contrast to other developed economies. In 1993 the US IT market grew by 7%

and by 6.7% if telecommunications (hardware and services) are included. The combined Four Tigers ICT markets continued to be among the fastest growing markets in the world, and due to the relatively low rate of penetration of ICT technologies, potential for market growth in this area remains strong in the long-term. The Japanese share of the world ICT market decreased. Following 1992's sharp fall in the domestic IT business, 1993 still reported a negative growth rate (- 3.8%), due to persistent economic recession and price erosion.

Chart 2: World-wide ICT Market by Region, 1993
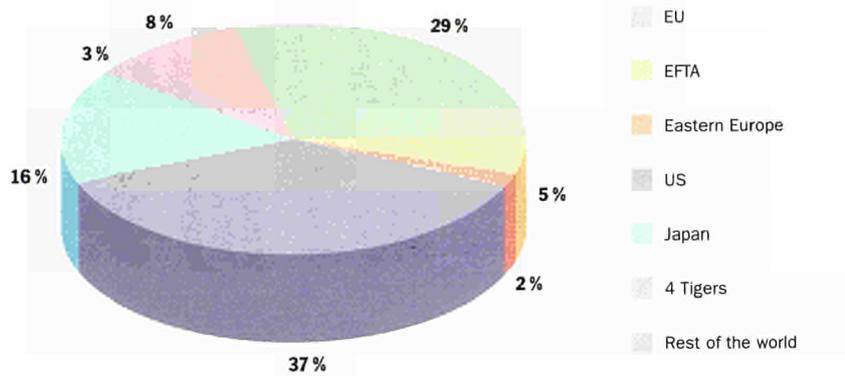
- EU
- EFTA
- Eastern Europe
- US
- Japan
- 4 Tigers
- Rest of the world

29%
8%
3%
16%
5%
2%
37%

Some of the major factors which have driven the ICT industry in the last year will continue to have a strong impact on future market developments: reduction of unit prices; technological development that will continue to drive the industry towards more affordable products and services; mass production and commoditisation.

IT markets in Europe

When the 1993 European IT market of 121 billion ECU is broken down into the main country markets, it can be seen that Germany is by far the largest one accounting for 24% of the total; the French and the UK markets are the same size (17%), and are followed by Italy (11%) and Spain (5%).

After recording annual growth rates of up to 15% for most of the 80s, the IT market expanded by only 2.5% in 1992 and 2% in 1993. In 1992, UK and Germany lead European IT growth, while Italy, France and Spain held the market back. In 1993, good news came only from the UK, among the top five countries. Tough times continued in the other major European countries. .

The outlook for 1994 is not too bright, although the crisis seems to have bottomed out. It is expected that, as Europe gradually comes out of the recession, the 1994 growth rate will be about 3.6%, rising to slightly over 4% in 1995.

Different growth rates

In Europe the expected growth will be the result of different growth rates in the various segments of the industry:

■ Hardware revenues declined by – 2.4% last year. Moderate growth is expected for 1994, from a combination of high growth for workstations, portable and desk-top PC and decline in mainframe sales.

■ Software products, both system software and application software, are among the strongest drivers of European IT market growth. The IT market grew by 7% in 1993 and is set to follow the same rate in the short-term.

■ IT services are another high-growth opportunity for European suppliers with a plus of 6% in 1993 and 1994. Notably bright spots are professional services and network services.

■ The telecoms sector will show higher growth rate than the IT sector; fastest growing segments will be voice network services and data network services, expected to grow about 8% between 1993 and 1995. In comparison to the IT hardware market, the European market for telecommunications reported a remarkable growth of 6.2% in 1993.

IT consumption and market concentration

The national IT markets of Europe have followed different patterns of development. Between 1982 and 1992 the Scandinavian countries led Europe in IT adoption. These countries have seen the level of IT penetration (the ratio between the value of IT expenditure and the value of GDP) almost tripled reaching ratios around of 2.6%. Germany, France and the UK have mostly doubled their level of IT penetration, reaching ratios between 1.9% and 2.4%. The countries in which IT penetration was less than 1% in 1992 (Italy, Spain, Portugal and Ireland) have also reported big increases, and their IT penetration ratios have risen between 1.2% and 1.7%.

Market structure too has changed radically in the past decade. The share of IT expenditure won by software and services has gradually overtaken hardware share. The latter decreased from over 50% of the total IT market at the end of the 80s to around 40%. The

Western European IT Market by Country, 1993

Legend:
- Germany — 24 %
- France — 17 %
- UK — 17 %
- Italy — 11 %
- Spain — 5 %
- Other EU — 12 %
- EFTA — 14 %
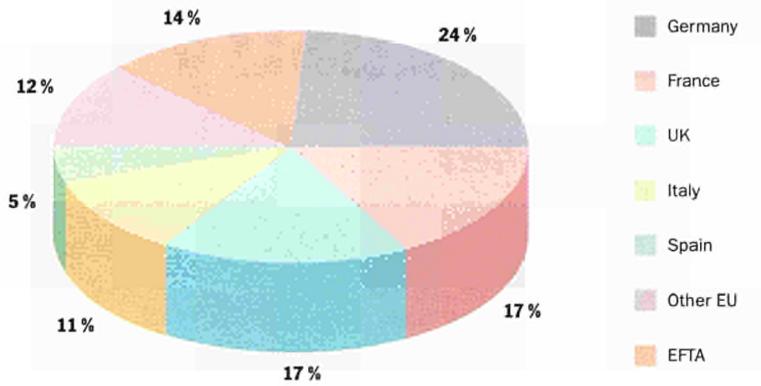
evidence suggests that users have become more aware and tend to spend more on applications and on services to increase the utility of their installed investments.

Concentration on the IT market has decreased significantly over the last decade. The top five vendors, who held more than 50% of the market in 1982, took only 1/3 in 1992. Many IT leaders have changed their business models under the pressure of the price wars, technology downsizing and lower growth rates. On the user side, recession and pressure to improve co-ordination of internal resources have pushed IT users towards outsourcing and system integration.

Major market drivers

Over time the relationship between the growth of European ICT market and the growth of the European economies have become closer. For the last three years, the ICT business grew more slowly than the economy. ICT and economic growth rates are converging for two reasons: the IT business gets bigger and therefore its growth is slowing, and economic downturn has frozen users' plans to invest.

Some of the major factors which have driven the ICT industry in the last year will continue to have a strong impact on future market developments: reduction of unit prices; technological development that will continue to drive the industry towards more affordable products and services; mass production and commoditisation. It may be questioned how long this trend will continue to impact most standard products such as PCs, but it is clear that other products such as workstations and software applications may have price reductions in the coming years similar to those experienced in the past for PCs.

On the demand side, new ICT applications will bring further benefits to the traditional business user. Even more important, a new breed of ICT customer is arriving: the home-based personal customer. They will require innovative technologies and services to satisfy both business and entertainment needs. On the supply side, everyone – from telecommunications and information technologies companies to cable, media and entertainment – is rushing to combine business endeavours. Leading companies in these sectors believe this convergence movement is the 90s' major growth opportunity. ■
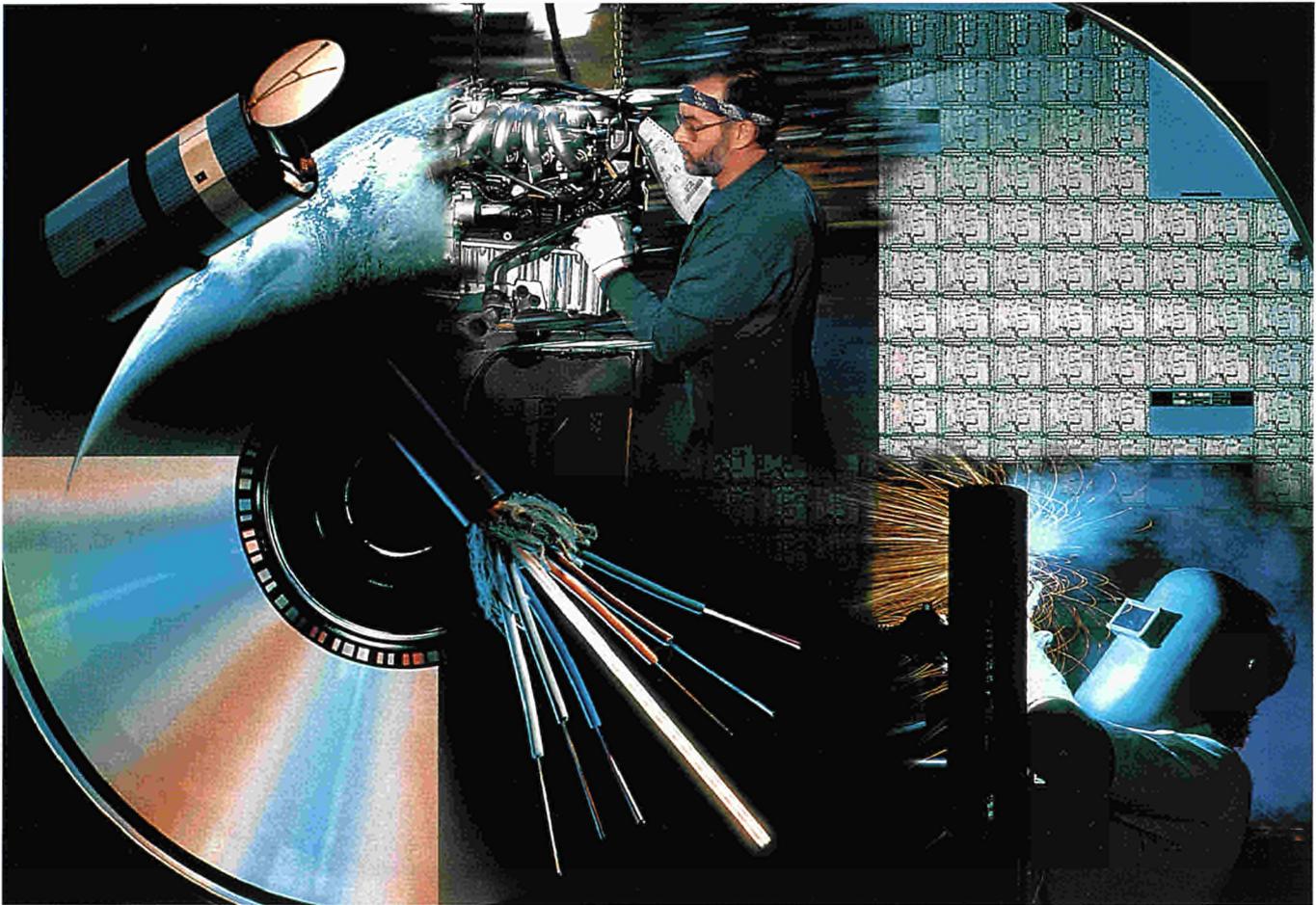
Ivo Locatelli *DG III*

Western European IT Market Annual Growth, 1988-95

Year	Growth
1988/89	14.2
1989/90	8.9
1990/91	4.3
1991/92	2.5
1992/93	2.0
1993/94	3.6
1994/95	4.2
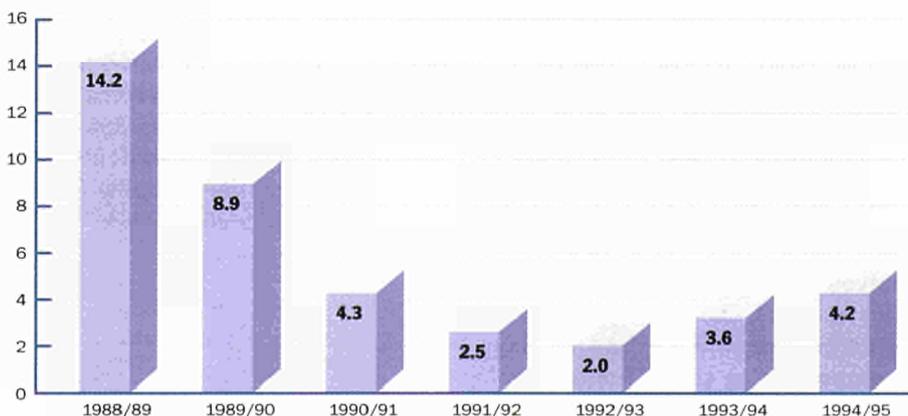
Panorama of EU Industry

1994 edition published

THE 1994 EDITION of the *Panorama of EU Industry*, which is now available, gives its readers an overall picture of the present position of European industry. The publication provides an overview of the main factors affecting the activity of almost 200 manufacturing and service sectors. Several "horizontal" issues (which are relevant for a number of different sectors) are discussed in the first part of the book. These cover a wide spectrum of subjects such as:

■ an analysis of recent patterns in strategic alliances

■ the investment strategies of EU firms in non-European countries

■ employment and structural change in the EU

■ the economic importance of total quality management

■ a review of the eco-industries in the EU.

The book was prepared during the second half of 1993, in the midst of the most severe recession to hit European economies since the oil crisis of the 1970s. Output suffered its biggest decline for nearly 20 years, and profits fell almost everywhere in Europe, while unemployment continued to increase, reaching 10.6% of the labour force in the EU-12, compared to 8.8% in 1991. Ireland and Spain presently report the worst employment situations, with their 1993 unemployment rates at 18.4% and 21.2% respectively. In 1994 it is expected that a timid recovery will eventually take place. However, the effects of the currency turmoil of 1993 combined with competitiveness problems and political uncertainty in some Member States still cast a shadow over the future of the EU economy.

Some important pending issues were resolved during 1993, the combined effect of which should help pave the way for positive economic and political developments in the EU and internationally. These included:

■ at the political level, the ratification of the Maastricht Treaty by all Member States;

■ at trade level, the positive conclusion of the GATT Uruguay Round and the decision to create a new institution intended to regulate trade issues (WTO);

■ at the exchange rate level, the widening of the ERM bands and the creation of the European Monetary Institute.

1994 will be a year of transition, as the European economies gradually move from recession to recovery. To complete the global picture, recession is also looming in Japan, while the USA are entering their third consecutive year of (slow) growth. In 1994, the Commission services expect GDP growth of 1.3% in the European Union, followed by 2.1% in 1995.

The second part of the publication analyses the position of over 190 individual sectors. Each sector is examined under a series of headings including the industry structure, market forces, recent trends in demand, production and trade, international comparisons, employment, regulatory framework, environment and future outlook.

Performance of EU Industry

A ranking of 76 industrial sectors of European industry on the basis of the average annual growth of production over the 1986-92 period is produced in chart form and reveals that:

■ the large majority of investment goods sectors (with the notable exception of medical and surgical equipment, telecommunications equipment and computer and office equipment) experienced slow growth over the period considered.

■ On the other hand, most of the intermediate goods producing sectors rank amongst the medium to strong growth sectors from 1986 to 1992, the best ranked sectors being rubber and plastics processing and the secondary transformation of metals.

■ Consumer goods sectors are more evenly distributed with the fast growing segment of pharmaceuticals taking first place.

The weakness of the EU investment goods producing sectors is continuing, therefore, and is a main concern for public authorities as these sectors represent a sizeable share of the Union's trade of high added value goods.

Most of the sectors enjoying strong growth are high technology sectors which have been characterised by increasing demand at world level within the last few years. At the other end of the spectrum, many of the sectors which recorded the slowest and sometimes negative growth during the 1986-92 period are consumer goods producing sectors. The stalemate in production reflects either changes in consumer tastes (e.g. furs and fur goods, all sorts of alcoholic drinks, tobacco products) or the take-over of large market shares by foreign competitors (e.g. musical instruments, clocks and watches, toys and sports goods) to the detriment of EU producers.

Among the eight sectors which experienced fastest growth (i.e. above 5%) during the 1986-92 period, two, pharmaceuticals and medical and surgical equipment, are strictly linked to the rapid rise in demand for health services. Another two, telecommunications equipment and computer and office equipment, have profited from buoyant demand for industrial services and the drive towards "electronification." A further three, rubber, plastics and secondary transformation of metals, owe their growth to the rapid expansion of the transport equipment sector during the period considered. Finally, growth in the soft drinks and mineral waters sector has to be interpreted in the light of the above-mentioned changes in consumer preferences.

Another chart ranks 65 industrial sectors in the EU by the number of employees. According to the figures presented, electrical and electronic engineering, food, drink and tobacco, mechanical engineering and metal products are the largest employers, followed by the motor vehicles industry. The variation in employment for the period 1987-92 is also shown for each sector. Although productivity growth

Telecommunications equipment and computer and office equipment have profited from buoyant demand for industrial services and the drive towards "electronification."

has not been homogeneous throughout industry, most of the sectors in which the largest cuts in employment have taken place over the period are the same which experienced low or negative growth during the past five years.

The analysis of the performance of the EU industry over the 1986-92 period also examines the relative change of the EU's net trade position with the rest of the world. The result points on the one hand to a deterioration of the net trade position of the EU vis-à-vis the rest of the world, hence a loss of competitiveness, while on the other hand it suggests that there was an improvement of the competitive position of EU producers on world markets. Taking into account only the sectors which have a high degree of export intensity, the analysis shows that over the reference period the two sectors which had their competitive position most negatively affected were cycles and motorcycles and motor vehicles parts and components, while the sectors which marginally improved their relative trade position over the same period were shipbuilding, textile machinery and the food, drink, tobacco industry.

One of the most notable consequences of the need to further enhance competitiveness in order to maintain and enlarge market share in an increasingly competitive world environment has been the recent upward trend in alliance formation. As the horizontal chapter on strategic alliances in the first part of the book indicates, this surge in alliances can be explained by three main factors:

■ companies are no longer able to lead in all areas of their activities;

■ there is less capital available for acquisitions;

■ already high concentration makes acquisitions very expensive.

Among the sectors which enjoyed the strongest trade creation effect over the 1986-92 period, (i.e. sectors which experienced growth in both their export intensity and in the rate of import

penetration), are a number of transport equipment industries such as aerospace equipment, railway rolling stock and shipbuilding. To a large extent, the trade creation in these sectors reflects the increased specialisation of production across producers located in different regions of the world, combined with the Single Market motivated transformation of national champions into truly European producers. Another homogeneous grouping is formed by the electrical and electronic engineering, and the subsectors of computer and office equipment and domestic electrical appliances, again sectors where technology is key to competitiveness and where massive R&D costs can only be covered through specialisation on a limited number of standardised items, each of which can then be sold on a large end-market.

The difficulties experienced by the EU producers in these technology intensive market segments are illustrated by the fact that for most of the sectors in question, the rise in export intensity has been offset or exceeded by the increase in import penetration (with the notable exception of the European shipbuilding industry, which has completed its restructuring and is now specialising in a limited number of market segments in which its technological leadership is well recognised).

The industrial sector which most enjoyed rising export intensity along with declining import penetration was the food, drink and tobacco sector, which has turned away somewhat from extra-EU imports in favour of increasing intra-EC trade.

The sawing and first–processing of wood sector experienced both export intensity and import penetration decrease during the 1986-92 period. The main reason behind this situation is an increase in intra-EC trade.

A number of sectors suffered from increasing competition, both at home and abroad, with decreasing export intensity and growing import penetration. Some large sectors such as chemicals, mechanical engineering and rubber and plastics are included in this group. However, the reasons behind this negative result can be very varied ranging from unfavourable cost structure vis-à-vis foreign competitors (e.g. footwear and clothing, motor vehicles), to unfavourable exchange rate developments and problems of over capacity (e.g. chemicals). It is interesting to note that two transport equipment sectors (motor vehicles and parts, cycles and motorcycles) are contained in this grouping. However, whereas the cycles and motorcycles industry is clearly facing a loss of competitiveness both at home and abroad, the automotive industry's problem chiefly reflects a loss in market share of EU producers on foreign markets, as the rise in import penetration within the EU has been somewhat contained through trade agreements and inward investment of foreign producers within the domestic market.

The EU and industry response

At the end of 1993, the EU responded to the challenges ahead with the issue of the Commission's White Paper on Growth, Competitiveness and Employment, which presents an analysis of the economic situation in the Union and outlines a medium-term strategy for growth, competitiveness and employment. The broad guidelines which were adopted by the Council on December 22, 1993 effectively translate some of the actions suggested in the White Paper into operational policy recommendations.

Starting from the observation that the EU's competitive position with respect to Japan or the US has deteriorated on many fronts, the White Paper sets forth a series of structural recommendations which can be grouped under four major themes:
■ macroeconomic policies
■ competition/industrial/enterprise policy
■ employment/labour market policies
■ trans-European networks.

On the macroeconomic policy front, the White Paper sets a macroeconomic reference framework to be implemented in two stages. The first stage aims to pull the EU out of recession, while the second aims at achieving greater stability as well as long-term macroeconomic and monetary convergence. The medium-term economic policy objective is to foster investment-led growth through measures permitting increases in

investment profitability and contributing to improving business confidence. A careful balancing of competition policy in order to encourage co-operation between firms, while ensuring that a healthy competitive climate is maintained, will also have a positive effect on investment, in particular in R&D. The White Paper underlines the importance of SMEs, and outlines a set of measures that would strengthen SMEs and facilitate the start-up of new businesses.

On the employment/labour market policy front, the White Paper endorses many of the conclusions of the study on Employment and Structural Change in EC Industry and Services, which is also the subject of a special horizontal chapter in the first part of the *Panorama*, by stressing the importance of on-going education and training, of enhancing both the internal and external flexibility of the workforce and of adapting national social legislation in order to contribute to a greater mobility of labour.
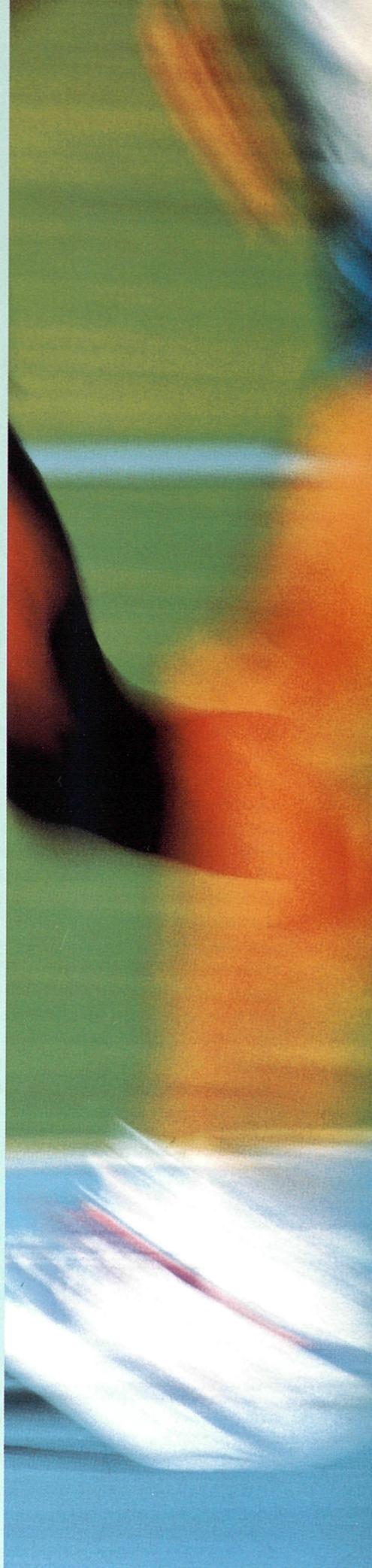
One of the recommendations of the White Paper which received much attention when it was published was the development of pan-European information networks, which are expected to enhance the competitiveness of European businesses by reducing transaction and transport costs and facilitating the exchange of information at all levels.

Some of the policy recommendations that are made can be followed up directly by the Commission, but most are under the direct responsibility of the Member States. The recent industrial philosophy of the European Commission is based on the assumption that the EU's role is to provide a stable operating framework for the industry, within which companies have to do their best to remain competitive. It is important to note, therefore, that the measures proposed by the European Commission will be effective only if European industry acts simultaneously as well. ■

Manuel Santiago *DG III*