XIII

M A G A Z I N E

EUROPEAN COMMUNITY POLICY FOR
INFORMATION TECHNOLOGIES
AND INDUSTRIES
AND TELECOMMUNICATIONS.

A Unified Air Traffic System for Europe?

XIII MAGAZINE

EDITORIAL

With so much work successfully accomplished on the single European market, we might have hoped for a calm countdown in the last 100 days to 1 January 1993. Instead, this has been a turbulent autumn in EC affairs.

For the information technology industry world-wide, 1992 has also been a year of turmoil. Prices of semiconductors and personal computers alike have fallen by half over 12 months. Growth in data-processing and consumer electronics has largely been flat. Restructuring and lay-offs are widespread. It is clear that the IT industry has now entered a period of growth rates far lower than those of the last 20 years or more. And yet the rate at which the technology itself has been advancing during those years is forecast to continue for at least another decade.

This is the background to the 1992 Esprit Conference and Exhibition, organized by DG XIII in Brussels on 23-27 November. Coming as it does shortly before EC heads of state and government meet in Edinburgh for the closing European Council of 1992, this year's Esprit Conference takes place at a vital time for European IT strategy.

It will not be held behind closed doors. Quite the contrary. Perhaps this should be stressed in a year when intense discussion of European Union has highlighted the need for wider public awareness of the key issues confronting the Community. From the start, when the Esprit initiative was presented to the international press corps in Brussels in 1983, DG XIII's conceptual and operational responsibilities for high technology policies and programmes have been accompanied, to the best of our ability, by the information actions needed to explain the issues and generate discussion. *XIII Magazine* is only one example of this information effort.

The centrepiece of the 1992 Esprit Conference, the IT Forum on 26 November, will be held on similar lines to the studio debates familiar from current affairs programmes on television. A panel of distinguished industrial and scientific figures will be open to questions from the conference floor and from the press in a discussion, moderated by a journalist, on the role of R+D in IT, not only in the context of industrial competitivity but in meeting social needs. Leading IT companies will be represented at the highest level on the panel, as will major IT 'user' sectors

such as science (CERN), telecommunications (Telefonica) and medicine (neurosurgery). On the Commission side, the IT Forum will welcome Vice-President Filippo Maria Pandolfi.

The future of concerted EC action in information and communications technology is the underlying issue of this discussion. As a 10-year programme, Esprit is approaching its end and is due to be followed by new initiatives under the Community's fourth Framework Programme for research and technology development (RTD), scheduled to start in 1994.

These proposed initiatives are based on the consensus of many hundreds of IT vendor and user companies, small and large, and of research centres throughout the Community. Intensive independent assessments of EC RTD programmes, including Esprit, have formed part of the input to the forward planning exercise. The essential proposals of the Commission's 1991 paper on the IT and electronics industry were published in this magazine's editorial last July. Since then, European industrial competitiveness has been confirmed as an EC priority by the 12 governments in the Maastricht Treaty text and the Commission has submitted a major communication to the Council and the Parliament on the ensuing implications for research strategy.

The 1992 Esprit Conference will reflect the discussion that has characterized this period of reflection. The conference's many working sessions will be open to anyone interested, as numbers permit. So will the accompanying Esprit exhibition, which is unmatched as a display of industrial prototypes in advanced IT.

Overseas visitors to the exhibition have sometimes been surprised to find a cross-section of the programme's results, of which there are now more than 700, so openly demonstrated. If information technology is to fulfil its potential, however, openness is more than ever necessary. Openness to social as well as commercial needs. Openness to cooperation as well as to competition: an example here is the IMS (intelligent manufacturing systems) initiative, which will bring together IT leaders from Europe, Japan, North America and Australasia in advanced manufacturing technology. R+D is only the antidote to subsidies if it is taken up in the form of products and services people really want, at prices they can afford, on markets that are open world-wide and in conditions that allow innovative IT companies to form

the international alliances which can best ensure their long-term growth.

The IT industry needs the single European market. At the same time, optimizing the beneficial impact of the single market on industrial competitivity requires the Community to play a role in research and technology development that is both increasingly necessary and increasingly complex. At a critical time for the IT industry, and on the threshold of the single market, the 1992 Esprit Conference will be a significant and influential forum for debate on future European cooperation in this key sector. ■

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

Air Traffic Management

Air traffic problems are stacking up over Europe. The EC's ATLAS study is looking into the electronic technology required for a unified European air traffic management system.

DURING THE 1970s and '80s, the opening up of more opportunities to airline operators and the development of second force airlines to link smaller concentrations of population with major international airports created difficulties for the air traffic system in Europe. As delays reached unacceptable levels, the constraints of the limited capacity of the airways and the limited facilities at airports became matters of public concern. These caused national parliaments and the European Parliament to consider the nature of the problems and the possibilities for solutions. Future projections indicate a doubling of traffic every 10 years. The situation is therefore likely to worsen considerably unless corrective measures are applied. Fundamentally, the nature of air travel is different to that experienced by road or rail users. Air travel is entirely operated within a controlled fixed route traffic environment which restricts the routes to be followed, the separation between successive aircraft and the frequency of departures or arrivals at airports. This closely regulated operation is an essential part of aviation safety and is the primary concern of the professional staff responsible for aircraft operations and air traffic control.

In the past, each country has developed its own air traffic control infrastructure in its own way whilst remaining within a universal broad spectrum of utility and service. It is important to recognise that the differences in air traffic systems between individual countries can often create capacity limitations whenever there is a need to move between countries within a single flight journey. Each separate country needs to provide an interface to the wider international world as well as to its immediate neighbours. This increases the need for regulated interface agreements to cover the handing over of aircraft into a safe environment.

Air traffic control has developed in its approach since 1944, when a convention signed in Chicago established international cooperation for the safe and expeditious conduct of all air traffic. This concentrated upon improving air navigation so that aircraft could fly safely along predetermined routes, or "airways". The development of direct two-way radio links between the pilot and a ground-based controller further contributed to safety. The addition of ground-based surveillance, utilising primary and later secondary radar, finally enabled the air traffic controller to detect the relative position of aircraft more accurately and, from this, to regulate traffic to even closer separations.

European perspectives

It is possible to create a realistic picture of the issues shaping the current European situation of air traffic systems and to project forward to around 2000, when traffic volumes will have doubled above those in 1991. Already the north-west European area experiences some of the greatest air traffic density in the world and congestion and delays, particularly in summer months, have become a serious problem which will get worse if effective measures are not applied.

Within the Community there are at least 12 different systems of control, with 42 en route control centres, multiple airports and many aircraft which operate under different performance requirements for speed and altitude. The responsibility for safe performance within this complex environment is shared between two persons, the pilot in the aircraft and the air traffic controller on the ground. Communication between these two key people is effected via a voice communication link.

The record of the national civil aviation authorities with respect to air traffic management has always been extremely high on both counts of safety and expediency. The essential need at present is to prepare a future environment which can cater for expected future demand. The advanced technology to be used for the future systems is to a great extent already available and can in some other areas be developed within the appropriate time frame. Without such systematic preparation there is little doubt that air traffic management will impose severe economic and social penalties throughout the Community and beyond.

The European Parliament carefully considered the nature of this problem in 1988 and concluded that the position for the Community was becoming unacceptable: "the present situation will lead inevitably to a needless fragmentation of airspace, costly duplications of effort, frequent equipment incompatibility and ultimately to increased air traffic costs which would be passed through the airlines to the air traveller." The Parliament was clearly looking to the most likely situation which could prevail by 2000. Furthermore, the traffic limitation problem was not uniquely European. Similar experiences in the United States had indicated the inevitability of the difficulties which would have to be faced in Europe.

The Commission of the European Communities was then instructed to consider the action which could be taken to encourage the development of a single system of air traffic

management for the Community, so that the problems will have been largely eliminated before the end of this decade.

The evaluation of air traffic systems

Consideration of the historical development of air traffic management systems since 1944 indicates that there has been a progressive evolution through three very distinct generations of control systems. Each stage introduced higher levels of technology, particularly in data processing, surveillance and communications. Characteristic of these developments was the continued total reliance on the human interface between pilot and controller as well as the dependence on ground/air communications.

The third or latest generation of air traffic control systems, with secondary surveillance radars to monitor aircraft, large display screens and off-line computer-supported radar data and flight data processing, became a standard configuration in the 1970s.

The level of technology used was generally behind that available to and used by commercial or industrial concerns. The capacity limit was reached in the later 1980s. At this point bottle-necks began to be identified and traffic delays became the symptom of a deeper problem of control capacity and capability.

The traffic growth predictions, showing a doubling of today's traffic by 2000, clearly illustrate the impossibility of retaining the systems within the current levels of technology. Doubling the number of controllers is not a viable solution because the sectorization of the airspace would increase and the interface problems between adjacent control sectors could become unmanageable. The solution for the future appears to depend on three cardinal factors:

- increasing the use of technology, to reduce the pilots' and air traffic controllers' workload whilst enhancing the safety of traffic operations;
- redesigning the geographical coverage under the control of any single control centre;
- reassessing the value of the fixed route system against a more open route system, the control procedures used and the social consequences of changes to the role of air traffic controllers.

The transport responsibility is clear, but the technological answers require an innovative approach. From the standpoint of the transportation issue there is a need to consider the possibility that a single system of air traffic control which extends throughout the Community could reduce the fragmentation and ensure consistent standards at all points throughout the system.

From a technological standpoint, proven advanced technologies for voice and data communications, satellite navigation and surveillance and decision support systems for air traffic controllers all need to be integrated within a single control system.

The ATLAS study

In response, DG XIII has commissioned a study into the requirements for the integration of communications, navigation and surveillance technologies to support a single air traffic management system for Europe.

Advances in other applications of electronic capability have shown that the modern technologies for communications, such as land-based networks, voice and data transmission and satellite-dependent systems, are all established and proven. The techniques for satellite surveillance and man/machine decision support systems have increasingly become available through military experience. Equally, the issues of achieving accurate navigation have largely been overcome. Even though the enabling technologies are available, the architecture and detailed specifications needed for an integrated system need to be created and defined in detail.

Thus DG XIII has been able to set down clear objectives for the ATLAS study and to plan a logical development programme to create detailed schemes for the integrated system.

The study consortium is drawn from companies within the Community. It is led by a major company with expertise in communications and computing technologies and will be supported by several principal sub-contractors which are national aviation laboratories. The objectives for ATLAS are specified as followed:

1. To define and provide functional specifications for the creation of a single unified air traffic management system for European Community airspace.

2. To provide a series of transition plans which would allow the described system to be introduced in a coherent manner within realistic time scales, so that it can meet the traffic demands from 2000 up to at least 2020.

3. To identify and specify areas of work which require research and development outside the scope of the study - in particular, to encourage European industry to respond to the need for new products and equipment to serve the described system.

The study will take 33 months and will be completed in the first half of 1994. A programme of full consultation with all interested bodies, i.e. national authorities, airline organizations and other international organizations, is a special feature of the work.

Other European initiatives

In addition to this initiative, the European Civil Aviation Conference (ECAC) has set down a strategy for the 1990s which aims to harmonize the present national air traffic systems of the 23 Member States of that organization. In setting out its strategy the ECAC has identified a longer-term requirement, phase IV, which covers the period after 2000.

The ATLAS study is appropriate to this phase IV and its results could very well satisfy the needs for the wider European systems after 2000.

The Eurocontrol organization is active also in developing work relating to research and development, which incorporates some of the EURET projects, under the Commission's transport department, DG VII, supporting research into air traffic controller work stations and air/ground data links.

In addition, Eurocontrol has a responsibility to manage the ECAC strategy project during the next five years as well as to develop its own design and implementation programme, known as EASIE, for enhanced air traffic control radar implementation and communication. The ATLAS initiative by DG XIII is entirely relevant to the future system demands and is the only strategic study at present concerned with investigating the possibility of implementing designs and specifications for a single unified system for the Community. ∎

Stephan Pascall *DGXIII*

Telecoms equipment

In the black on switching and transmission, in the red on terminals:

the European telecommunications equipment industry is at a crossroads.

AN ANALYSIS OF THE European telecommunications equipment industry[1] put forward by the Commission in July proposes several areas of action aimed at improving the competitiveness of this sector.

The paper is in line with the policy pursued by the Community since 1984, aiming to harmonize telecommunications policy in all the Member States, create the conditions for an equipment and services market at Community level, promote interaction between networks throughout the Community and encourage the development of the necessary technology, systems, standards and services to advance technological progress and cooperative research.

It is also in line with the implementation of the Community's policy of placing industry in an open and competitive environment, as defined in 1990[2] . With regard to industrial policy, the Commission considers that the responsibility for improving industrial competitiveness falls mainly to private enterprises, but that government authorities have the task of providing them with a framework and clear and predictable perspectives for their activities, while respecting the rules for competition within the Community.

A changing sector

The telecommunications era began on 24 May 1844 when Samuel F.B. Morse transmitted his historic telegram: "What hath God wrought!" it exclaimed. Today more than ever, the key to this era is the control of the main electronic routes for information transmission and processing.

Telecommunications equipment is usually considered to include two main product categories:

- Network equipment (switching and transmission).

- Terminal equipment, which covers all kinds of terminals, from telephones to facsimile terminals, individual computers linked to networks and earth satellite stations.

For the last 20 years, technological innovation and the availability of technology, new regulatory frameworks, market structures and the proliferation of telecommunications services have all caused profound changes to the telecommunications sector. Until the beginning of the 1970s, the worldwide telecommunications market consisted of the national markets, whose needs were satisfied by local companies. This structure fulfilled two necessary conditions: it provided a homogeneous network and a universal service. The service organizations were either regulated monopolies, funded by private or public capital, or else government departments with guide-

lines defining their obligations and responsibilities. In most cases the network service organizations were the sole purchasers and users of equipment. As for the equipment manufacturers, they were either subsidiaries of the service organizations, vertically integrated, or else independent companies funded by private or public capital. Competition took place chiefly in developing countries or in markets where there was no existing local industry. In this environment, the users had very little influence on the development of the telecommunications infrastructure and the development of services or equipment for subscribers. The needs of users were less important than the requirements of industrial policy and regulatory matters. In this way the telecommunications world was the opposite of the computer world, where users and manufacturers together dictate the development of technology and applications.

During the 1970s, this controlled world began to break up. The true significance of this change was the call from the market for competition. Telecommunications has passed from an environment oriented towards technology and driven by supply to an environment oriented towards applications and driven by the users.

The main consequence has been that markets have become increasingly global, resulting in numerous mergers, acquisitions and joint ventures, and also a rapid increase in R&D expenditure. Competition in international markets is moving away from the few developing countries or industrial countries insufficiently supplied with appropriate technology and towards the world market, where the users are in a position to make significant demands.

In spite of these important changes, accompanied and reinforced by the process of deregulation/demonopolization/ privatization which has been developing progressively throughout the world, the sector still has a certain number of specific characteristics:

- Close financial interdependence between the manufacturers of telecommunications equipment and their principal clients, the telecommunications service organizations.

- The strategic necessity for telecommunications equipment manufacturers to maintain their own expertise regarding the design and manufacture of electronic components, especially integrated circuits[3].

- The traditional domination enjoyed by the principal manufacturers in their home markets, which constitute a base from which they can operate in other markets. However, this situation is tending to change as new rules are introduced in relation to government procurement.

- The overriding need for equipment manufacturers to conclude alliances or even to consider ways of amalgamating some of their activities, partly in order to meet the ever-increasing cost of R&D[4], but also to break into new markets.

- The uncertainties of the market, accentuated by the combined effects of rapid technological development[5], the proliferation of new methods of accessing sources of information, the explosion in demand for communications and also the emergence of a more competitive environment.

- The significant differences observed in the ways companies are structured (especially the extent of vertical integration) and in their fields of activity between the main regions in the world.

The European industry in an increasingly worldwide context: comparison and assessment

At first glance, with a worldwide equipment market amounting to about $100 billion, European companies seem to be in a favourable competitive situation. There are three European companies among the world's six main manufacturers: Alcatel (no. 1), Siemens (no. 3) and Ericsson (no. 6).

Alcatel has pursued a strategy of external growth which has taken it to first place in the world in public switching equipment, optical clusters and cables, and second place in the world in line transmission systems. In 1991, 7.7 million System 12 telephone lines (the digital exchange originally made by ITT) were sold by Alcatel, and

CLASSIFICATION OF THE WORLD'S MAIN TELECOMMUNICATIONS EQUIPMENT MANUFACTURERS (BASED ON 1991 TURNOVER IN MILLIONS OF ECUS)

COMPANY	COUNTRY	TELECOM TURNOVER	TELECOM TURNOVER/ OVERALL TURNOVER
Alcatel NV	EC	14 454	91.8 %
AT&T	United States	8 337	16.4 %
Siemens	EC	7 980	22.4 %
Northern Telecom	Canada	6 596	100.0 %
NEC	Japan	6 010	26.5 %
Ericsson	Sweden	5 751	93.9 %
Robert Bosch	EC	3 867	23.6 %
Motorola	United States	2 925	30.7 %
Fujitsu	Japan	2 669	12.9 %
IBM	United States	2 109	4.0 %
Ascom	Switzerland	1 741	100.0 %
Philips	EC	1 603	6.5.%
Italtel	EC	1 452	94.7 %
Nokia	Finland	1 305	42.2 %
Oki	Japan	1 107	27.1 %

Source: DGXIII

[1] Doc SEC (92) 1049 Final.

[2] Doc COM(90)556.

[3] With regard to the main European companies, Alcatel controls the Belgian company Mietec (1991 turnover: ECU 85 million), which is the European leader in ASICs and the world no.2 in mixed analogue-digital circuits, representing 70% of deliveries. Philips and Siemens hold first and second place respectively in the European semiconductor market. Finally, Ericsson sold electronic components to the value of ECU 296 million in 1991, of which 55% was to meet its own internal needs.

[4] Telecommunications equipment manufacturers devote on average 10-12% of their turnover to research and development.

[5] To take just one example, switching equipment has passed from the electromechanical era to the computer era in the space of ten years. For a switching equipment manufacturer, which has in fact become a sort of software company, the expenditure on labour now represents no more than 2% of the price of a telephone exchange.

this figure does not include the 3.9 million E10 lines (the digital exchange originally made by Alcatel itself). It is expected that these two ranges will converge into a single product, the Alcatel 1000. Moreover, at the end of 1991 the Siemens EWSD system was in service in 56 countries with 40 million lines installed or ordered, while Ericsson's AXE system was operating in 87 countries with 45 million lines installed and 11 million lines on order.

The Community makes a net surplus on trade in telecommunications equipment with the rest of the world. This surplus has increased during the last three years; from ECU 91 m in 1988 to ECU 383 m in 1991, it has quadrupled. However, close analysis of the statistics shows there are some areas of weakness in Europe.

First, although there is a significant trade surplus in switching equipment and even more so in transmission equipment, the Community makes a heavy trade deficit on terminals: ECU 702 m in 1991. This is mainly due to facsimile terminals, but it should be stressed that the "other terminals" account has also suffered a net decrease since 1990.

Another weakness is that the Community's trade surplus is exclusively due to its dealings with developing and less-industrialized countries. The Community has a heavy primary trade deficit in its trade with the other 'Triad' countries (the United States and Japan), and this gives even more cause for concern because it affects all main product groups. The Community also has a deficit in its trade with the 'Four Dragons' in Asia. Finally, in the area of switching equipment, Community exports to Japan are insignificant and exports to the United States are falling gradually.

There are two main points arising from these statistics.

Firstly, it is important to distinguish the network equipment market - in which the Community's industries enjoy a favourable position in the world - from the terminals market, where the Community's industry has some worrying areas of weakness. This sector is changing rapidly, with extensive technological innovation, products which are quickly replaced, where design is increasingly important and selling prices are collapsing. Series are shorter and have to be written off more quickly, and the production costs 'maintained' at the maximum. This reflects a structural change: telecommunications terminals are becoming mass market products and their manufacturers must therefore adapt to a new role. This development also favours Asian companies, which enjoy
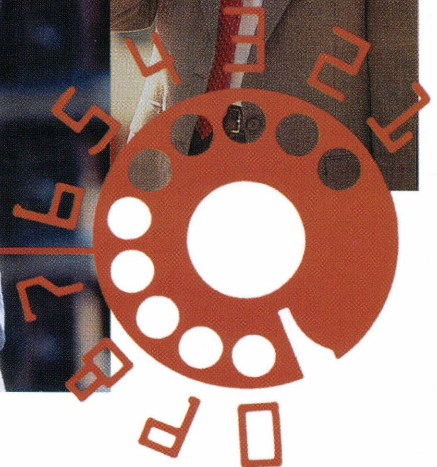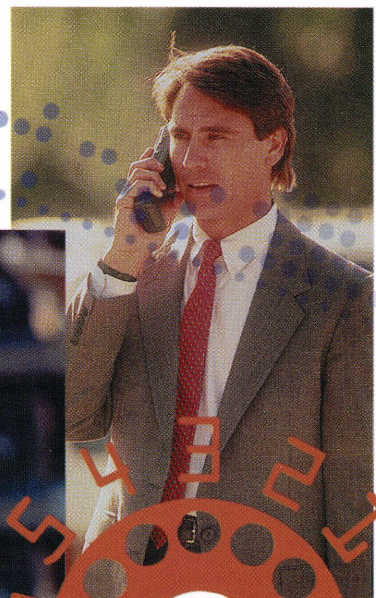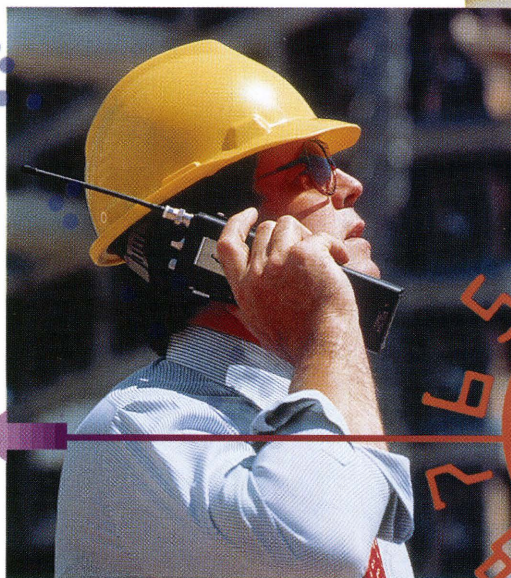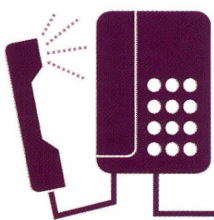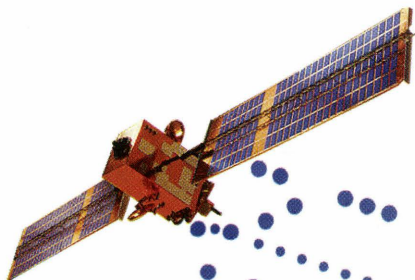
a high degree of expertise in mass market electronics, above European companies which are more used to governmental and professional markets. The swing towards the mass market means competition and also the need to offer multiple functions: amplified speakers, on-hook dialling, answerphone-recorder, display of call date and time, drop-down menus and icons, etc.

If they are to adapt, European companies will need to undertake constant innovation, invest in software and design working technological 'building-blocks' enabling them to produce terminals virtually on demand. If they do not rise to this challenge they will run a long-term risk of becoming restricted to assembly. For this reason it seems to be very necessary to reinforce the European position in the terminals market.

Secondly, the development of trade raises the question of the degree of market openness and reciprocity of market access conditions with certain other countries, especially within the 'Triad'. In some places there are legal and/or structural obstacles which can hinder the free flow of merchandise or encourage unfair competition. Hence, for example, the vertical integration of some North American companies gives them experience in operating networks, providing services and maintaining networks, while providing them with a relatively protected market which can bear initial R&D costs. This kind of organization will, once the Community equipment market is completely free, allow these companies to make tenders covering the whole Community, exploiting the advantages of vertical integration, particularly the opportunities for long-term planning and cross-subsidization. Unfair competition has an inexorable effect on the profit margins of businesses and reduces their competitiveness. In an industry obliged to operate on a worldwide scale, obstacles to trade should be eliminated and the conditions for fair competition restored. The Community has opened up government markets in its Member States; it will soon complete the liberalization of its communication markets; and it maintains a strict and non-discriminatory competition policy.

Therefore it also requires the rapid removal of legal and structural obstacles which still exist in the United States and Japan, so that Community companies can face competition on an equal footing.

The objective of a 'level playing field' will not in any case be achieved for several years, simply due to the technical constraints of the network. Recent experience has shown that even in open markets it would take some time for competition between the various equipment manufacturers to come fully into play. Assuming that all the obstacles to competition are removed, the traditional services will still retain a net competitive advantage for several years in the network equipment market, in particular in the areas of maintenance, modernization and extension of existing installations.

The Commission's proposals

The Commission proposes that the Community's actions on behalf of the telecommunications equipment industry should be oriented towards four main aims:

- Establishing a true internal market as a basis for the development of the telecommunications industry and for maintaining the conditions for dynamic demand on a consistent long-term basis.
- Supporting technological development so as to provide the European economy with advanced services and to allow industry to maintain its competitiveness in world markets.
- Improving the position of companies producing terminal equipment. This segment of the telecommunications equipment market is undergoing extensive growth.
- Seeking conditions for fair competition in the world market, so that European companies can gain access to markets in other countries, especially in cases where there are difficulties at present.

The internal market

A dynamic telecommunications services market is one determining factor for the success of the telecommunications equipment market. Continued expansion of the services market, which is assisted by the liberalization process, combined with a sustained level of investment on the part of network operators, who are still the main purchasers of equipment, should provide a basis for growth in

the equipment sector. The Community rules for government procurement will be strictly applied to ensure that government markets are open and non-discriminatory. This in turn depends on the opportunity for service providers to move freely in the telecommunications services market; their competitiveness will be endangered if telecommunications operators are able to maintain high tariffs which are not linked with costs, by abusing their monopoly or their dominant position in the creation and operation of networks and in some cases the provision of telecommunications services.

The liberalization of services is a condition for their rapid development but harmonization of both services and equipment is also important to permit the unification of a market which is currently fragmented due to technological variations. Another important factor affecting unification is the creation of pan-European services. The basis for harmonization must be the existence of a coherent and dynamic European system of standards and certification. The creation of ETSI (European Telecommunications Standards Institute), which has joined the existing standards bodies CEN and CENELEC, has been of real assistance to the telecommunications sector in Europe. Community legislation which has already been passed, particularly in the area of terminals, provides the basis for efficient implementation of the standards prepared by ETSI and CEN-CENELEC.

Technological research and development

To keep up with the rapid increase in the exchange of information, it is necessary to move towards very high capacity systems. In order to satisfy demand it will be necessary for global solutions to operate in the gigabit range and to use synchronous transmission as well as temporal asynchronous technology (ATM) for switching. For this reason it is becoming necessary to develop a new generation of specialized equipment. In view of the significant R&D investments required, industrial, trans-national and multi-disciplinary cooperation remains more than ever an essential element of Community policy. It would appear necessary to support

EC Telecommunications Equipment Trade 1988-1991 by Product Category and Trade Partner in million ecu

Product/Partner	EC Imports				EC Exports				EC Balance			
Total Extra-EC	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	3696	4552	4261	4831	3787	4663	4558	5215	91	110	297	383
Switching equipment	511	588	572	645	560	667	707	995	49	79	134	351
Transmission equipment	722	963	750	816	1163	1477	1316	1381	441	514	567	565
Radio-related equipment	173	202	154	156	210	216	231	296	38	14	77	140
Components	304	338	338	355	322	362	373	384	18	25	36	29
Terminal equipment: Total	1986	2462	2448	2860	1531	1940	1931	2158	-455	-521	-517	-702
Facsimile terminals	*761*	*1018*	*861*	*905*	*167*	*207*	*205*	*218*	*-595*	*-811*	*-656*	*-687*
Other terminals	*1225*	*1444*	*1587*	*1955*	*1364*	*1733*	*1726*	*1940*	*140*	*289*	*139*	*-15*
USA	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	820	1037	1001	1208	412	716	563	532	-408	-321	-439	-677
Switching equipment	103	148	121	120	101	115	93	92	-2	-33	-29	-27
Transmission equipment	335	422	352	368	149	252	199	183	-186	-170	-153	-185
Radio-related equipment	42	50	42	50	20	21	25	22	-23	-28	-17	-28
Components	54	60	53	48	55	62	66	67	1	2	13	20
Terminal equipment: Total	285	358	432	622	86	267	180	166	-199	-92	-253	-456
Facsimile terminals	*63*	*103*	*122*	*179*	*9*	*17*	*15*	*23*	*-54*	*-85*	*-106*	*-155*
Other terminals	*222*	*255*	*311*	*443*	*77*	*249*	*164*	*143*	*-145*	*-6*	*-146*	*-300*
JAPAN	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	1223	1453	1204	1257	51	65	70	65	-1172	-1388	-1134	-1192
Switching equipment	98	114	118	128	4	5	5	3	-94	-108	-113	-125
Transmission equipment	90	117	80	95	26	31	33	34	-64	-86	-47	-61
Radio-related equipment	70	72	45	48	3	4	2	2	-67	-69	-43	-46
Components	91	94	97	107	10	9	8	11	-81	-85	-88	-96
Terminal equipment: Total	874	1056	864	879	8	16	21	15	-866	-1040	-843	-864
Facsimile terminals	*652*	*858*	*651*	*573*	*4*	*4*	*3*	*2*	*-648*	*-855*	*-648*	*-571*
Other terminals	*222*	*197*	*213*	*306*	*4*	*12*	*18*	*13*	*-218*	*-185*	*-195*	*-293*
4 DRAGONS	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	343	409	441	536	186	259	261	277	-157	-150	-180	-259
Switching equipment	29	47	50	54	21	28	42	36	-8	-19	-8	-18
Transmission equipment	78	104	91	99	60	69	81	79	-18	-35	-10	-20
Radio-related equipment	5	8	5	6	15	12	7	17	10	4	2	11
Components	7	7	6	8	19	23	28	32	12	16	22	24
Terminal equipment: Total	223	244	289	369	70	127	103	114	-153	-117	-186	-255
Facsimile terminals	*6*	*18*	*42*	*71*	*11*	*8*	*14*	*12*	*4*	*-10*	*-29*	*-60*
Other terminals	*217*	*226*	*247*	*298*	*60*	*119*	*89*	*102*	*-157*	*-106*	*-158*	*-196*
EFTA	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	951	1138	1084	1103	1038	1130	1073	1111	88	-8	-11	9
Switching equipment	195	175	167	182	124	139	111	121	-71	-36	-56	-61
Transmission equipment	149	185	147	156	413	483	464	455	264	298	317	299
Radio-related equipment	42	55	52	41	37	33	35	44	-5	-22	-17	3
Components	119	134	137	140	114	129	117	103	-5	-5	-20	-37
Terminal equipment: Total	446	589	580	583	350	346	345	388	-96	-243	-236	-195
Facsimile terminals	*23*	*22*	*21*	*37*	*48*	*51*	*53*	*68*	*24*	*29*	*31*	*31*
Other terminals	*423*	*567*	*559*	*547*	*302*	*295*	*292*	*320*	*-121*	*-272*	*-267*	*-226*
REST	1988	1989	1990	1991	1988	1989	1990	1991	1988	1989	1990	1991
Total	361	515	532	728	2101	2492	2592	3230	1740	1977	2060	2502
Switching equipment	87	104	116	161	309	380	455	743	223	276	340	582
Transmission equipment	71	136	79	97	516	642	539	630	445	507	460	533
Radio-related equipment	13	17	10	11	136	146	161	211	123	128	151	201
Components	34	43	45	52	125	139	154	171	91	96	109	119
Terminal equipment: Total	157	215	282	407	1016	1185	1283	1474	859	970	1001	1067
Facsimile terminals	*17*	*16*	*25*	*45*	*95*	*126*	*120*	*112*	*78*	*110*	*95*	*68*
Other terminals	*140*	*199*	*257*	*362*	*921*	*1058*	*1163*	*1362*	*781*	*859*	*906*	*1000*

Source Eurostat - COMEXT/DG XIII

R&D projects dedicated to the short term, whilst being particularly vigilant to ensure management competence in projects of this kind and avoiding involvement in projects which are not related to market requirements. "Priority technology projects" as defined in the Commission's communication on research after Maastricht (SEC(92)682) should contribute to this objective by ensuring the availability of generic technologies for the support of industrial research projects spontaneously emerging from enterprises. The research carried out within this framework could also help enterprises to reorient themselves towards the new requirements created by technological and regulatory developments in the sector, for example by promoting the development of new common products for advanced users.

The terminal equipment market

The terminals market is an important sector within the telecommunications equipment market. The position of European enterprises is weak. The Commission proposes to launch a series of consultations, in accordance with the Community rules on competition, with the aim of supporting industrial efforts to achieve competitiveness in new market segments. Of course this requires the continuation of the current policy of terminals liberalization and of competition between firms with regard to basic engineering, production, distribution and services. These consultations, covering the upstream stage of the industrial process, in a strategic context, would bring together industrialists, service providers and users. This would equally imply cooperation in R&D in those basic technologies which are necessary for producing the terminals identified in the context of these consultations, in line with the approach set out in the Commission's recent communication on research after Maastricht.

Conditions for competition in the world market

The worldwide nature of the telecommunications equipment market makes it necessary to take action so that European manufacturers can enjoy non-discriminatory access to the markets of other countries, just as the companies of these countries will have access without discrimination to the Community market. In order to achieve the aim of fair competition in the telecommunications sector on a world scale, the Commission aims to eliminate unsatisfactory access conditions which exist in markets outside the Community, and also to work towards the establishment of appropriate rules for competition on a worldwide level. This action will be supported by a 'centralized point of information', called for by the Council last November, which is currently under development, so that conditions for market access and competition can be assessed in the world's major industrial regions.

The Community has been attempting for a long time to penetrate the markets of its principal trading partners (the United States, Japan, Canada and the EFTA countries) under conditions which are fair and comparable to the conditions enjoyed by foreign enterprises in the EC market. The Community has been doing this through multilateral fora such as GATT and OECD, and also through bilateral negotiations. In this regard, the overriding priority must be a successful result from the Uruguay Round on market access and the renewal of the GATT Code for Government Procurement. At a time when foreign companies are multiplying their efforts to increase their share of the Community telecommunications market as it opens up more and more, it is becoming essential for Community firms in turn to have the benefit of similar effective, long-term access to the markets of other countries.

However, even if the GATT negotiations are successful, the problem of fair access conditions will not be completely resolved. This is because of the imbalance and strategic advantages which arise from anti-competitive practices in certain regions and the absence of adequate protective measures. This applies particularly to vertical integration and the transfer to industry, either free or at a price below the actual cost, of R & D results by telecommunications operators. As a consequence the Community will pursue the policy of parallel competition in North America, Japan and Europe, as far as is necessary to achieve modifications which will guarantee the conditions for fair competition.

A truly dynamic, open internal market. A strongly innovative and also competitive industry in the fast-growing segments of the market. Fair conditions for trade and competition. During the months ahead these will be the main areas for priority action by the Commission in the field of telecommunications equipment. These priorities will be supplemented by work to continue and sometimes increase the efforts already being made by the Commission in the following areas: standardization, mutual recognition and acceptance of terminals, training and recycling. ∎

Gérald Santucci *DGXIII*

Assistive technology

The Community's TIDE R&D initiative
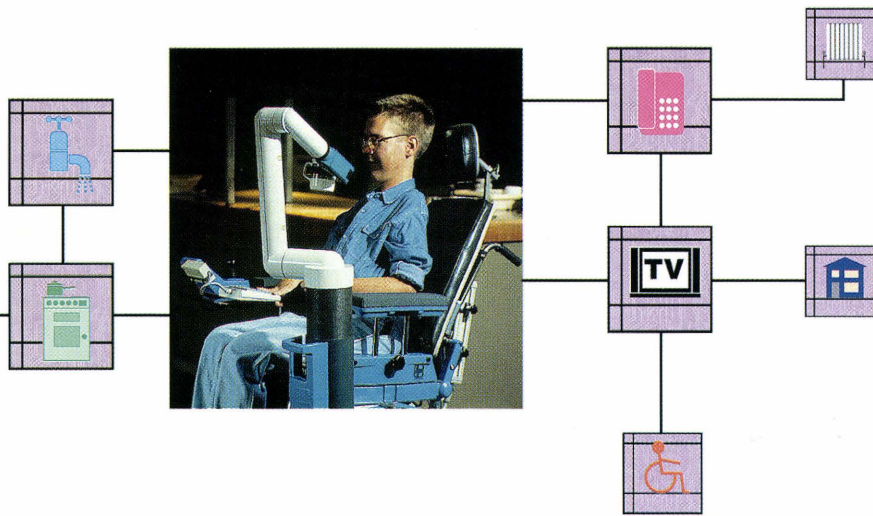
THE EC R&D programmes of the '90s will put greater emphasis on a growing number of customer-related issues, the so called "user-oriented approach". Moreover, under the proposed Treaty of Maastricht, the role of the EC in areas related to both competitiveness and welfare will be augmented. Disabled and elderly people in particular should benefit from these trends.

In the EC countries, between 60 and 80 million people have physical, sensory or cognitive impairments. These already large figures are expected to increase, due to the ageing of the Community population (by the year 2020, one in four people in the Community will be aged over 60) and to the prospective enlargement of the EC.

TIDE (Technology Initiative for Disabled and Elderly people) is a Community R&D initiative in the field of 'assistive technology' or 'rehabilitation technology' as it is often called. Assistive technology supports the process of rehabilitation; it addresses the technology needs of elderly and disabled people, in particular their need and desire to maintain independent living and supports their participation in social and economic activities.

Assistive technology is defined by its customer base: elderly and disabled people. The emphasis on the needs of customers rather than a particular technology push makes it one of the user-driven industries. It has two basic themes: the first is to allow equal access to common technologies for everybody (and the many opportunities for work this provides to disabled people) regardless of functional limitations. The second theme is to enable new technologies to fulfil everyday needs by compensating for human organ and function impairment/disability.

Although assistive technology incorporates a wide range of technological building-blocks (including information and control technologies, telecommunications and services), it must not be confused with medically-directed technology. Whereas medically-directed technology is aimed at the rehabilitation process itself, the emphasis of assistive technology is to support the individual in the normal activities of daily life (work, home, transport, mobility, learning, education and health care).

The need for collaboration at a European level in the field of assistive technology is compelling. Traditionally, the markets in the Member States have been relatively small and fragmented. These markets have often been served by SMEs operating at a local or regional level. This has not allowed the economies of scale that could deliver products incorporating up-to-date technology at reasonable prices. The effect of the completion of the single European market and, in particular, pan-European certification will be to increase significantly the size of the individual markets, making the products more economic.

European cooperation also helps meet the challenge posed to European industry by US legislation in favour of people with disabilities which is both forcing the information technology and telecommunications industries to take their needs into account and stimulating a strong assistive technology industry in the USA.

Addressing these larger, more technological markets is not only a matter of understanding the user requirements and technology transfer; it also requires the development of technical norms and standards. Technical standards are needed to support interconnecting and interoperability. This makes it possible to satisfy the complex needs of users with disabilities, in particular multiple disabilities.

A single market in assistive technology will be promoted by the TIDE initiative's programme of pre-normative and pre-competitive R&D. TIDE's support for new assistive technology devices and services will encourage technology transfer, make user requirements more transparent, and provide a basis for the formulation of new technical standards and norms.

Current status

Under the TIDE pilot phase 21 projects are currently up and running. They cover a wide range in the areas of general models and tools, manipulation and control, personal communications, safety and daily support and access to information.

General Models and Tools

A critical aspect of the pilot action is the creation of a set of management models and tools for use by sector actors. Those models and tools

concerning the service delivery, structure of the market, etc., are instrumental in order to achieve the stated objective, a single market in rehabilitation technology in Europe. One of the projects will develop a general model for the rehabilitation technology market, while a second one will develop a specific model of the disabled in working environments to allow the building of an expert system for employers decision support in matching the profiles of worker capacities to the job requirements.

Manipulation and Control

The projects in this group aim at the development of devices for severely physically disabled people who are cognitively able. Examples of applications in this area are robotic systems allowing a higher level of independence at the workplace. Another example is in the control of domestic appliances, for example from the wheelchair.

Personal Communications

Personal communications devices are addressed by several projects dealing with the many varieties of impairments which lead to communication disabilities, such as those affecting hearing, speech and cognition. Hearing difficulties are the most common personal communications impairment, in which a major problem is that of screening out unwanted sound. One project addresses this by developing an advanced programmable hearing aid. Speech disorders give rise to a wide range of pathologies, so there is a need for flexibility in rehabilitation technologies used here. Several projects develop different speech analysis and synthesis devices for this purpose. Also cognitive difficulties result from a wide variety of medical conditions which require varied solutions. Learning systems using images and word relationships, language fragments and sentence construction, etc., are being developed by projects in this area. Present augmentative aids are largely stationary and there is a need for mobile, lightweight aids in this area.

Safety and Daily Support

New home systems applications will be developed, adapting existing technology to the special safety and daily support needs of an ageing population. The problems of setting decreasing mobility, general capabilities and energy against the desirability of continued independence for disabled and elderly people are providing ample grounds for research. Wireless control of the home for the management of everyday life, remote monitoring of the individual at risk and multimodal safety devices are just few examples of the work done by projects in this area.

Access to Information

If integration through IT is to be achieved for people with impaired sight and hearing, adaptable solutions and common standards need to be found. These solutions, developed by a number of projects, will be based on generic technologies and the use of true multimedia.

For example, to offset the negative effects of increased graphical presentations in IT, some projects develop prototypes with an increased use of audio and innovative tactile capabilities. Another project will offer superimposed spoken commentaries for television, films, etc which will do much to enhance the use of primarily visual media by this user group.

The table below provides an overview of the grouping of the projects.

The 21 pilot phase projects were selected from the 70 proposals received following the call for proposals in 1991. This strong response to the pilot phase call demonstrated that the sector actors are capable and indeed eager to collaborate towards creating an internal market in assistive technology. The TIDE pilot phase is 50% financed by the Commission with funding of ECU 8 million and will finish in mid-1993.

In parallel to the initial implementation of projects, the sector actors have been consulted on the priorities for a second phase of activities in a major planning exercise conducted by a number of technical panels. The technical panels also considered the 400 responses to a questionnaire survey addressed to 4000 people and organisations, and supplemented the R&D tasks where necessary. This will constitute the basis for a future call for proposals. In the meantime, ECU 10 m has been allocated to TIDE in 1992. This will be used for the extension of a selection of the 21 pilot phase projects and for horizontal activities related to subjects such as testing and certification of advanced technology assistive devices, assessment of assistive technology users spectrum and assistive technology service delivery.
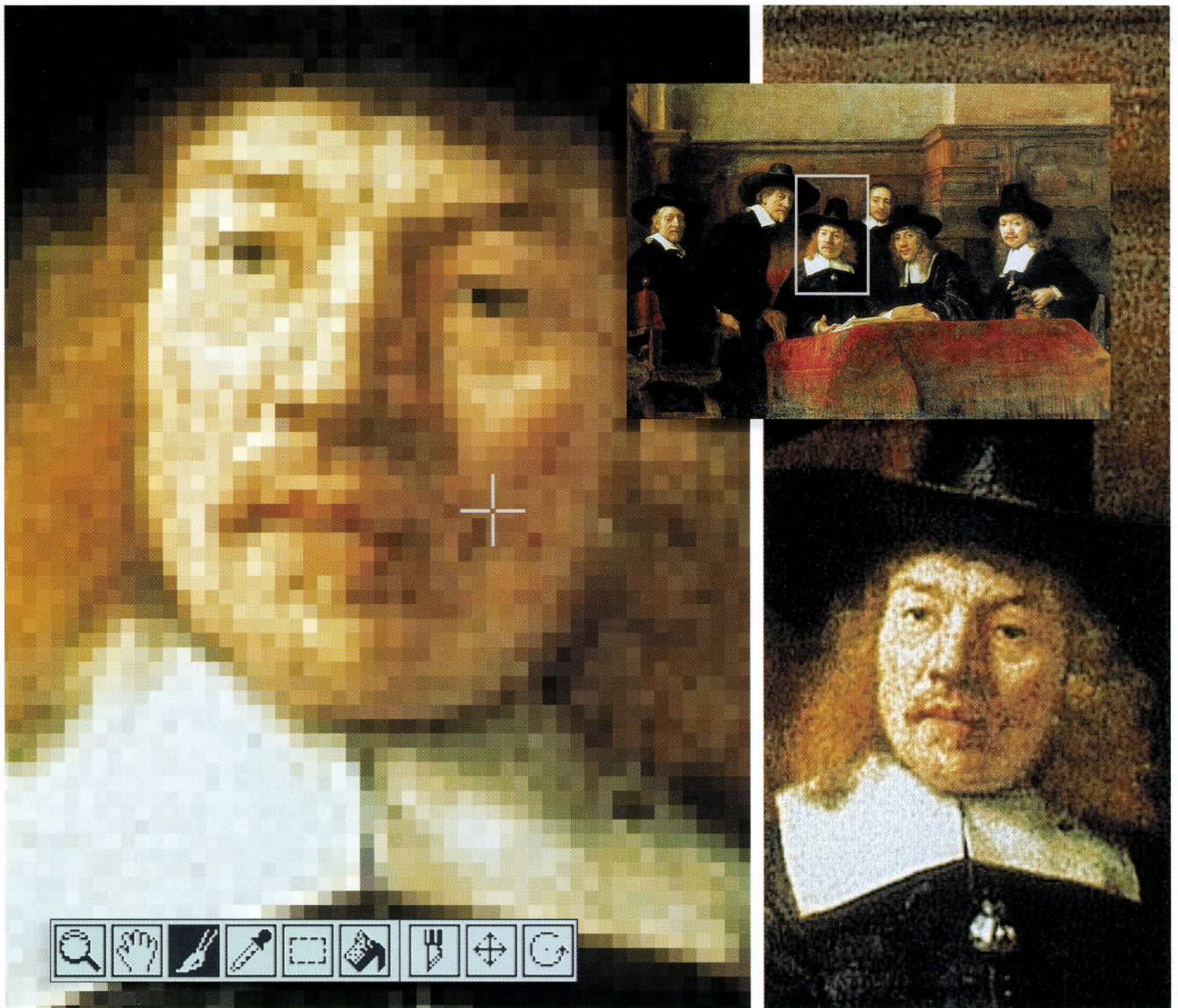
Conclusion

TIDE is a pilot programme specifically aimed at exploring the R&D requirements in assistive technology in Europe with the final objective of contributing to the creation of a single market for technology products and services in this field. The R&D efforts in assistive technology require the harnessing of scarce scientific and technical resources in the Member States, as well as the creation of a partnership between the European information technology and telecommunications industry, SMEs, research institutions and universities, based on a commonality of interests..

TIDE comes about at a moment when conceptual rethinking Community R&D policy is under way and it is in line with the Maastricht approach. TIDE research will be put at the service of a wider range of solutions to problems centred on Europe and society. ■

Egidio Ballabio *DGXIII*

TIDE pilot phase projects

No.	Name	Group	Mobility	Vision	Hearing	Speech	Language	Cognition	Ageing	Services
126	CORE	General Models & tools								X
123	MODEMA			X						X
152	INSCAD		X							X
120	RAID	Manipulation & control	X						X	
150	MARCUS		X							
112	MECCS		X						X	
128	M3S		X						X	
158	KOMBE	Personal communication				X	X			
142	GPPC					X	X			
134	SYMBOL						X			
118	MUSA						X	X		
133	STRIDE					X			X	
141	FASDE	Safety & daily support			X	X	X		X	X
101	ASHORED				X	X		X	X	X
113	ACT-IT								X	X
161	CHEF								X	X
136	CAPS	Access to information			X	X			X	X
169	AUDETEL					X				X
103	GUIB					X				
135	VISA					X				
166	INDICES				X	X	X			X

THE 'TECHNOLOGY DRIVING' systems of industry have traditionally been defence, aerospace and other high R&D spending sectors. Museums have been one of the lagging sectors as regards the application of technology, and to imagine them as potential technology drivers was hardly possible only a few years ago. Now leading art museums are now helping European technology to move forward thanks in particular to the Vasari project of Esprit.

Vasari signifies Visual Arts Systems for Archiving and Retrieval of Imaging, but the acronym is really named after the famous Italian 'father of art history' Giorgio Vasari. This appealing acronym has helped raise the project's profile, especially in the arts sector and in Italy.

The Vasari project aimed first of all to make a contribution on three real user issues:

- colour deterioration of valuable paintings;
- damage to painting in transit;
- art history education.

The first two problems require advanced measurement technology based on state-of-the-art technology transfer from military and aerospace work. However, it has been a notable factor of Vasari that the work has been user-driven as distinct from technology-driven. This has been due to the very active involvement in the project of four leading-edge users:

- The National Gallery of London.
- The Doerner Institute of the Bavarian State Galleries at the Neue Pinakotek, Münich.
- The Laboratoire de Recherche des Musées de France (LRMF) at the Louvre.
- The Art History Department of Birkbeck College, University of London, with its pioneering MA course in Computers and Art History.

The museum staff involved were all people at the intersection of the 'two cultures' i.e. experienced scientists working in three of the world's top art museum research laboratories, led by

Paintings by numbers

Digital imaging meets the fine arts in Esprit's Vasari project

Dr David Saunders, Dr Andreas Burmester, Dr Christian Lahanier and Charles de Couessin.

This contributed in defining the technical requirements for the first two problems of measuring colour differences and the detection of hair-thin cracks in a painting's surface texture. Conservation scientists need improved measuring devices in order to be able to study research into the impact of differing environmental conditions and the inevitable colour deterioration such as fading, plus the impact of transportation on paintings in widening or lengthening existing cracks, as well as creating new ones.

The approach taken by the consortium was to develop a totally new approach for direct digital imaging inside the museum. This was based on a total systems approach using an advanced systems development method, the 'spiral methodology' originated at TRW systems in California.

The acquisition system itself consisted of a revolutionary new camera, the Kontron ProgRes 3200, designed by Dr Reimar Lenz of the Technical University in Münich just before the Vasari project was launched. This camera uses a CCD array with 500 x 290 pixels which, by an innovative piezo-controlled aperture displacement, moves the camera so that high resolution images of up to 2994 x 2320 pixels can be produced. This level of quality is, however, still too low. A much higher level of system resolution is necessary and this was achieved by mounting the camera on a high precision computer-controlled repositioning device, which permitted X-Y-Z movement, supplied for the two first phototypes (Mark I and II systems) for the National Gallery in 1991 by Time and Precision of Basingstoke UK, using precision engineering approaches typically used in nuclear engineering and other highly demanding sectors.

The Mark II system handles painting up to 1 metre square and was followed by the Mark III, installed at the Doerner Institute in 1991, which handles painting 1.5 metres square with a repositioning system supplied by ALCO of Germany. This permits a set of small high-resolution images to be taken covering the whole surface of the painting and then mosaiced together using advanced and specialized techniques used in photogrammetry for purposes such as satellite imaging of the earth. Probably the most challenging problem of all in the Vasari project was that of colour difference

measurement, led by the National Gallery and Birkbeck College team, using research results from Professor Maitre's team at Telecom Paris, working in the National Gallery itself. This led to the choice of a sophisticated seven-filter system which provides sufficient digital information for the measurement of colour differences, making advances beyond the prior state of the art.

Other technical advances of the full Vasari system include sophisticated software development to ensure highly accurate colour display using a calibrator monitor generously donated by Barco, as was one of the cameras by Kontron.

An advanced Human Computer Interface was developed by Thomson LER to provide a Sun workstation access to the system and eventually to image banks, a first prototype being developed with a DBMS from Syseca, a subsidiary of Thomson.

The third area of Computer Aided Learning for Art Historians was led by Anthony Hamber of Birkbeck. SIDAC, a leading Italian electronic publisher, very quickly produced a first CD-ROM prototype with over 100 images of Dutch Seventeenth Century artists including Rembrandt, Vermeer and Hulz. This effort was supported by Birkbeck and Brameur, the prime contractor, a specialist British research consultancy. Four further prototypes were produced, firstly on Dutch artists and then solely on Rembrandt, taking advantage of a recent National Gallery Exhibition ('Rembrandt: Art in the Making'). This sequence of prototypes, increasing in functionality and usability, followed other software engineering methodology advances developed in the project.

A further example of the project helping to drive the technology forward was the work of another partner, Tuev-Bavaria, one of Germany's leading software testing organizations, which developed new approaches to image systems prototyping testing. Thus, although the work was located in the office and business systems area of Esprit since the main objective was the application of technology to art museums, there were substantial technical results of relevance to the information processing and systems & software area. Further valuable work was carried out by GFal from east Germany, including evaluation of other potential advanced imaging technologies.

The acid question is 'Are the systems

being used in practice?' The answer is a firm yes. Both the National Gallery and the Doerner Institute Vasari Museum Laboratory systems Mark II and Mark III are being used for applied research by conservation scientists. Jacques Delors has seen the Münich system and Michel Carpentier, director-general of DGXIII, has visited the National Gallery Vasari Laboratory, as have numerous museum specialists. It is hoped that new funds will lead to Vasari Mark IV at the Uffizi and, ideally, Mark V at the LRMF although, thanks to the sister project Narcisse (under the Impact programme), the LRMF is receiving a system for high quality X-ray imaging.

One of the most important aspects of Vasari is its role in stimulating European IT industry to take an active interest in the potential of art museums and the cultural sector. The main effort in this dissemination work has been the Electronic Imaging and Visual Arts Conference, EVA, held for the third time in July 1992 at the National Gallery, London, following EVA 1990 at Imperial College and EVA 1991 at University College London. Over 100 participants attended EVA 92 with increased participation from industrial companies - including several US and one Japanese company. The EVA Conference was initiated with Vasari support and further help was provided by a new Race proposal, RAMA (Remote Access to Museum Archives). This and other projects such as MARC (Methodology for Arts Reproduction in Colour), led by Thomson CSF LER, are carrying on the work of Vasari and other 'first generation' EC R&D projects in the museum area to help drive technology development as well as implement new technology in useful - and perhaps unexpected - new applications. ∎

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Electronic polyglots

Developing a basic linguistic technology for

computer applications using natural language

EUROPEAN cooperation in linguistic research and engineering (LRE) moved up a gear last year with the launch of an LRE programme under the "telematic systems" section of the EC's third framework programme for research and technology development. The LRE programme has a budget of ECU 22.5 million from the Community for 1991-94. Following its adoption by the Council of Ministers last summer, a call for proposals issued in August brought in 81 project proposals, distributed over six sub-areas of activity, of which nine proposals finally received total funding of ECU 6.5 million.

A second call is scheduled for this month (October), with an expected budget of ECU 9 m.

The overall objectives of the LRE programme can be summarized as follows:

- To strengthen cooperation and the exchange of information on natural language processing (NLP) research, projects and emerging products.
- To encourage and coordinate efforts to create general-purpose tools and resources.
- To promote the use of new NLP tools and their integration in applications.
- To stimulate and strengthen the supply of NLP products and services, by eliminating legal and technical barriers to collaboration, encouraging demonstrations and disseminating information on existing or emerging standards.

Four action lines address the key activity areas of the programme, namely:

- Research of general interest.
- Development of linguistic resources and related computational tools.
- Support for the formulation of standards and guidelines for the encoding and interchange of linguistic data.
- Pilot and demonstration projects in a

number of application domains.

Amongst the "horizontal" supporting actions foreseen are:

- The provision of a common basic infrastructure for projects, through the development of portable toolkits.
- The setting of common specifications and guidelines.
- Studies, promotion and the dissemination of information.

Background

Community action in the language field is not new. Valuable experience has been gained in such projects as Systran for machine translation and Eurotra for machine translation research to improve Europe's position in language and technology, in Esprit initiatives in speech processing, natural language interfaces and expert knowledge bases, and in Eurodicautom, which provides a terminology database for multilingual applications. Such activities have encompassed basic and applied research, development of prototypes and innovative products, sectoral studies and awareness actions, etc., thus promoting research and technology development activities while increasing awareness among professionals, industrialists and decision-makers as to the social and economic impact of natural language processing technologies, products and services.

The LRE programme specifically addresses natural language and, to a lesser extent, speech technologies. LRE concentrates on the written language, whereas in Esprit there has been a substantial level of investment in speech technologies and systems.

Embodied in the programme is the aim of developing a basic linguistic technology which can be incorporated into a large number of computer applications where natural language is an essential ingredient, with a view to accommodating or overcoming

limitations and inefficiencies within the Community caused by different natural languages. The need for improved effectiveness in written documentation, produced at lower cost, is well recognised. A recent study revealed that ECU 500 billion per year is spent in Europe on documentation - leaving abundant scope for streamlining. LRE includes both multilingual (e.g. translation) and monolingual activities.

A wider objective is to improve language communications within European research, industry, administration and society at large. The imminent completion of the single European market and the increased requirement for information exchange this entails give particular immediacy to the LRE programme, which represents an effort to involve industry in linguistic engineering. The approach emphasises user-related aspects in terms of language processing needs and the combination of these needs with the available technologies.

In the long run it is hoped to develop a European infrastructure that will enable the Community's 346 million citizens to handle written information, in particular, with greater efficiency and ease and with minimum language barriers. The problems related to the multiplicity of nationally recognised languages are intensified by the increasing amount of jargon used in different professional fields: science, computing, electronics, medicine, law, insurance, etc.

While natural language processing has traditionally been an R&D activity, the realm of small teams of experts in universities and private enterprises, it is expected to develop into a worldwide market during the coming decade. The ability to process natural language by computerized techniques is ready for exploitation by industry. Europe needs to make every effort to remain competitive in the world market in this area. This means urgently addressing the problems created by the Community's many languages, a situation which is considerably less critical in other economic regions of the world.

Europe must find a means of stimulating innovation while exploiting existing linguistic skills. The Community's large number of small companies and research departments or institutions associated with linguistic development can best be encouraged and supported through a flexible, cooperative approach; given the budget available for the LRE programme, it is these categories which are most likely to become involved in LRE projects.

As an example of potential applications, the ability of natural language database interfaces to allow the user to express his/her query in everyday language (and in any mother tongue) creates an access medium which is instantly available with minimal requirements for training or practice. A large potential customer base exists for such interfaces.

Other applications emerging or reportedly at the embryonic stage include specialized machine translation systems, contents scanning systems, text authoring tools, intelligent text indexing and routing systems, talk-writers, etc.

A prerequisite for all such developments is the availability of a common infrastructure comprising linguistic resources such as grammars, electronic dictionaries and terminology collections, comprehensive text corpora and computer-based models of each language involved, including the software tools enabling users and professionals to access and manipulate such resources. These resources must ultimately be available in the nine official Community languages and require the definition of standards for the data concerned.
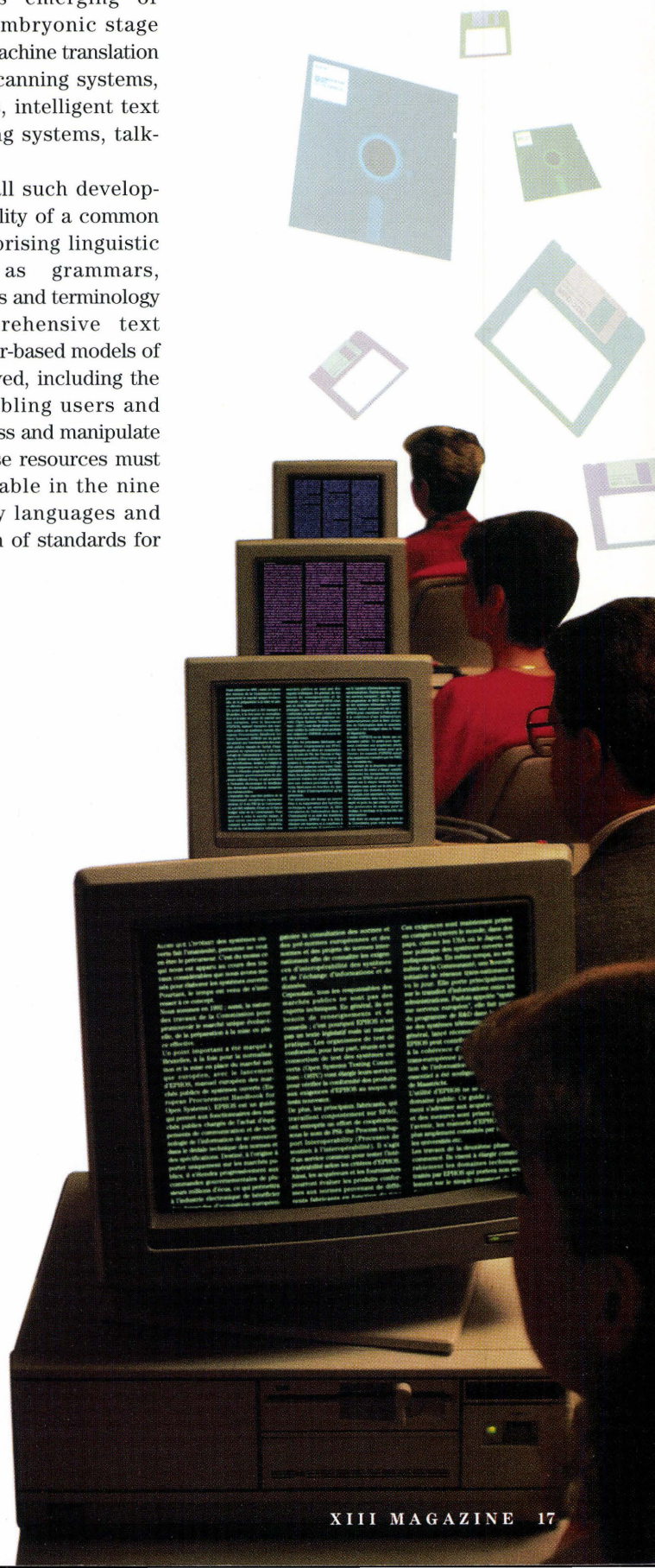
The need is recognised for consumers to be presented with comprehensible, user-friendly language. The frustration of struggling with a poorly written manual or garbled operating instructions is only too familiar. Potential customers in areas such as computer hardware/software, pharmaceuticals, banking services, insurance packages, etc. are often deterred by the alienating jargon used. All those involved, from research and development to production and implementation, need to focus on user requirements. A multi-disciplinary approach is necessary. If authors do not produce well-structured texts,

Natural language processing is expected to develop into a worldwide market during the coming decade

translators cannot translate and end-users will not understand, influencing their decision to buy a product or service.

Implementation

The LRE programme is based on shared-cost research and technology development (RTD) projects, awarded through calls for proposals supporting activities involving reusable methods, resources and tools, and applications.

The first call for proposals under the LRE programme could be considered oversubscribed in terms of expressions of interest. Most of the interest was shown by universities, SMEs (generally 5-15 employees) and private research laboratories.

Under the second call this autumn, work will be supported in the sub-areas of research, linguistic resources and pilot applications. Research includes the themes of computational semantics and assessment methods and procedures for natural language systems, products and services. Linguistic resources, in this instance, will comprise multilingual corpora of machine-readable texts in the Community languages and related methods, guidelines and tools for text acquisition, normalization, annotation and exploitation, together with a feasibility and project definition study for the creation of catalogues and repositories for precompetitive linguistic resources.

For the pilot and demonstration projects, proposals have been invited on the following themes:

- Machine translation and automated aids for human translation.

- Advanced office automation tools for all stages of document handling (with the emphasis on multilingual environments and applications involving structured text databases and electronic authoring and publishing systems).

- Computer-aided training, teaching and learning, include tools and materials for language learning, interfaces, resources and tools for interactive applications (e.g. self-learning systems) where natural language plays an essential role.

It is anticipated that this call will also be oversubscribed. It is vital to stimulate and support the industry's interest in activities which have the potential to improve Europe's position in the world market in this sector. A third call is therefore foreseen for the first half of 1993 subject to availability of funds.

The horizontal accompanying measures address common development environments, specifications and guidelines.

In particular, an ambitious project, ALEP (1992-1994), should lead to the availability of a portable natural language processing toolkit for researchers and application designers. This builds on the conclusions of extensive preparatory work carried out by the Eurotra programme.

An initiative was also launched early this year to set up an Expert Advisory Group on Language Engineering Standards (EAGLES). This brings together relevant specialists from the European R&D community to promote and accelerate cooperation and consensus building in specific areas of language engineering in Europe and to produce pre-normative specifications and guidelines.

These guidelines will be made publicly available and will contribute to the development of a common methodological framework which will allow for different linguistic environments, encouraging equal opportunities for all Community languages. A common goal will be to exploit the results achieved in members' own R&D activities and seek cohesion with other R&D efforts in Europe and worldwide.

The cooperative approach, combining academic and industrial organiazations and professional users, and involving a sharing of know-how, is crucial as the European situation is typified by small organizations with limited financial and human resources. Likewise the emphasis on standardized, reusable linguistic resources will ensure that a wide range of consumers can access and use them.

Considering the number of people involved in a variety of text entry, storage, retrieval and manipulation tasks (estimated as an annual nine million man-years for European white collar workers alone), advances in R&D culminating in subsequent increased availability of effective products will bring immense benefits. Improved productivity and quality of work will lead to considerable economic advantages.

The sound core of European-based natural language processing research, which has produced a significant level of expertise, must be exploited so that the transition from research to prototypes and from prototypes to operational systems can be accelerated. The Commission's LRE programme is designed to give the necessary impetus for this transition to occur rapidly and efficiently. ■

Frans de Bruïne *DGXIII*
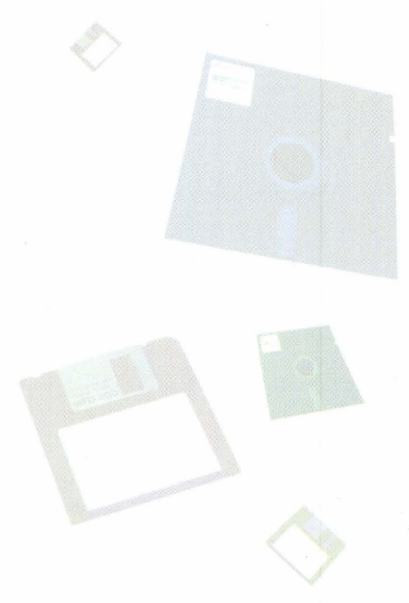
LAB assistance

Overcoming legal problems in the European information services market:
the role of the Legal Advisory Board

THE EUROPEAN INFORMATION services market is fraught with problems of diverse types. It is a fragmented market where linguistic, regulatory and technical barriers tend to obstruct the free movement of information and the development of information services. In addition, legal problems abound, as the main legal developments occur at national level and difficulties arise due to the differing situations and lack of appropriate legal frameworks in the various Member States.

The EC's Impact (Information market policy actions) programme has as its aim the establishment of an internal market for information services. This involves identifying the strengths and weaknesses of existing services, strengthening the competitiveness of European suppliers and promoting the use of advanced services. These general objectives are targeted on achieving a truly integrated European information services market with improved accessibility of information, a theme succinctly labelled 'INFO EURO ACCESS'.

Action line 2 of the programme, aimed at overcoming legal and administrative barriers, focuses on creating a comprehensive legal framework for information services and issues related to information. The Legal Advisory Board (LAB), set up in 1985, helps make it easier for information services to be made available with the minimum of legal and administrative barriers for both supplier and user.

The LAB can best be described as an instrument or advisory body of the legal section of DG XIII's information market directorate in Luxembourg. It assists the Commission in highlighting problems and possible solutions, or in deciding how best to proceed in the areas under consideration. This may mean the Commission either taking a certain initiative or deciding that action is not appropriate in a particular instance. When the outcome involves an initiative, the analysis of results and subsequent follow-up are of particular importance.

The LAB is composed of independent experts, invited by the Commission from all Member States and chaired by Mme Charlotte Pitrat. Membership has been extended to include representatives of the information industry, who along with government representatives have been invited to LAB meetings since October 1991. This
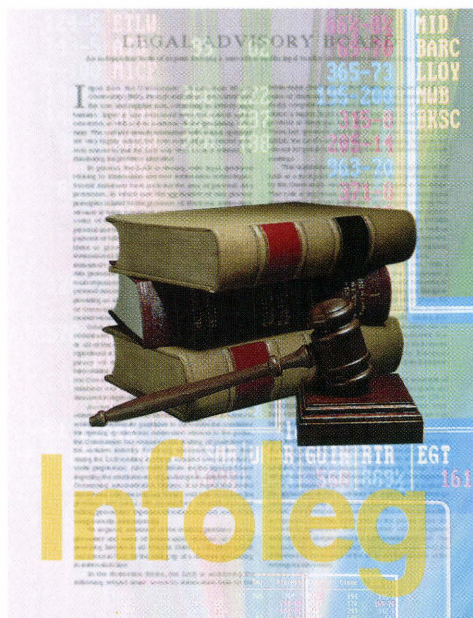
enables LAB experts to keep in touch with the market's demands and the views of operator in the field.

As the trend in recent years has been towards subject specialization rather than generalization in information and information technology law, it has been decided to expand the list of potential LAB experts so that an adequate number of specialists from each Member State is available on each of the subjects addressed. In building up a pool of relevant subject specialists, the cooperation of national delegations on the Impact Programme Committee (IPC) was sought at their meeting on 1 April this year. This proved very productive and a structure for the future was discussed at the LAB meeting on 2 July.

It is proposed to hold a general assembly of the main core of LAB members once or twice per year, and to follow an ad hoc procedure for other meetings, to which the appropriate subject specialists will be invited. For instance, a meeting devoted to personal data protection will not necessarily be attended by the same group of specialists as one on legal protection of databases. Such a procedure will help to exploit specific expertise and encourage active participation by the selected experts. Creation of a LAB members' steering committee, which will help to manage LAB activities, is also being considered.

The element of active participation was achieved at the LAB meeting in July, where participants summarized the current legal activities in their respective countries. This produced an interesting overview of current European information law developments. It is hoped that the network established will also exchange information concerning legal developments in Member States throughout the year, for example by preparing short summaries on issues of interest (e.g. computer fraud and personal data protection) which may be included in LAB bulletins.

This leads to the subject of LAB publications in general. As a follow-up to meetings, reports are published detailing the discussion proceedings. Information/discussion documents will also be prepared under a contract known as Infoleg.

In addition, studies are undertaken. For example, Publaw 1 is a comparative study of the situation in Member States regarding commercialization of public information. Publaw 2 evaluates the application of the guidelines for improving the synergy between the public and private sectors in the information market, and investigates policies in the USA on the availability and granting of public information to the private sector for commercial exploitation. This second study will be completed early next year and

presented at a LAB meeting in March. The decision on possible related Community action will be influenced by the findings of the study and the outcome of the subsequent discussion. Many of the legal issues affecting the development of the information services market (intellectual property, data privacy, liability, authentication of electronic signatures, etc.) have implications extending beyond the scope of the Impact programme. However, the LAB's main core of current activities is directly linked to its advisory role within Impact - overcoming legal and administrative barriers to the internal information services market.

Input from the Commission's Information Market Observatory (IMO), through analysis of the market from the user and supplier side, could help to identify legal barriers. Input is also welcomed from the market actors concerned, as well as from academic circles specialising in the field. The contacts already established with market operators are very highly valued, but even more input is needed from such sources so that the LAB may work towards solutions for eliminating the problems identified.

In general, the LAB is dealing with legal questions relating to information and new information technologies. Recent initiatives have included the area of personal data protection, in which case the application of data privacy principles related to the provision of electronic information services is being monitored and the drawing up of European codes of conduct encouraged. Nowadays, with so many personal and business transactions leaving an electronic trace - payment of bills, health records, administrative records and so all - there is growing concern that existing national and international legislation does not satisfactorily cover the individual's rights to protection. A draft directive on personal data protection was adopted by the Commission in 1990, the main objectives of which are to ensure the free circulation of personal data necessary for establishing the internal market while providing an adequate level of protection, and to prevent abuse of Community citizens' personal data in third countries. A revised version will be proposed to the Council this autumn.

Other investigations have concerned the legal protection of databases. In this domain, piracy is particularly easy as some or all of the contents of databases can be downloaded and reproduced at low cost and high speed. To combat international piracy of databases, the Commission has proposed harmonizing the legal protection of databases produced within the Community. A draft directive on legal protection of databases was adopted by the Commission in January and discussed in depth during the LAB meeting on 1 July.

Access to information services in general (such as videotex and audiotex) has also received attention. In efforts to establish Community guidelines to harmonize the conditions for opening up electronic information services to the public, the Commission has welcomed the drafting of guidelines by the audiotex industry. Following discussion of a first draft during the LAB meeting in March, a

It is important to harmonize the legal and regulatory environment of electronic information throughout the European Community

revised code of conduct is under preparation. Also under debate are the legal problems impeding the establishment of pan-European videotex services. Concerning administrative barriers, it is hoped that useful discussions with the relevant bodies will help to reduce the problems associated with inconsistent administration and billing procedures experienced nationally and, even more conspicuously, internationally.

To improve awareness of the existing problems among providers and users of information services, as well as practising lawyers in all Member States, a call for proposals was issued in June for the setting up of a database specialising in information law.

In the short-term future, the LAB is addressing the following subject areas: access to information held by the public sector (the Publaw 2 study referred to earlier); the proof value of electronic documents (based on an existing Probat study); computer-related fraud; and the question of VAT tariffs, where a higher level of VAT is imposed on information products in electronic form than on paper-based products. These last questions clearly go beyond the domain of DGXIII/E; the LAB's involvement lies in bringing together the relevant EC parties and market operators for discussion at LAB meetings.

This orientation towards increasing the recognition of the LAB as a focal point for new IT-related legal problems faced by the Commission services will be developed in the future. This role is important, as information law has horizontal characteristics and new information technologies have become part of several Community projects and programmes beyond Impact and beyond DGXIII. Existing examples are DGXIII programmes such as Tedis, Race, Delta and Aim, as well as activities of other DGs in the areas of telepayment, telemarketing, banking, consumer protection and national archiving, where electronic information flow is involved.

The year ahead promises to be a busy one, with a provisional calendar of events scheduled that will provide a forum for LAB experts, market operators and end-users to identify and debate the legal barriers confronting the European information services market. After the initial study phase, the time is now right for action and for the Commission to draw conclusions. When considered appropriate, taking into consideration the principle of subsidiarity, initiatives will be undertaken for the removal of the barriers discussed. It is important to harmonize the legal and regulatory environment for electronic information throughout the European Community as a necessary condition for a pan-European information services market. Documentation will be made as widely available as possible to interested parties. A list of available reports and studies may be obtained from:

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Wolfgang Huber *DGXIII*

PHARE

Efforts by the European Community's Phare programme to help restructure the economies of central and eastern Europe, and their telecommunications sectors in particular, are beginning to generate the momentum required for a real lift-off.

THE FIRST PHARE PROJECTS in a number of these countries are well underway and the fruits of studies on regulation, tariff and technology issues are having a practical impact on the countries' decisions on how to develop their telecoms sectors.

Commission (DGXIII) staff have been involved in setting up these projects in Poland, Czechoslovakia and Bulgaria. Now they are working on similar efforts in Hungary and Romania, and on a `horizontal' training effort in all five countries.

Work has also started on laying the foundations for technical assistance to the New Independent States (ex-Soviet republics) where the EC is providing support under the Tacis programme in a similar way to Phare.

The Phare programme has been in operation for more than two years now and in that time has expanded from Poland and Hungary to include Bulgaria, Czechoslovakia, Romania, Albania and the Baltic states. The budget, directly managed by DG I, has grown to ECU 1 billion in 1992.

In the telecoms sector, Phare has aimed to contribute grants to fund technical assistance on consultancy, studies, training and pilot projects. Full-scale infrastructure investment is the province of the various development banks and the private sector. At this stage it is much more a case of deciding how many operators will be in the market and to what rules they play than encouraging use of the latest fax, digital, or mobile service. These should follow if the market conditions are right.

Bulgaria, Czechoslovakia and Poland have selected the telecoms sector as a priority for assistance. As a result,

projects are most advanced in these three countries. In each case DGX III has provided technical input to DG I on what the projects should include.

In Bulgaria, a major study has been started to prepare the ground for investment by a consortium led by the European Investment Bank (EIB). An interim policy and regulatory study has already been completed. In Czechoslovakia, a major sector structure and tariff study is nearing completion.

In Poland, a contract for implementation of a rural telecommunications demonstration project has been signed. This will set up three pilot sites and a development centre. Some Phare support has also been given to the main operator in managing the World Bank and EIB loans. A study on connection charges might be the next subject of interest.

Thus, Phare has already committed ECU 11 million to Poland, ECU 6 m to Czechoslovakia (with a possible further ECU 6 m in the pipeline), and ECU 3 m to Bulgaria. Another ECU 3 m is under consideration for Romania (in connection with an EBRD loan) and ECU 7 m has been allocated for a training project covering five countries. Hungary, which has not yet included telecoms as a Phare priority, will now join this training programme, to be led by Bulgaria. A secretariat in Sofia, co-financed by the Bulgarians, will manage the programme, which is to be a genuine 'regional' effort.

These countries need investment quickly and the studies set the framework for regulating the marketing and the various operators. This includes resolving an uncertain legal position on property ownership in many of the countries as well as telecom standards.

The Czechoslovak experience is a useful model of how Phare can operate in the telecoms sector.

Phare rules specify that countries themselves choose how they wish to spend their grants after widespread consultation with the Commission. In the Czechoslovak case, it was decided to spend the major part of the first ECU 6 m on consultancy to study a new regulatory structure, competition and related issues.

At an early stage the Commission was aware that the division of competence within the country could change in the course of the work and the study should be managed to take this into account. Another aim was widespread consultation between the various government departments involved, in order to obtain consensus solutions. This was not established practice before.

In first instance, a number of narrow or rather isolated project proposals were being put forward. Wider consultation produced the more ambitious project which is already guiding the sector.

The Commission urged the setting up of a steering committee representing all the parties involved: the Czech and Slovak republics' phone companies, the two radiocommunication companies, the telecoms ministries at federal and republic level and the competition authorities.

The committee proved a key in consensus building as the regulatory study got under way and reported its findings to the committee. There are hopes that major users will soon be represented on the committee too.

The Czechoslovak administration has become more open and appreciates the advantage of the committee, which also includes development bank representatives. The vice-minister who chairs the meeting is able to build a strong case for change to put to politicians.

Of course, the future of the sector after the break-up of the Czechoslovak federation is not completely clear and this will come as the study is due for completion. Privatization is another factor which complicates regulation along traditional continental European lines.

During the study, a plan to licence a second voice operator with a foreign partner came to light. This was planned outside the consensus-building in the steering committee and upset development banks which were expecting to fund a single operator.

However, after discussion in the steering committee, the problem was resolved by temporarily shelving the project for a second operator. It had proved another useful example of how consensus-building had to involve all parties.

Further projects out of the ECU 6 m Czechoslovak budget are just being launched. These cover more technical aspects of the regulatory regimes, such as setting up a laboratory for approval of equipment to European standards. Another project will handle training.

But setting the right regulatory regime is key. It should allow development banks to lend on a secure basis and for operators, users and manufacturers to operate in a market economy where the forces of competition are not allowed to discriminate between players.

Many of the other central and eastern European states will go through the same process in setting up a framework for telecom regulation as Czechoslovakia. Under Tacis, the new Independent States will join too in that process of modernization.

In 1991, the indicative Tacis programme for the Soviet Union did not include telecoms as a priority. Since the break-up of the Soviet Union last year that has changed, and now Russia and the Ukraine are both keen to use Tacis funds for telecom projects. For this year, 1992, amounts of respectively ECU 6 m and ECU 1 m have been set aside already.

The CEPT is also keen to assist the development of the former East and Soviet blocs. Now that many countries of the region have joined CEPT, there is indeed an opportunity for sharing experiences, both in the operating and the regulatory fields, between the west European telecom authorities and their new partners. The Commission will be closely associated with the planning of these efforts.

The Phare and Tacis programmes can provide the foundations for all these new countries to build their own successful and liberalized telecom sectors, but it will take much more than money. Boosting their telecommunications will require a long-term commitment in policy, management and human resources. ■

Nigel Tutt *journalist*

Providing the foundations for the central and eastern European countries to build their own successful and liberalized telecommunications sectors

EUROCHIP

European cooperation in training highly qualified VLSI microchip designers

THE ESPRIT VLSI Design Training Action is set to continue for a further three years following the successful completion of its first phase. Since its inception in October 1989, this initiative has developed from a pilot scheme for about 50 academic institutions to the present mainstream operation providing VLSI design training support for more than 250 universities and polytechnics throughout the Community.

The main aim of the VLSI Design Training Action is to provide a solid basis at European level for the training of highly qualified VLSI designers. By coordinating fabrication and centralizing software and hardware procurement, services can be offered which would be beyond the reach of individual training institutes. Specialists trained with the help of the resources provided will apply their knowledge to exploiting microelectronics in advanced processing, products and services in commerce and industry.

For some years Europe had been losing ground in key IT areas to its major international competitors in the US and the Far East. The idea behind this scheme to boost the training of European IT engineers was to meet the clear need for an effort by the Community as a whole to make the most of the VLSI design potential in academic institutions. Modest resources strategically deployed could help both increase the number of

trained engineers and enhance the effectiveness of the training provided by academic institutions. Although a number of national schemes had been launched to meet the training requirements, the problems were that these efforts might not suffice and there was a lack of harmonization of the software, hardware and circuit fabrication resources in use.

The VLSI Design Training Action supports training institutions by providing CAD software, hardware such as workstations and integrated circuit testers, free access to circuit fabrication, and financial backing for lectureship posts in up to 50 academic institutions. It has resulted in the formation of an additional group of training institutions provided with free circuit fabrication and CAD software at advantageous prices. Continuing demand from academic institutions to take part has led to the opening of the scheme to any appropriate Community training institution on a "pay-as-you-use" basis.

With the help of a steering board, DGXIII selected five national information technology institutes to provide the service framework for the VLSI initiative. The resulting consortium of the Institut National Polytechnique de Grenoble (France), Denmarks Tekniske Hojskole (Denmark), Gesellschaft Für Mathematik und Datenverarbeitung (Germany), Interuniversitair Micro-electronics Centrum (Belgium) and the Rutherford Appleton Laboratory (United Kingdom) now runs the EUROCHIP organization, which is responsible for all aspects of the service provided. EUROCHIP staff are all VLSI specialists with experience in the design, testing and production of integrated circuits and have been active in their national schemes. EUROCHIP is the link between the training institutions and the industrial resources they need.

In setting up the scheme, careful consideration was given to the selection of resources to be offered. These included appropriate software at affordable prices, suitable hardware and solid, reliable routes to modern fabrication technologies. Effective distribution arrangements for CAD software and associated documentation were established, and an interface between academic designers and commercial circuit fabricators implemented. Training was initiated for academic instructors in the use of the selected CAD software and a secretariat was put in place to handle the necessary contracts, software licences, distribution mechanisms, information dissemination and enquiries.

The Community's academic institutions have responded enthusiastically to the opportunities presented to them. More than 220 universities and polytechnics are now taking part in the VLSI Design Training Action. Some 800 courses have already provided an estimated 1.7 million student course-hours of training. The resources provided under the action have been augmented several times over by the

The original goal of tripling the previous Community total of engineers trained in VLSI design each year has already been achieved

institutions from their own funds. In 1990-1991, 24 fabrication runs yielded more than 5,500 sq.mm of drawn area involving over 400 circuits from 67 institutions. By the end of 1991 more than 5000 students - 500 more than the targeted number - had received VLSI design training. The high level of interest was also illustrated by the response to a three-day EUROCHIP workshop held in Grenoble last autumn which attracted 300 participants from all over Europe including Czechoslovakia, Hungary and Poland. This year's workshop (30 September - 2 October in Grenoble) is expected to attract even broader interest from academia and industry.

The original goal of tripling the previous Community total of engineers trained in VLSI design each year has

already been achieved. The action has brought a new harmonization to VLSI design training in the Community's academic institutions. During the second phase, it will be open to any appropriate academic institution up to an anticipated number of 300. The services offered are to be enhanced consistently with the overall aim of providing state-of-the-art facilities for high calibre industry-relevant VLSI design training by Europe's universities and polytechnics. Research laboratories could also be given access to prototype production facilities for training purposes.

These developments are meeting the human resources needs of European industrial and commercial companies, large and small, in the many sectors of activity where the use of tailor-made chips is an economic necessity.

In the longer term, the robust framework which has been established will promote continuing cooperation and will help ensure that the contacts and partnerships forged so far will continue to enhance the European training effort. The VLSI Design Training Action is already designing for tomorrow's Europe. ■

Klaus Woelcken *DG XIII*

Copyright protection for materials in electronic formats

THE CITED SOLUTION

One of the biggest clouds on the horizon of electronic information is the problem of protection. The intellectual property industry is big business and cannot afford to allow its products to be copied, repackaged, pirated or distributed without ensuring adequate economic compensation.

Each piece of material which is made available in digital form, as well as all those that are in more conventional formats, contains intellectual property created by, and belonging to, a variety of creators. A straightforward text may contain contributions by many different authors; it may be illustrated with visual images which are separately owned; a sound recording will contain music, words and arrangements as well as performing rights for the musicians, and a video recording may contain all these, plus rights for dancers or actors. Not only can material be manipulated within its own form but multimedia packages can be created and information from different sources downloaded, copied, edited and repackaged to suit the user or generate completely new products for sale or hire on the open information market.

A recent survey by the European Information Industry Association (EIIA) estimated that the value of the supply side alone of the professional electronic services industry is about ECU 3.5 billion, and that was in 1990. Moreover, creators are unwilling to lose their control over how their intellectual property is used, regardless of the economics. Not everyone wants their music used to promote consumer durables or their writings used in political campaigns.

Although digital technology brings so many possibilities, it also therefore poses considerable threats to the owners of the rights in the material. The fact that the content can be copied so easily is itself a major problem: the quality of copies made digitally is such that it is impossible to know what generation a copy actually is. When ease and quality combine, this can be a recipe for unauthorized copying, pirating and use.

Some information providers are already clearly reluctant to make their products available in digital form simply because of the threat that copyright infringement poses. For

example, some companies will not provide information such as statistical data to the Questel/Minitel system in France because of its high value. A similar fear in the music recording industry has inhibited the introduction of Digital Audio Tape (DAT). But "you can't stop progress". In the end the question surrounding copyright materials is not so much how to prevent as how to monitor access and use. Generally, intellectual property is made available to the public so that it can be used, and mechanisms which simply prevent use eventually defeat the reason for which the material was created at all. The real issue is control linked to compensation. The ideal is a system which can monitor use, limit where necessary who uses what and how, and provide a mechanism to pay the owner for the use to which the property is put.

CITED (Copyright in Transmitted Electronic Documents) is an Esprit II project which has successfully developed a model for such a system. The partners in the project, from France, the Netherlands, Germany, Spain, the UK and Belgium, include electronic publishers, a computer manufacturer, a library, a barrister, security and software specialists and experts in databases and networking.

The consortium covers not only a good spread of EC countries but also the whole technical range of digital information. Although not evident from the list (see opposite), digital sound expertise is available through the National Sound Archive of the British Library, which has extensive experience in digital sound recording techniques.

The basic technical philosophy of the CITED project is that, since we are dealing with information which is stored and, more particularly, processed digitally, it is therefore possible, in the digital environment, to control the processes which are an inevitable part of digital technology and in consequence control the copying of copyright material. In the present context, it is immaterial what information is represented by the digital signal in any given case; what is now possible is the development of a generic model of copyright protection of digital information (the CITED model), together with corresponding

guidelines and toolkits to enable the model to be implemented in specified domains. The generic nature of the CITED model means that it can be relatively easily mapped on to the legal background, both as it currently stands and within its foreseen developments. The generic model is also capable of acting as a standard for conformance testing of proprietary systems of information protection, to determine whether they in fact meet all the needs of the actors in the information industry. CITED compliance with the model can be established to a range of standards and via a number of different technical strategies. The level of protection can be defined, depending on the nature of the information to be protected, and the rights of various CITED users can be specified. These rights are specific to the users, but the effective right to gain access to a particular piece of information will in practice depend on the protection level of that information.

At the technical level, the CITED model is primarily concerned with the relationship between events and rights. The term "events" covers a range of occurrences, which may be permitted or not but which are significant within the CITED environment, while the term "rights" refers to rights possessed by a range of actors in the CITED environment, who may be owners of copyright, distributors of copyright material or end users of copyright material. The CITED model is concerned with the detection or "capture" of events and the response to the capture, which will depend on the currently-held rights of the relevant actors. A critical area is in the detection of non-permitted events, or "threats", and the application of countermeasures to meet those threats. The environment is dynamic, since the rights of any actor may be updated - for example, a money-related "right" such as a credit rating for royalty payments.

Inevitably, some of the technical tools used in the CITED project are adopted from the repertoire developed for the security industry. However, within the CITED project, these are viewed as placing a protective guard around the copyright information in a manner which, while preventing unauthorized copying, nevertheless permits

convenient access for authorized use. Various tools may be used in various situations but the intention is always that the system, while protecting the rights of copyright holders, shall be as transparent as possible to its end users. The project has already produced a detailed survey of the functions which will be required by a user of CITED copyright protection mechanisms in a wide range of fields and, on this basis, has constructed the conceptual model of the CITED copyright protection system. The project consortium is currently involved in validating the results of the survey by two means. The first consists of the development of a significant number of scenarios on to which the model may be mapped. These scenarios are being developed in consultation with the users in the various fields; the conceptual model will be refined if necessary to accommodate needs identified by users. The second consists of the design and testing of actual demonstrators of the CITED solution in a number of different technical areas.

The first demonstrator is being set up in the context of on-line retrieval of stored document images. It is clear that providing on-line access to full-text image databases introduces a large risk that copyright material will be pirated. The demonstrator is based on the ADONIS document supply system which, for the purposes of the experiment, has been integrated with an information retrieval tool developed by Bull in an earlier EC research project. The demonstrator will permit an authorized user, identified by a smart card, to log on to the system and to download copies of documents under controlled conditions, subject to the status and credit rating he possesses. The downloading activity is monitored by the system and the user's credit reduced by an amount corresponding to the access gained to the system. The demonstrator includes a user-right management system, which keeps track of the privileges of the user and may be used to vary those privilege. The demonstrator, which will stimulate a remote-access network-based system, will be used in a real document supply environment to test the comprehensiveness of the CITED protection system.

The second demonstrator is intended to address the problems of the audio recording industry. Here, in the entertainment market, the end users, unlike the users in the first demonstrator, are not individually known to the manufacturers of the recording and the "information", i.e. the recorded sound, is provided on a physical carrier which is sold through retail outlets. The demonstrator relies on the interaction between the information on the carrier and the hardware on which it is used. Planned to use Write Once Read Many (WORM) devices, the demonstrator is intended to show the use of CITED protected recordings and the use of a royalty payment process to authorize playing of the recording. A range of scenarios will be included in the simulation to take account of the various cultural, economic and infrastructural variations which will be found in the different environments. The demonstrator is also intended to incorporate a facility to play back the recorded material for a single monitoring or time-shifted playing.

On the basis of their wide experience across the whole range of the information industry, the partners in the CITED project have been able to design a coherent model for the protection of all kinds of copyright information in digital form. They have shown how the model can form a consistent basis for a repertoire of technological guidelines and tools for the protection of copyright in digital materials in various fields of the information industry. The demonstrators and test scenarios are being used to validate the model, and to develop the guidelines and tools by which the problem of copyright protection in this area can be met. Indeed, the existing demonstrators are already producing tools which will be of direct commercial value and the CITED consortium will design further demonstrators to show the application of the CITED approach to other information industry fields, and to allow the development of the appropriate further guidelines and tools.

The consortium is also addressing the question of legal and technical standards in relation to the CITED approach. These concern the relationship of the CITED model to the legal framework, particularly as it is developing as a result of EC directives on such matters as software and database protection, but also in relation to data protection and privacy laws. Attention is particularly directed to international developments under the auspices of the World Intellectual Property Organization (WIPO). At a technical level, the question of standardization of CITED rights, event capture and rights logging is being addressed, and the possibility of an EDI-like communication of rights between separate CITED systems is being studied. This could develop towards a pan-European CITED clearance centre to provide the necessary infrastructure for a comprehensive system of copyright protection. ■

Graham P. Cornish *British Library*
Jean-François Boisson *Bull*

CITED Partners		
Bull SA	France	Computer manufacturer
ACK	Spain	Electronic publisher
British Library	UK	Legal deposit library
Bureau Van Dijk	Belgium	CD-ROM publisher
Charles Clark	UK	Barrister-at-law
CIRU	UK	Consultants
Elsevier Science Publishers	NL	Electronic publishers
NTE	Germany	Research consultancy
Oxford University Press	UK	Electronic publishing
Sagem	France	Security specialists
Teles	Germany	Software/security
Tele-systemes	France	Database/networking

European Forum of Information Technology and Telecommunications Users
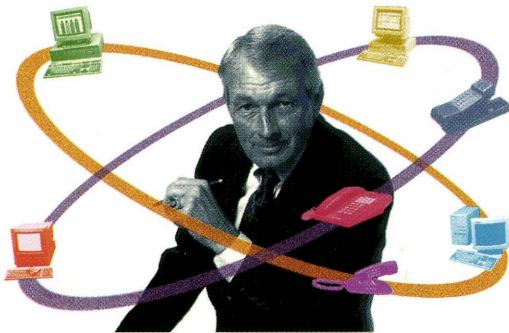
The European Forum of Information Technology and Telecommunication Users (EFITTU) was set up in 1991 at the instigation of two European users' associations, CECUA (the Confederation of European Computer Users Associations) and ECTUA (the European Council of Telecommunications Users Associations) and with the support of the Commission. Its main objective is to enable the numerous user organizations throughout Europe to have their opinions heard on matters which affect the achievement of the single European market in the areas of information technology and telecommunications.

The first conference of the European Forum was held in Brussels on 6-7 July on the premises of the European Parliament. Over 200 representatives of users, equipment manufacturers, service companies and operators held a wide-ranging exchange of views on the major issue of European networks, with the active involvement of representatives from DG XIII.This article provides an overview of the subjects discussed and a synopsis of the viewpoints aired.

In a brief welcoming address, CECUA chairman Tilo Steinbrinck (President in Office of the Forum), reminded the audience that this first meeting should be capable of taking up the challenges of the single market: namely to solve communication problems via appropriate standards, enable the administrative authorities to interconnect without difficulty, and to guarantee data protection and safety.

On behalf of ECTUA, Georges Lecocq indicated the requirements and the weak points. "Our subject matters are standardization, rented lines, service quality, network management and the issues concerning call charges. Our needs cover network interoperability, at structural service levels. We call for interface standardization. We would also like to have a general idea of the basic services available, the VANs and intelligent networks. We have some weak points: international communications are still in an empirical state, and we would like to have common standards in this area. We support ONP (Open Network Provision) and any efforts which can be made in the field of rented lines, voice telephony and data transmission".

On behalf of the Commission, Michael Hardy, recently appointed director of telecommunications policy, stressed the interest in having numerous user associations, given that the needs are many and varied and change with the passage of time. He felt that chapter XII of the Maastricht Treaty - on telematics networks for public administrations - represents a considerable challenge for the European IT and telecommunications industry as well as for the public authorities. He emphasised the user-related aspect of these efforts. Mr Hardy expressed the hope that the Commission will be given a stable basis for carrying out its work. "We need both a wide range of views and a unanimity which will enable us to draw up optimal strategies. The experience of SWIFT demonstrates that it is possible to achieve promising market openings in Europe and beyond". The Commission took the view that the Forum must become the ideal framework in which associations can come together on their own initiative, while maintaining their distinct identities and carrying out their sectoral activities.

Carlo Cilento of Italtel, speaking on behalf of ECMA (the European Computer Manufacturers Association), said that to use technology is one thing but to produce it is quite another. "The Commission's R&D programmes are unduly geared towards pre-competitive measures", he said, adding that "R&D is extremely expensive and we have to supply the products". There are currently around 35 million PCs in Europe which are not connected. Can ONP be adapted to deal with this situation, will liberalization be carried out under the control of the public operators, will deregulation leave market forces to be the sole arbiters, and will privatization improve quality? Michael Hardy answered that the directive on 2 MB exchanges is now being implemented, while the measures concerning fibre optic networks must cover new infrastructures. In video-conferencing, a 64 Kbyte switched network is operational. "Furthermore, European industrialists are open to cooperation on R&D with the European Communities".

The delegates then split up into four specialist working groups:
- Communicating in a united Europe.
- Progress on standardization for Europe
- Information technologies in European public administration.
- Data protection for Europeans.

Group 1: Communicating in a united Europe

Olivier Voirin (France Telecom) wondered whether interoperability, the end of the monopolies and the advent of competition would in themselves be capable of satisfying consumer demands. With regard to ONP, he asked who would guarantee non-discrimination for access to networks. Mr Hardy emphasised that competition was needed and that the needs of organizations must be satisfied. A major UK user has already confirmed that the initial effect of competition is not the redistribution of market shares but rather an improvement in the quality of the service. ECTUA chairman Walter Schäfer emphasised the leeway of a number of Member States, which is accentuating compared to the others. "In drawing up a business development strategy", one delegate felt, "we want to be in a position to correctly budget and plan our activities across the entire territory of the single market, and to ensure that we have the facilities foreseen in time".

Françoise Naisse outlined the standard used in the Assurnet network, which was carried out by EDIFACT, commenced operations in 1986, currently covers 60 companies in Belgium, is quietly restructuring the presentation and distribution of its products, and is now being used in other European countries. A golden rule: follow up the new needs of the customers. Margaret Haffenden (RINET) emphasised the difficulty of developing new telematics services at international level, even in the cases of existing human networks, over and above purely technical considerations.

Jean-Pierre Masclet of La Redoute (the French leader in distance shopping and the sixth-largest in the world) described the needs of his

company with regard to the pan-European market. With over 17,000 information services available on Minitel, this network gives La Redoute some 8 million faithful customers and 18 million families in France. However, while the approximate number of Minitels produced and sold is known, there is no way of telling how many customers use a PC to gain access to Minitel. Mr Masclet said Minitel lends itself ideally to information in the form of characters, but the presentation of products requires a fixed or mobile video picture in the home: this will have to wait for the ISDN networks or take other media forms such as TV, audiotex or video disc. The question is knowing when viable pan-European networks will be available.

Group 2: Progress on standardization for Europe

After a statement by Michel Audoux (DG XIII) on the Commission's views on standardization, T. Jacobson of Telebit I/S outlined several concrete examples of open networks. Brian Bolton (Open Systems Testing Consortium) summarized the control procedures which underline the mutual recognition of conformity tests, emphasised their importance, in particular in the area of trans-European networks between public administration, and highlighted the contacts between conformity tests and interoperability tests. "The combination of these tests provides a full test service", he said, "whose aim is to provide the user with approved products whose interoperability has been demonstrated". Interoperability in the SPAG sense was then outlined by Patrice d'Oultremont, who extolled the virtues of PSI (Process-to-Interoperability) certification, a procedure by which the interoperability of components from different producers can be guaranteed. Finally, on the question of open systems, Norman Lamb outlined acquisition strategies developed by the UK GOSIP initiative and the contribution of EPHOS. A delegate asked the Commission to set up the necessary contacts for the recognition of European standards by US standardization agencies. "Recently, a meeting was held in Vancouver at which we wanted to speak about the use of EDIFACT; but nobody was interested, and the US side only wanted to talk about the X12, the equivalent to CEN. The Commission should capitalize the EDIFACT standard at ISO level. We should also make an

effort in Europe to maximize the advantages of our languages. With the software products available on the market, it is well-nigh impossible to operate multilingual applications which we need in companies with a multilingual workforce. The extra cost this entails is enormous. Has the Commission any suggestions on this subject? Where can this problem be dealt with?"

Group 3: Information technologies in European public administration

Jean-Paul Baquiast from CIIBA (information technology and office automation in the French civil service) raised the strategic question of trans-European networks, a subject to be developed by Emile Peeters on behalf of DG XIII. "These networks", said Mr Baquiast, "are directly linked to the removal of inter-Community borders and are a prerequisite for the efficient operation of the customs activities of the Community, VAT systems, statistics, the police force and social security. Other areas will be explored, such as the environment, health, education and employment. All these projects require substantial investment, cooperation with industrial partners and global coordination in line with the European Commission. The Commission is working on new initiatives which should allow the interconnection of telematics networks to public administrations, in compliance with the Maastricht Treaty's title XII on the transport, telecommunications and energy sectors. The Telematics Administration Group will coordinate the strategy and the work, the role of DG XIII being that of an institutional interface between the Member States, a director of feasibility studies, and as a prescriber of common specifications which will subsequently have to be certified. The only costs which have to be borne by the Commission are those which correspond to the tasks it carries out", said Mr Baquiast, "and the setting up national interfaces with the common networks will be borne by the Member States, who will have to adjust their budgets for this, and carry out an estimate of the necessary costs. For the peripheral regions of the Community, it should if necessary be possible to use the Structural Fund, and the new Cohesion Fund", he added. In conclusion, he said the current legal vacuum with regard to data protection is a major obstacle to the implementation of administrative services via trans-European networks, which are desperately needed.

Group 4: Data protection for Europeans

Turning to the service industries, and in particular to the insurance sector, Michael Fitzgerald of the Irish Insurance Federation felt the Commission too frequently took an attitude which consisted of suspecting the private sector of being prepared to act in a manner which is contrary to the interests of the citizens. According to Mr Fitzgerald, the cost of implementing such legislation, which is borne by the insurance companies, far outweighs the marginal benefit to insurance policy holders, in terms of premiums. However, the point raised by Mr Fitzgerald was strongly contested by the idea advanced by Isabelle de Lamberterie, research director at CNRS, Paris, and chairman of the data protection group on behalf of CECUA. "In France", she reminded her audience, "the Information Technology and Freedom Committee was set up before the networks, and prior to the advent of Minitel in particular. Experience has demonstrated that this committee operates well and that the legislation is good, even if it requires some modification. In any event, it has not been an impediment to business. The principle we defend is that data provided by an individual should not be deflected from the original objective".

Conclusions

The European Forum of IT and telecoms users this summer was held in an atmosphere strained at times but always characterized by very strong interest all round. This inaugural meeting, organized at the initiative of the users' associations, is an important step in a dialogue necessary in drawing up and implementing the Community policy in the field of information technology and telecommunications. The documents published at the Forum provide a detailed account of the key issues summarized above. The participants expressed the hope that this joint approach will be continued. Closing the working groups, the Forum representatives and the Commission undertook to do their utmost to ensure that the voices of the users will be more present on Commission bodies. ■

Marcel Vanden Clooster, *journalist*

Interactive Multimedia

An innovative range of interactive compact disc systems goes on sale across Europe this autumn, opening up the market to a new catalogue of sophisticated multi-media information combining sound, images and data on a standard-size CD and at little more than the price of a conventional CD.

THE COMPACT Disc Interactive (CD-I) system from Philips, the Dutch consumer electronics leader, is recognized worldwide as a breakthrough in television viewing and digital video. A fully interactive programme allows viewers to use their TV screens with the aid of a special CD player, incorporating a microcomputer and a mouse, to delve into an entire library of information, entertainment and more, in their own time, from their desk or armchair.

The system is good news for bookworms and libraries running short of space, as huge amounts of written information can be stored on a single CD-I and accessed via a television set at home, at work or at school. Tourist attractions may soon be selling CDs in their souvenir shops rather than the increasingly outmoded pack of colour slides.

Because the system can draw together data, maps, text, sound, photographs and film, the possibilities are endless. The enormous volume of data that can be stored on a single disc can provide a range of products from industrial training packages to games of remarkable sophistication, such as a disconcertingly realistic game of remote-control golf, with the swings of the club operated by the mouse and realistic views of drives and putting greens.

This commercial system has grown from Community-sponsored research, the Domesday project, launched back in December 1985 under the Esprit information technology programme.

Domesday brought together Philips Electronics, Logica and Acorn Computers to develop a small-scale and effective method for storing and retrieving large volumes of data, voice and moving and still pictures.

The system's first test came when the British Broadcasting Corporation (BBC) was asked to make a series to

commemorate the 900th anniversary of the Domesday Book, the tax register ordered by William the Conqueror that became a snapshot of daily life in the 11th century.

The programme makers soon ran up against the same problem that the clerks had centuries earlier: how best to store the information they had collected to make it useful?

The modern answer is more effective than the 11th century solution, which relied on hours of laborious page-turning. Using Philips' technology, the project managed to store 1 Gigabyte of data, plus 100,000 still photographs and 30 film sequences complete with sound, on two LV(Laservision)-ROM videodiscs.

The final product, the Domesday Gallery, included the complete results of the 1981 UK population census, 10,000 sets of statistics, 26,000 Ordnance Survey maps, 20,000 pictures (not including 10,000 pictures assembled in "surrogate walks" to allow the viewer to roam the landscape), plus more than 20,000 texts from articles to essays, and the BBC's *Daily Life in the 1980s* series. All stored on just two discs.

Domesday proved that a compact electronic storage system capable of offering rapid random access to large volumes of multimedia information was both feasible and practical. Users could have direct access to the information via a pre-programmed index, key questions or a "map-walking" technique.In the years since, Philips has refined and updated the system and the end product looks quite different from the results of the 20th century Domesday book. Now all it takes is a special CD-I player (which also has the sound-only functions of traditional CD), a mouse and a TV set to access the wealth of information contained on one of the growing range of new CD-I discs.

The advent of digital television has increased the opportunities for developing new multimedia projects using computers and digital sound. In future, the distribution of programmes via disc, cable, telephone and broadcast satellites will increase the range of inputs even further.

The CD-I player system went on sale last October in Japan and the United States, where special CD-I players retail at around $800, the price of a top-of-the-range conventional player[1]. There are some 65 software titles already available, retailing at $15-60, and covering the spectrum of uses from data storage and distance-learning to travel guides and games; over 200 more are in development worldwide, in six languages.

Launched in the UK this April, the Philips range was extended into the Netherlands, Belgium, Germany, Switzerland and Austria in September, retailing at around ECU 870.

The language range of the software products has been broadened to include French, German, Spanish, Swedish, Portuguese, Italian and Dutch. Co-productions are already underway linking Philips to established publishing houses including Reader's Digest, the Library of Congress, Berlitz, Bertelsmann, Turner Broadcasting and Time Warner.

At the same time Philips has launched a Photo CD system using either a special Photo CD player or the CD-I system, enabling people to view still photographs on television.

The commercial success of the system now depends on developing new products based on a recognised international standard, ISO 11172, developed in collaboration with the Esprit COMIS project. Philips, together with Sony and Matsushita of Japan, presented a draft CD-I standard in 1988. The following year they released the CD-ROM XA Bridge, a standard designed to bring together the worlds of computers and television.Already a standard for CD-I with full motion video (FMV), developed by the Moving Picture Experts Group last November and based on the Bridge standard, has become the basis for incorporating video sequences with a range of sound qualities into the system. Philips is confident the way is now open for a range of sound-and-vision CDs covering business and entertainment from travel brochures to karaoke. Relatively low costs should also mean the system can be used in a variety of on-the-job training courses and educational programmes. ∎

Marijke J H van Hooren *Philips IMS*
Lucy Walker *journalist*

[1] Following further work on integrated circuits for CD-I players, carried out in partnership with Motorola, Philips now reckons to be able to bring the price down below $600.