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From Gutenberg to multimedia

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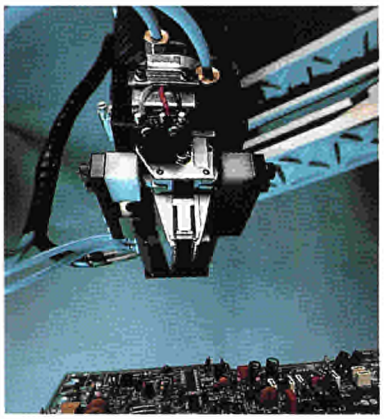

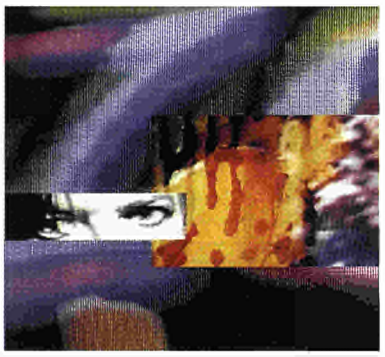

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Editorial

THE WHEELS of the Commission machine turn too slowly, say its critics. Yet its political resolve to implement the guidelines of the White Paper, particularly in the area of trans-European networks of telecommunications, shows its true colours.

As a reminder, on December 5 1993, the Commission adopted the White Paper on "Growth, Competitiveness, Employment: the Challenges and Ways Forward into the 21st Century." This document was well received by the Heads of State and Government, meeting at the Brussels European Council on 10 and 11 December, and the decision was taken to implement a plan of action and a follow-up procedure.

In the more specific area of information and communication infrastructure, the Council called for the rapid creation of a group representing industry and the market in the information and communication technologies sector. This group must report back to the Council's meeting on 24 and 25 June.

This political resolve provided the impetus behind a number of major choices in 1993. Although the completion of the internal market, in place since 1 January 1993, was overshadowed by the deepest economic crisis to hit Europe in the post-war period, 1993 was a year of exceptional achievements. Despite all the fears and difficulties, the Maastricht Treaty was ratified, the monetary system rescued from the worst upheaval that it had ever faced and the GATT negotiations reached a successful conclusion.

Only with steadfast political resolve could the Community have had such a positive year. Where did this come from?

The development of multimedia, interactive and user-friendly communication infrastructure will enable individuals to weave a new network of relationships with one another, with official bodies and with community life overall, and will give these relationships back a value all too often lost.

It stemmed from awareness of the vast changes that the world has witnessed. The Single Market graduated from aim to tangible reality. Moreover – and as stated with clarity in the White Paper – world change in recent years has been even more rapid than that in the Community. Geopolitical developments, notably the collapse of the Communist bloc, combined with the growing globalisation of economic activities – largely under the impetus of information and communication technologies – have changed the face of the world.

In other words, although the Maastricht Treaty was a decisive development on the European political stage, Europe could no longer ignore the fact that at the same time the rest of the world was making a date for a rather different event, where the issue at stake was the Community's place in the world.

The European Union, fresh from the final ratification of the Maastricht Treaty, marked its political debut with a decisive contribution to the conclusion of the GATT accord and, in the process, expressed its determination to strengthen the multilateral trading system.

Consecrating the geopolitical events of the second half of the eighties, in principle this accord opens up positive prospects. Past experience tells us that behind every surge in economic growth lies a qualitative leap in international trade. But changes in competitive balances also imply wide-ranging restructuring of economic activities and a vast re-configuration of professional qualifications.

The political leaders of the EU must shoulder the heavy responsibility of making difficult political choices inherent to this period of change, while firmly maintaining their sights on an open and mutually supportive world. President Delors was the first to express the need for the definition of a strategy fostering growth while managing these adjustments, particularly in the area of employment.

This is why, through adopting the White Paper, the Commission and then the European Council expressed their political resolve to take on these structural adjustments and ensure that they have positive implications for all the Union's citizens. This obviously begs the question of why, against the backdrop just described, the Commission and the Council gave such primordial importance to information infrastructures.

This will not be the first time in our history that political, economic and technological changes are concurrent and open up totally new perspectives.

Information and communication technologies do not just improve business competitiveness. They can also improve the efficiency of our whole social and institutional environment in which these same companies operate, and can contribute at the same time indirectly to furthering competitiveness and the general growth of the European economy.

Information and communication technologies can in addition help meet basic needs, thus stimulating growth and social cohesion. These needs are engendered by the contemporary upheaval in society, in family life and urban civilisation; by the need to preserve the environment and rural areas and by the search for a high quality of life in society. The development of multimedia, interactive and user-friendly communication infrastructures will enable individuals to weave a new network of relationships with one another, with official bodies and with community life overall, and will give these relationships back a value all too often lost.

Little by little, a political vision is emerging where the determining factors in micro and macro-social competitiveness move well beyond the relative level of direct costs. Thus, almost blow for blow, political leaders are observing a situation where, curiously, the characteristics of contemporary society are assuming the main traits of the evolution of information and communication technologies. As a result they are calling for the rapid deployment of communications infrastructure and of the associated applications.

Does the private sector have greater reservations about the role of information infrastructure? While social problems are indicative to political leaders of the importance of such infrastructure, economic leaders are interested primarily in current and future data on the market. Key people in the private sector are aware that the investment required for such infrastructures in the European Union runs into hundreds of billions of ECUs. Their viewpoint may not tally with the political decision-makers' hierarchy of needs. The markets which, apart from the market in professional business information, appear suitable for private investment in infrastructure are almost at the opposite end of the scale of social priorities: video, interactive games, teleshopping, messaging and so on.

Reconciling the political and commercial visions requires a dialogue between political and private decision-makers. What are the regulatory conditions and the incentives and norms which will encourage private investment in such infrastructures? Which ones will lead to an environment where a multitude of initiatives, some complementary, some competitive, can culminate in a coherent infrastructure spanning the entire Union and open to world infrastructure? How can we ensure that these new modes of communication and information are simultaneously at the service of the private economy and of society and its institutions?

A real partnership must be forged in order to set out a deployment strategy for information infrastructures. The report which the group of representatives, chaired by Martin Bangemann, Commissioner, will submit to the Heads of State and Government constitutes the first step along this path. On the basis of this report, the European Council will examine an operational programme defining the precise forms which action will take and how it will be implemented.

In any event, the institutions and companies capable of combining daring with realism will be the ones to reap the new type of comparative advantages which the information society will bring forth. ■

Michel Carpentier *DG XIII*

The EDIfication of the European Union

Electronic data interchange: an everyday tool for trade and industry.

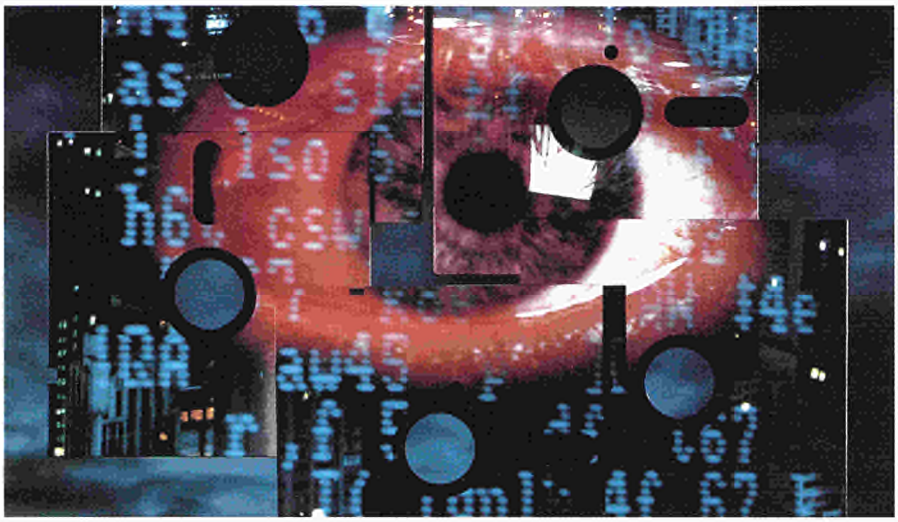
SINCE THE START of the TEDIS programme (Trade Electronic Data Interchange) in 1987, Electronic Data Interchange (EDI) has come a long way. It has rapidly graduated from being a specialised part of information technology to become an everyday tool for trade and industry. Moreover, TEDIS is not part of the Framework Programme for R&D, nor is it concerned with public administrations, except when these exchange data with businesses. Did TEDIS manage to provide a common European framework for businesses in all sectors of industry, enabling them to implement EDI in a consistent and compatible way? Did it also help them become more competitive? Let's take a closer look.

The last few years have seen the EDI message standards development process grow from an informal body of experts into a large global bureaucracy. The increasing scale of the process and its widening geographical scope has led rapidly to difficulties in coordination, which have manifested themselves in message development slowing down and fewer messages progressing to become standards.

Partly this reflects the maturing of the process. But the underlying difficulties also relate to conflicts between the needs of participants; between users who wanted stable messages and others who wanted messages developed rapidly to meet business needs; between users who wanted messages for use in closely defined regional communities and users who wanted universal messages; between users who want messages rapidly available to allow the rapid transformation of their existing trading links and users who wish to take longer to develop messages which will enable the re-engineering of their business. Any standards development process has to reconcile these competing pressures.

The Commission will continue to support the EDIFACT[1] standards through the European standards organisations. It will continue to support communities of Electronic Data Interchange users who wish to migrate from their own interchange formats

[1] The recommendations on Electronic Data Interchange for Administration, Commerce and Transport of the working party on Trade Facilitation of the United Nations Economic Commission for Europe.



The adoption of a Common European Implementation Guide by key European EDI user communities will contribute greatly to the interoperability of EDI systems between different sectors within the European Economic Area.

towards these standards and to encourage the use of EDI throughout all industry sectors. In addition it will ensure that everyone in Europe involved in message development is aware of other parallel activities, whether inside or outside the international standards process.

The TEDIS workprogramme also includes measures aimed at the integration of solutions to the telecommunication issues, legal and security aspects of EDI within particular industry sectors and in multi-sector pan-European projects. It is also concerned with analysing the social and economic impact of EDI.

Support for telecommunication projects concentrates currently on the combined use of EDI and the Integrated Services Digital Network. Work in the legal area aims to identify the real needs of industry for a harmonised legal framework by a close examination of particular implementations. A pilot scheme for issuing certificates and the development of specifications for management messages are the topics in the security area. A range of projects are supported where all these elements are addressed in the context of practical implementations within industry.

Particular results which are worth emphasising include the Memorandum of Understanding for the operation of EDI registration authorities, the work towards a draft Commission recommendation on a European model EDI agreement and the common implementation guidelines.

The Memorandum of Understanding for the operation of EDI registration authorities was finalised in December 1993. The different conventions for identifying senders and receivers of EDI messages has for some time been a problem inhibiting interchange of messages between different sectors. The memorandum lays down a structure and procedures for the operation of registration authorities for EDI names and addresses. Organisations who are, or wish to be, a registration authority for a particular sector or region are invited to sign the memorandum in order to ensure that the same rules are applied throughout Europe.

Work on a European model EDI agreement has been underway since 1989, when an informal group of experts began drafting a European Interchange agreement based on the the best contemporary practice, such as the uniform rules of conduct adopted by the International Chamber of Commerce in 1987 and the various agreements formulated at national level or in use in private companies at the time. This group produced a draft European Model Interchange agreement in 1991 which was comprehensively discussed and improved during the following two years. After a final round of consultation this final version will be put forward as a Commission Recommendation during 1994.

The TEDIS programme is encouraged by the adoption of this common guide by four of the most significant industrial sectors in terms of EDI usage. Four more user groups intend to join the proposal in its second phase.

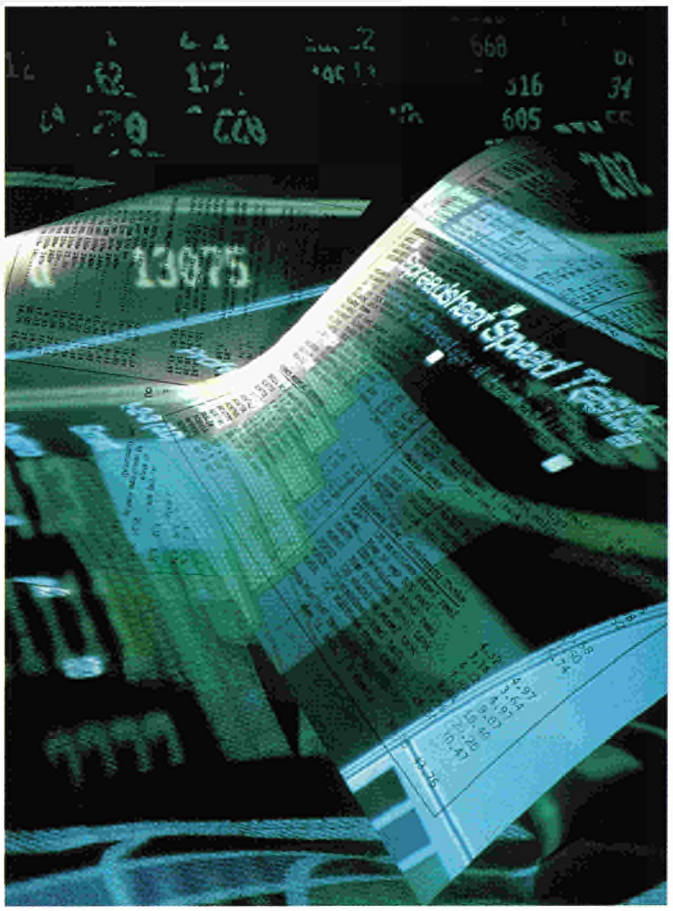
The adoption of a Common European Implementation Guide by key European EDI user communities will contribute greatly to the interoperability of EDI systems between different sectors within the European Economic Area. In a particular EDI implementation, choices must be made when defining the subset of the EDI messages to be used within a specific community of users.

The Common European Implementation Guide is an attempt by the automotive, chemical and electronics industry user groups in Europe, together with the International Article Numbering Association, to agree upon common interpretation and subsets for the most widely used EDI messages, such as purchase orders, delivery advice notes and invoices. The TEDIS programme is encouraged by the adoption of this common guide by four of the most significant industrial sectors in terms of EDI usage. Four more user groups intend to join the proposal in its second phase.

A network of EDI awareness centres has been developed over the last two years which now includes over forty contact points in the European Economic Area. Members of the network include chambers of commerce, regional development agencies, technology or business centres as well as national EDI promotion or trade facilitation associations. These centres will be active participants in other TEDIS projects such as the inventory of European EDI activities and the European EDI reference centre.

Many centres concentrate their effort in those industrial sectors which are most significant in their area, while others focus on particular issues which slow down EDI development in their region. As well as helping to disseminate the results of the TEDIS programme, they continually provide it with feedback on the changing needs and problems experienced by users implementing the technology in their business practice. ■

Robert Wakeling *DG III*



Advanced television
between the lines

A FINGER TOUCHES the TV remote control . . . and three beams cut across the living room: red, green and blue converge into the life-size, 3D hologram images of a woman and her young son. There is a burst of canned laughter. The holograms speak dialogue typical of an American comedy series. They move naturally round all the furniture in the room, oblivious to the family viewing them. A viewer reaches out to touch the female hologram – and it jumps smoothly away: "Great anti-collision software!" says another viewer.

This vision of the ultimate television system was dreamed up by Oliver Stone for his recent television mini-series *Wild Palms*, set in the mid-21st century. The American film maker obviously enjoyed himself visualising the future; and, as television broadcasting contemplates the era of the Information Superhighway, we should not dismiss futurology. After all, broadcasting already uses satellites in geocentric orbit, first hypothesised by Arthur C. Clarke in his famous 1940s short story. But the really problematic aspect of futurology is not to create a striking concept or an objective, but to imagine in detail the transition from today's humdrum reality to the bright vision of tomorrow. The process of transition itself often generates so many new ideas that the objective itself is not immutable but in constant metamorphosis. It is rarely as tidy as the intellectual constructs of the technocrats would have us believe.

This is certainly true in broadcasting, where several years ago many experts saw high definition television (HDTV) as the great objective. Now HDTV has been replaced in the limelight – perhaps temporarily – by "digital television", which can mean HDTV or many other kinds of services.

So what really is "digital"? Broadcasters and other technically knowledgeable key players are clear amongst themselves: it is the burning issue for the future of television broadcasting. A host of new acronyms* has entered their everyday discussions: MPEG, COFDM, ADSL . . . but walk into any high street electronics shop and all the products are already digital, even the analogue ones – it says so on the box: "Digital" in large friendly letters. Clearly the transition to a new technology is blurred by the subtleties of consumer product positioning, which mean that any product with a few Ecus of digital processing can be sold as "Digital".

But if the headline is digital, the reality is much more complicated. The Commission's Communication on digital video broadcasting predicts a twenty year transition from analogue to digital television simply because it's not possible to turn off the television systems PAL and SECAM overnight, which would abruptly disenfranchise the viewing public. There is scope for some broadcasters to extend those existing services during the "Long Goodbye" to analogue.

However, what counts for the consumer are the benefits of the product or service – what it does and its advantages – not the technical implementation. This is a better starting point for any discussion than the intricacies of the technology itself. Once the benefits have been identified, then one can map the appropriate technologies for delivering them. Given the technology blindness, even technophobia, of consumer markets, the term "advanced television" seems more neutral and more appropriate than just talking about "digital television."

* *(For explanations see page 8)*

What are the benefits of advanced television?

Advanced television offers three clearly identifiable groups of benefits to consumers (*figure 1*).

Enhanced realism, the first one, is the classic and best-understood benefit. Any product or service which will improve the impact of the presentation offers this, like wide-screen television in cinema 16:9 format or HDTV.

Access and choice, the second one, is more recent. It widens the range of programming available with products like videorecorders and pay-tv channels, and with new digital service ideas like "video-on-demand" – dial-up films transmitted from high capacity computer servers by telephone lines or relayed by cable networks to the home. These exploit digital compression to increase the range of programmes available and make access easier. "Video on demand" (VOD) has a broadcast cousin "Near video on demand" (NVOD) which is a similar case: rather than transmitting one film in a channel, broadcasters will be able to compress ten or more simultaneously in the same channel, allowing the several films to be started many times during the same evening. As with VOD, this liberates the viewer from both the television schedule and the video recorder. It is a convenience service. Digital transmisson in (N)VOD form is inherently much more efficient – for programme quantity – than analogue.

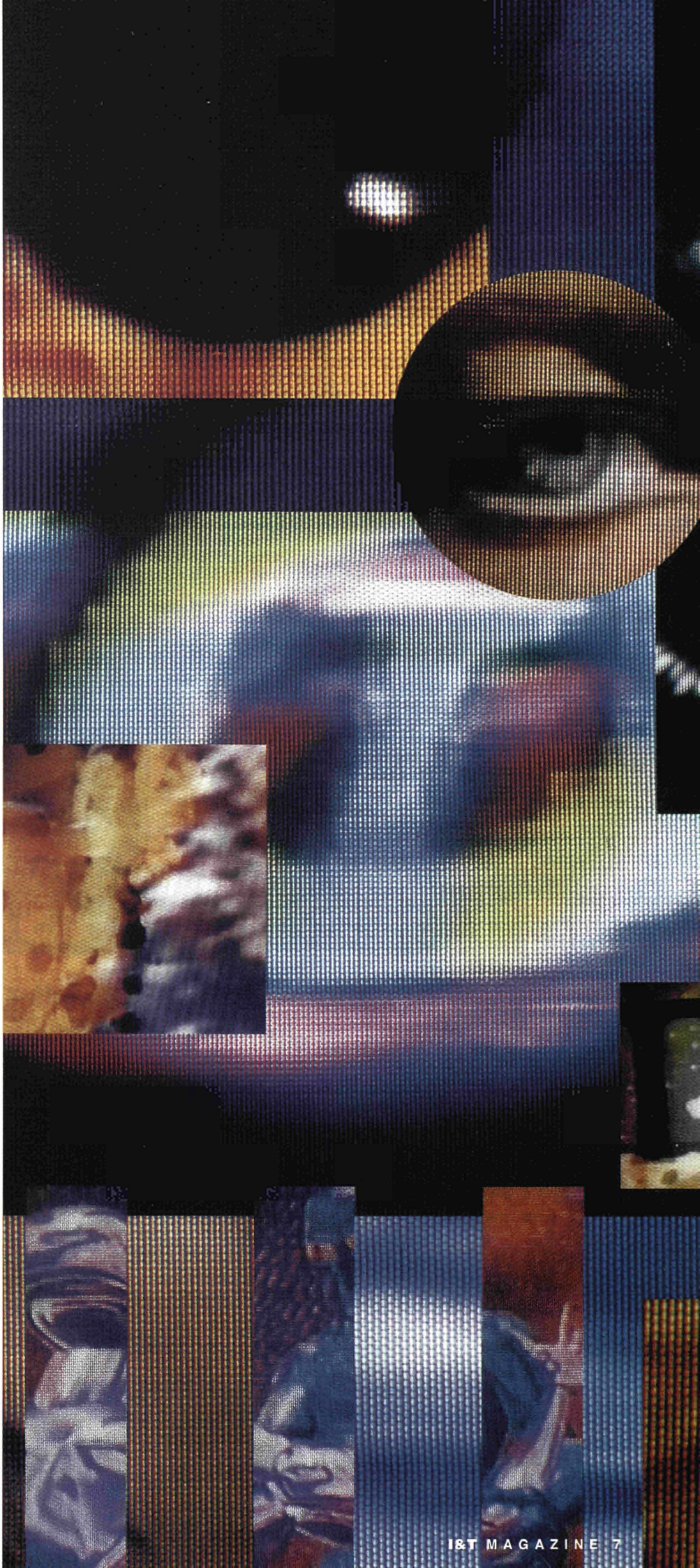
The third type of benefit is technologically related to "Access and choice" offerings like VOD, but is quite new and still in the process of being defined. Let's call it **Maximum involvement and stimulation**.

All the products and service ideas featuring interactivity are examples, including video games and multimedia systems like CD-I (Compact Disc Interactive). These are not usually seen as broadcast-related products; but Philips and Sega are considering broadcast "add-on" capabilities for both. There are high hopes for the interactivity which digital television systems will bring to this service through cable TV networks.

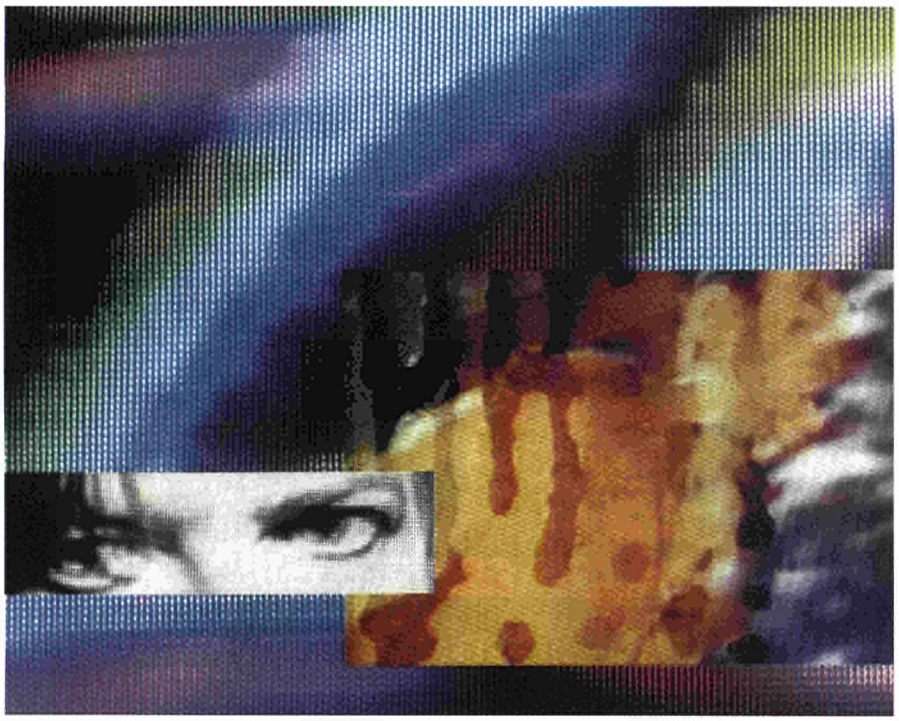
Interactive television is being promoted heavily in the United States, fermenting furious mergers and acquisitions activity between combinations of cable TV companies, telecom operators, movie companies and any computing company with ideas on the domestic equivalent of the "Windows" interface. US demonstrator projects to test interactive service concepts are proliferating: Time-Warner has installed a sophisticated two-way cable TV and telephony network in Orlando, Florida.

Sometimes "interactivity" means basic VOD services, limited to ordering the film and simple functions like "fast forward," as on a videorecorder. But in a mature form, interactivity and VOD would mean the audience interacting with those on screen, in a game show or telegambling, perhaps. In the United States, home shopping is already a phenomenon even in respect of today's analogue TV. US companies believe that home shopping will be the "killer application" for interactive TV. The truth is no one knows how the "Maximum stimulation and involvement" strand of service possibilities will turn out. Interactivity has proven itself in the youth market with video games; but no one knows who else will pay, nor how much, or for what.

British Telecom (BT) is trying to find out by running two VOD trials over conventional twisted pair telephone lines during 1994; first a technical one with some of its own staff, followed by a



Consumer benefits of Advanced TV			
Benefit	Enhanced Realism	Access & Choice	Maximum involvement & stimulation
Product	Colour TV	video recorder	video games
Service	Stereo	pre-recorded video cassette	CD-I
Attribute	wide-screen	Pay-TV movie channel	Multi-media
	HDTV	NVOD	Inter-activity VOD



"The wide-screen 16:9 format is an important new element for recreating the movie theatre experience in the home," confirms Stéfane France of Premiere, Germany's leading pay-TV company. Feature films make up 60% of Premiere's programme schedule.

more ambitious 2,500 household demonstrator in the autumn, to include charging. For BT's ICE Group Product Manager Peter Berrie, existing broadcast and movie service offerings are only the point of departure to the world of interactive multimedia in the home.

"People always start with the existing model. In our minds, this is not just another way of delivering *Jurassic Park*; it's a way of delivering a much broader range of services to the home."

He conjures up visions of families browsing through video shopping catalogues stored on the VOD server computer or innovative distance learning courses for children.

"But no one anywhere really knows what's wanted, including BT, because nobody has had interactive multimedia in the home before," he stresses. "We must invest much effort in our interactions with potential service providers in order to find out." He is expecting many surprises from the household trials, accidental revelations like the Sony Walkman, simple in retrospect, but the marketing equivalent of Ali Baba's "Open Sesame" password.

Interestingly, Peter Berrie is open-minded even about what his department will call itself in future. ICE stands for Information, Communication and Entertainment – at the moment. The "E" is flexible and could mean Education or the hybrid "Edutainment." Only the market will clarify this over time. The exercise he describes is a textbook effort to define service concepts and identify benefits which people will pay for. Based on the results, his department will have to formulate its case to BT's board of directors for further funding of a large-scale pre-market trial – or not – as the case may be.

Old map-makers used to mark such unknown territory with the legend "Here be dragons." However, many network operators have no such fears. They believe in "buried treasure": ie that the risks associated with this third strand of benefits will carry concomitant rewards. Clearly the concept extends far beyond broadcasting as we know it. However, the three types of benefits are not mutually exclusive and can be combined.

The role of cinema

One important element which ties together "enhanced realism" and "access/choice" products and services is cinema. Manufacturers are offering "Home Cinema" systems with wide-screen TVs and improved surround sound; and movies are the most commercially important programmes published on videocassette or broadcast in pay-tv services. The convergence between the film and television business is much better established in the market than the convergence with computers, which is just beginning.

However, in the commercial world, market players like to claim that the public is more interested in one type of benefit over another. This is in the nature of competition and reflects their particular commercial strategy and what they can offer at a certain point in time, rather than being strictly true of what the public wants. There is no evidence to prove the assertion that the public "wants more programmes" via VOD instead of HDTV or wide-screen TV enhancements. The public is potentially interested in all of them.

For instance, it will be possible in the future to combine the enhanced realism benefits of HDTV with the VOD or NVOD concept. In the meantime, wide-screen versions of films could easily be included in a VOD or NVOD programme menu. An interactive home shopping channel in HDTV is another obvious service idea - you can only see the pattern on that Hermes scarf or tie in HDTV- but not for the immediate future, because it would be complicated and expensive, requiring broadband coaxial or fibre delivery to the home. For the moment, a telecom operator wanting to offer VOD will stress the "on demand" feature, because with this system only adequate picture quality is possible, as long as ordinary telephone lines are being used, rather than coaxial cable or fibre optic.

VOD is an entirely new service, with a possible 16:9 option as a secondary feature. However, with film, some broadcasters are already offering films and sport in cinema's 16:9 aspect ratio as a primary service attraction, via an existing D2-MAC service, or by introducing the wide-screen PAL Plus system, a compatible upgrade of PAL. For them, wide-screen 16:9 is an important development in its own right, not linked to any particular technology.

Broadcasters' enthusiasm

"The wide-screen 16:9 format is an important new element for recreating the movie theatre experience in the home," confirms Stéfane France of Premiere, Germany's leading pay-tv company. Feature films make up 60% of Premiere's programme schedule. It is one of the eleven broadcasters participating in the European Union's Action Plan for the Introduction of Advanced Television Services. Together they offered an overwhelming 100,000 hours of wide-screen broadcasting over four years for Action Plan funding, totally outstripping the available resources for the 1993 call for proposals. Following future calls, other broadcasters will commence broadcasting in wide-screen, some perhaps using digital transmission, because the Action Plan does not make particular technologies mandatory.

The Action Plan is helping to accelerate the introduction of the 16:9 wide-screen format by contributing a proportion of the transition costs incurred in migrating from the 4:3 picture format to 16:9, seen in Europe as a bridge between analogue and digital television and the basis for the future introduction of HDTV.

"Of course there's evolution towards digital," says Xavier Drumare of France Supervision. "The studios are already digital; so is the D2-MAC broadcast sound. But screen formats are independent of technology and standards. 16:9 is exciting for the public. French retailers are boosting their stocks of 16:9 products; and the Action Plan has enabled us to double our daily wide-screen output to 9 hours to trigger consumer interest. The creative possibilities of 16:9 excite the programme producers too."

The Action Plan also contributes to 16:9 programme production costs, including the 1994 Winter Olympics at Lillehammer, Norway. These were televised in HDTV and down-converted to ordinary definition for 16:9 transmission. With their major coverage and popular appeal, Drumare sees the Lillehammer Olympics as having been an important show-case for the 16:9 format in Europe. ■

Adam Watson Brown *DG XIII*

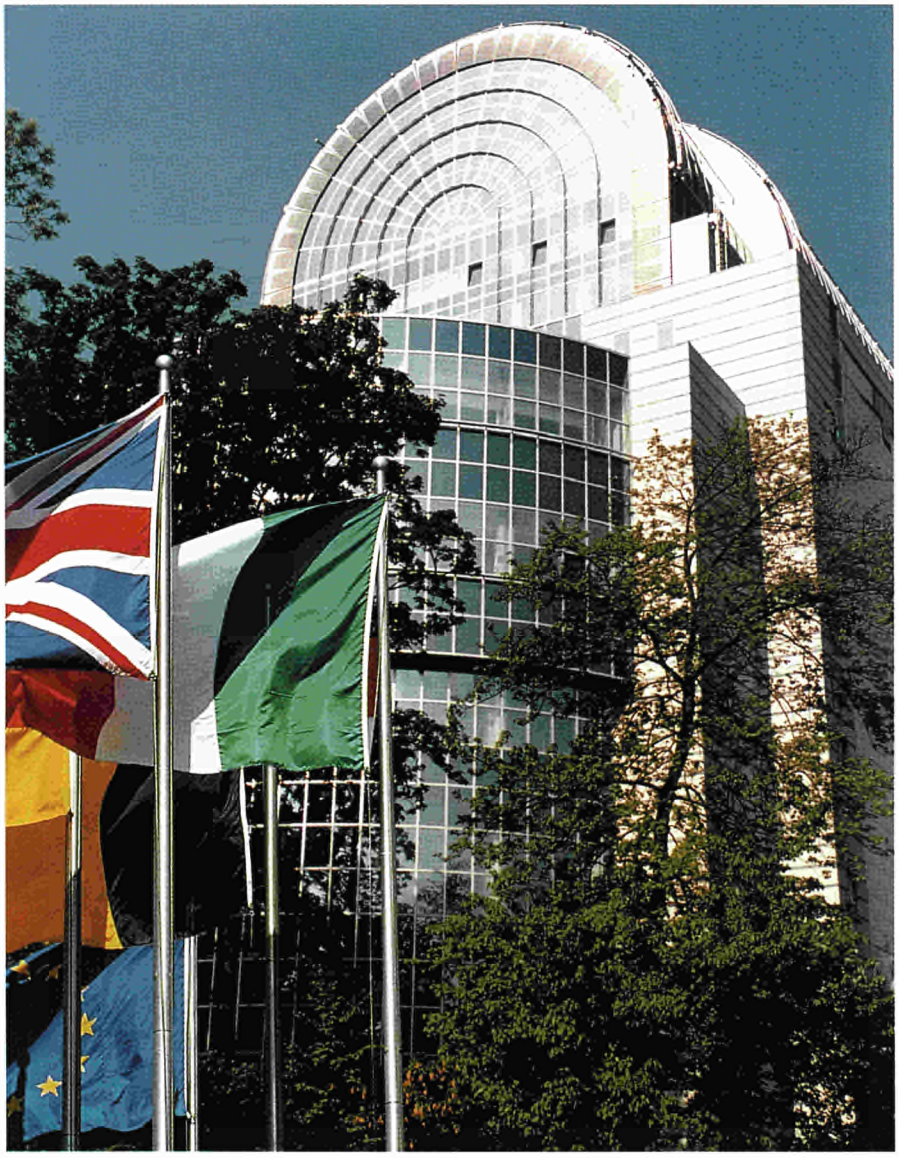
Key to acronyms

ASDL	Asynchronous digital subscriber loop
CD-I	Compact Disc Interactive
COFDM	Coherent Orthogonal Frequency Division Multiplex
D2-MAC	a variant of MAC (see below)
dTTb	digital Terrestrial Television broadcasting
HD-MAC 1250 line /50HZ line	High definition transmission system compatible with D-2MAC
HDTV	High Definition Television
ICE	Information, Communication and Entertainment
MAC	Multiplexed Analogue Component video for satellite and cable TV transmission
MPEG	Motion Picture Experts Group
MUSE	Multiple Sub-Nyquist Sample Encoding, 1125 line/60Hz HDTV transmission system
NVOD	Near Video On Demand
PAL	Phase Alternate Line
RACE	Research and technology development in Advanced Communications in Europe
SECAM	Séquence à Mémoire
VOD	Video on Demand

The Fourth Framework Programme

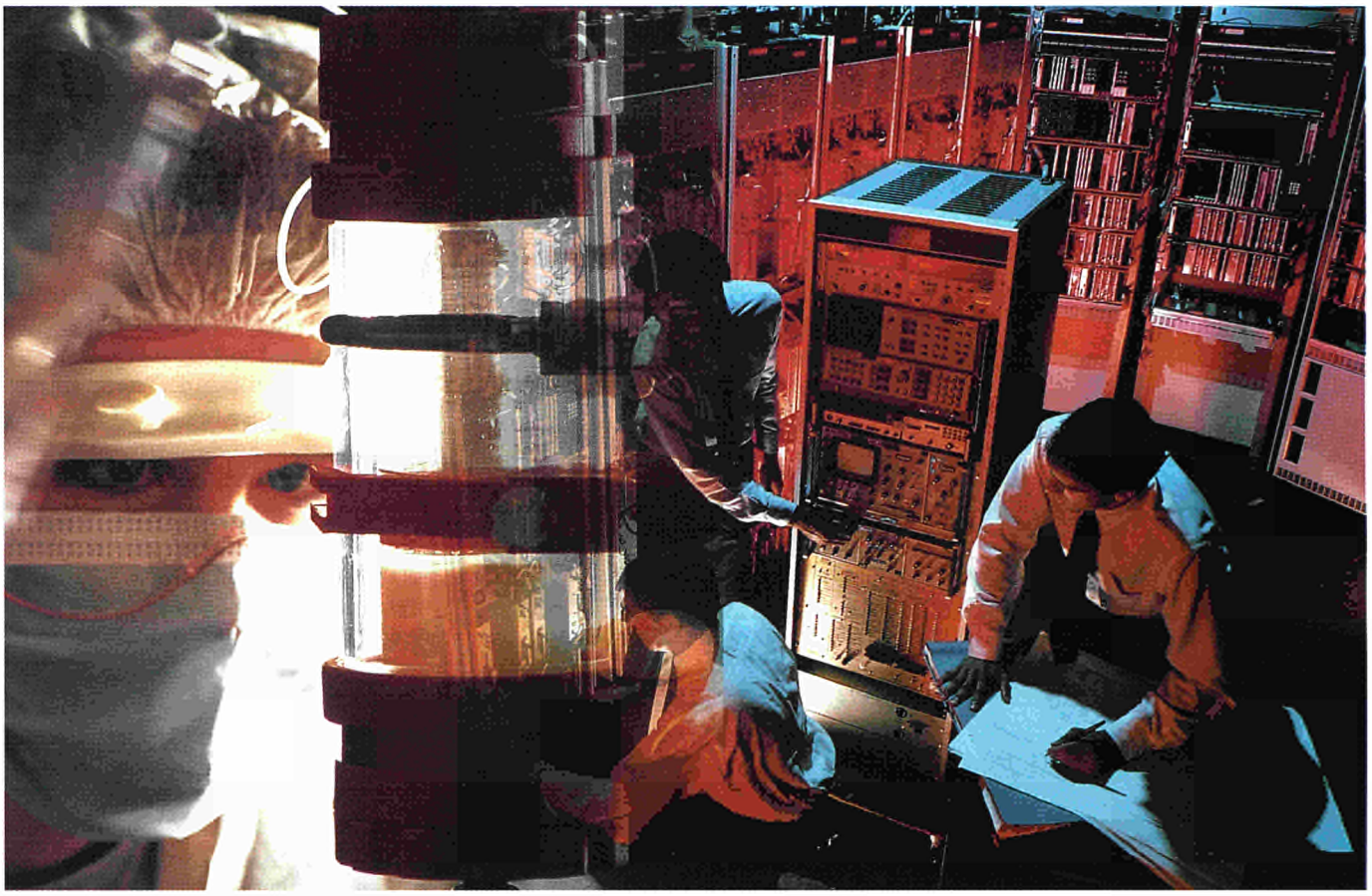
how the process works

Planning for the Fourth Framework Programme of Community R&D activities is now finished. It is a good moment to look back at the earlier stages of preparation, and forward to the launch of the programme itself.



IT IS WORTH recalling that, although R&D activities have been supported by the Community for many years, the formal basis for them was established only in 1987 with the Single European Act. This more or less coincided with the launch of the Second Framework Programme. That framework programme ran from 1987 to 1991 with an overall budget of around 5.4 billion ECUs. It was followed by the Third Framework Programme, running from 1990 to 1994 with an overall budget of 6.6 billion ECUs.

One way in which the Fourth Framework Programme differs from the previous framework programmes is that it now embraces all Community supported R&D, including those activities – for example preparatory, accompanying and support activities (APAS), in Commission jargon – which hitherto have been executed outside the framework programme itself. This is reflected in the structure of the framework programme proposal, which is divided into four "activities". The first activity is itself subdivided into lines corresponding to the anticipated specific programmes. In addition, there are Energy programmes falling under the Euratom treaty, and so not actually a part of the framework programme, as well as Joint Research Centre activities. The overall schema is as follows:



I. Research, technological development and demonstration programmes

A. Information and communication technologies

1. Telematics
2. Communication technologies
3. Information technologies

B. Industrial technologies

4. Industrial and materials technologies
5. Measurements and testing

C. Environment

6. Environment and climate
7. Marine sciences and technologies

D. Life sciences and technologies

8. Biotechnology
9. Biomedicine and health
10. Agriculture and fisheries

E. 11. **Non-nuclear energy**

F. 12. **Transport**

G. 13. **Targeted socio-economic research**

II. Cooperation with third countries and international organisations

III. Dissemination and application of results

IV. Stimulation of the training and mobility of researchers

The first thing to note is that international cooperation, dissemination of results, and training and mobility appear as separate lines – in fact this was true of the training and mobility activity under the Third Framework Programme. But of course dissemination, training and international cooperation will also be carried out as appropriate within the specific programmes, often as one aspect of R&D projects or as separate activities none the less closely related to the other activities of the programmes.

A second point is that the broad scientific areas of the Third Framework Programme continue into the Fourth – R&D lines A-E. Of course at a greater level of detail we can see considerable changes in the topics covered, reflecting the evolution of science and technology and of research needs, and the aim of greater selectivity. The two new lines are Transport and Socio-economic Research.

The Transport programme is concerned with the identification of new technological needs for European transport, and with the evaluation and integration of technical innovations.

The Socio-economic research programme has three themes: assessment of scientific and technical policy options; research on education and training; and research into social integration and social exclusion.

Four themes run through the proposal for the framework programme as well as for the draft specific programmes.

- the need for greater selectivity in formulating the programme, to ensure the maximum economic benefit;
- the importance of the close integration of R&D activities across Europe, particularly framework programme activities and national initiatives;
- the synergy between research and training;
- responsiveness – the ability to respond rapidly to scientific and technological developments.

It is not just the technical content that is new in the proposals for the Fourth Framework Programme. A great deal of effort has gone into rethinking the way in which activities are to be implemented – the so-called modalities. The framework programme proposal mentions, for example, three kinds of networks which have been pioneered in different specific programmes, including thematic networks of excellence, developed in the IT programme. In addition the concept of a focused cluster offers new scope for flexibility in R&D. A focused cluster brings together a range of different types of activity covering different

technological areas in an effort focused on a well-defined goal. It provides the possibility for integrating R&D efforts not just within one programme but across different Community programmes, as well as with other initiatives such as Eureka.

As well as technical content and modalities, the Fourth Framework Programme will see new approaches to the management of programmes, with the aim of making it easier and cheaper to make proposals and to participate. The importance of selectivity and focus has already been mentioned as a way of optimising the use of resources. But focus also helps avoid oversubscription of calls by specifying more precisely the areas to be covered, though of course this must not be done in a way which stifles originality. Again to help potential participants calls will in general be issued on fixed dates – such as 15 March, 15 June, 15 September, 15 December – with a three-month minimum deadline. Some programmes will launch more frequent calls than in the past, but with each call focusing on just part of the programme. These changes should make the process more predictable, and spread out the effort of preparing proposals. The information required in proposals will be reduced as far as possible, and a new simplified model contract brought into use.

As well as technical content and modalities, the Fourth Framework Programme will see new approaches to the management of programmes, with the aim of making it easier and cheaper to make proposals and participate.

Further proposed measures are aimed at reducing the burden of preparing proposals, with small and medium-sized enterprises (SMEs) particularly in mind. These could include a two-stage call process, with an initial project development phase, an approach which has been pioneered in CRAFT. Some programmes will introduce "open calls" – calls which remain open for a period of time, with proposals accepted at any point in the period.

More details on the new aspects of the Fourth Framework Directive will be made available after this has been approved.

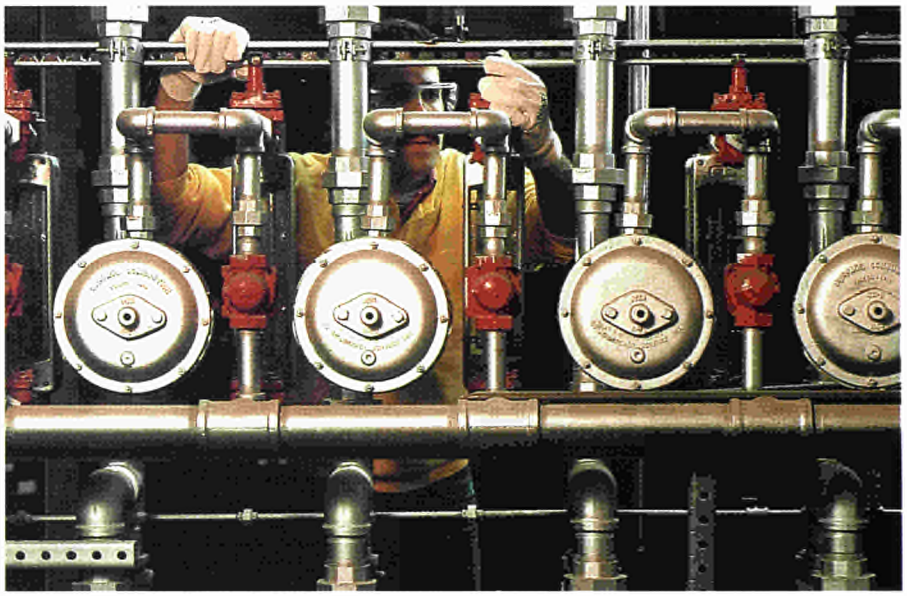
The framework programme itself falls under the new codecision procedure introduced by the Maastricht treaty. This means that once the Commission has made its first proposal for the framework programme, the proposal goes to the European Parliament for a first reading. This was actually completed in November 1993. The proposal had already been discussed by Council, but the completion of the first reading in Parliament cleared the way for Council to consider it fully.

This they did in December, and by early January we had a formal Common Position, that is, a common agreed view between all the Member States in Council.

The next step is for the proposal to go to a second reading in Parliament, where amendments are raised and voted on. What happens subsequently will depend on the reaction of the Commission and Council to the Parliament's amendments. When agreement is reached, the proposal is then ready for formal adoption by the Council.

Once this has happened, the way is open for Council in consultation with Parliament then to adopt each of the specific programmes. In this case the procedure is not quite as complicated and can be expected to go faster. The specific programmes should in turn be adopted by the end of the year. After this, the Commission can issue calls for proposals for the adopted specific programmes, and the work of the framework programme can begin in earnest.

But in order to issue a call for a specific programme there needs to be a work plan. The work plan refines and elaborates upon the broad lines given in the specific programme, to the point where there is sufficient basis to issue a call. This process of elaboration involves extensive external consultation over a period of several months. In particular in the industrial programmes – information and communications technologies and industrial technologies – representatives of industry are closely involved. Series of working groups and panels are convened to explore and advise on the different parts of the programme, leading eventually to the drawing up of the work plan. As this is inevitably a lengthy procedure it must be carried out in parallel to the legal process, and in fact many working groups were already beginning their work towards the end of 1993.



The working groups mainly bring together industry experts in the technological areas of the programmes. In addition the IT R&D programme, in collaboration with colleagues in the Industry DG, has convened a set of Industrial Advisory Panels. Each panel brings together representatives of a group of industry or service sectors with related IT needs to provide input on the programme as a whole from a user perspective.

The objective now is to get to the point of completing the work plans and launching calls as soon as possible, so that research projects can then get underway. ■

John Powers *DG III*

In order to issue a call for a specific programme there needs to be a work plan. The work plan refines and elaborates upon the broad lines given in the specific programme, until there is sufficient basis to issue a call. This process of elaboration involves extensive external consultation over a period of several months.

As publishing goes electronic, will Gutenberg survive?

How Europe can compete successfully in the global electronic publishing market

A changing scene

Detective story at bedtime, in-flight perusal of the financial daily, historical novel lazily browsed on the beach, magazine nervously leafed through in the dentist's waiting room – could the days be numbered for the traditional print medium with which we adults are so comfortable? Will the familiar print form be driven out of existence by the convergence of telephone, television and computer brought about by digital technology?

The combination of digitisation and fibre optics certainly makes it feasible to predict an era when the television, with powerful computing capacity, will become an interactive medium for a wide range of information and entertainment. Advances such as digital compression enable more information to be sent in digital form using a given amount of transmission capacity or bandwidth. Fibre-optic cables provide vastly increased bandwidths enabling two-way communication or interactivity.

On offer to the consumer will be an extensive palette of products and services. These will include video-on-demand, video games, databases, educational programmes, home shopping, telephone services, tele-banking, teleconferencing, and more. Many of these activities are interactive multimedia applications, involving a combination of sound, still and motion pictures, graphics and animation, data and text, and with the interactive capabilities of a computer.

The potential for combining different media is having a considerable impact on the processes of accumulating and presenting information. Applications in areas such as training, education, point of sale, business presentations, professional and technical publishing, in addition to the entertainment market, are on the increase. A whole gamut of new opportunities is emerging not only for traditional print publishers but for software publishers, information providers and the film and television industries.

Although heralded as the greatest revolution in publishing since Gutenberg, electronic publishing is unlikely to banish the printed product, in particular for leisure reading. It is, however, predicted that by the year 2000 electronic products could account for up to 40% of the turnover of the publishing industry as a whole. According to the strategic study on "New Opportunities for Publishers in the Information Services Market" commissioned by DG XIII/E, rough estimates show a market potential for electronic publishing in Europe of some 12,000 million Ecu by the turn of the century.

European Commission activities

Recognising the strategic role of electronic publishing in Europe, DG XIII/E has carried out a number of activities in this field within its IMPACT (Information Market Policy Actions) programme, which aims to develop the European information services market. The study referred to above was undertaken in close consultation with the publishing industry. Its executive summary was distributed to over 2000 participants in the market, inviting comment. Following this, a meeting attended by over 280 European heads of publishing houses and related industries was held last October during the Frankfurt Book Fair. This gave an opportunity to review the main findings of the study together with industry.

The study reveals a lack of awareness in the traditional publishing industry of the opportunities and threats as well as the strategic implications of implementing new media. The message for Europe's 60,000 publishing houses is clear: There is a need to re-think existing strategies, start making the transition "from scribe to screen", and get on the necessary learning curve early.

In terms of global competitiveness, the European Union is lagging behind the United States and Japan, whose governments are fully committed to electronic and multimedia publishing. Japan holds the lead in hardware, while the US are strong in applications software. Japan is also penetrating the world market through the consumer electronics sector with its video games products. The US have the advantages of fairly global use of the English language, a high level of computer literacy and wider use of online services.

Europe's potential strength lies in its richness of content for information products, derived from its legacy of recorded information from a diversity of cultures and traditions. Access to such

content is a crucial factor for companies active in multimedia. The global telecommunications, information technology and media companies – mainly American or Japanese – are recognising this and are entering the publishing business.

The importance of forming strategic alliances and joint ventures is illustrated by recent non-European alliances such as US-West/Time-Warner, Nynex/ Viacom, Bell Atlantic/ TCI and the take-over battle between Viacom and QVC for Paramount Communications.

The future of the publishing industry will be characterised by a change in roles for the key players, such as publishers, book stores, printers, television, telecommunications, music/ films, industrial corporations, hardware manufacturers, software developers and video game suppliers. Figures from outside the traditional publishing arena will play a stronger role than many of today's conventional publishers realise. For instance, game-making expertise may be channelled towards creating educational and reference products. The skills are already there for successfully bringing together video, animation, sound and narrative.

To be commercially attractive, the electronic information product should not simply mirror the print product but exploit the features made possible by digital technologies to include text, graphics, images, sound, video and eventually virtual reality. The creation of products with attractive content hinges on the availability of relevant skills and experience. New skills are needed for the development, design and manufacture of competitive value-added products. The uptake of electronic information products will be accelerated by the development of user-friendly devices and falling prices, and above all by products that offer real benefits for the user in terms of how information can be accessed and handled.

Forthcoming European Commission initiatives

Many of the above findings indicate the need for action if Europe is to compete successfully in the global electronic publishing market. The transition from purely printed to combined printed and electronic products is a long-term process. The prime responsibility for action lies with the publishing community itself. The involvement and expertise of the various market players are essential for success. However, the CEC strongly supports the trans-

formation process, which is vital for Europe's competitive position and has a good potential for creating new growth and employment. Building and exploiting advanced electronic information infrastructures in Europe is a key element in the White Paper on "Growth, Competitiveness, Employment" adopted by the European Council in December 1993.

Creating the right conditions

The approach taken is three-fold. To help **create the right conditions**, the Community telecommunications policy directed towards achieving full liberalisation by 1998 is being vigorously pursued. The issue of an appropriate legal framework, particularly in relation to intellectual property rights, will continue to be discussed in view of its importance for electronic publishing and the information services market. Feasibility studies are being conducted involving cooperation with market participants. The first of these is investigating the establishment of a European network of multimedia laboratories to exchange of experience, for training, and as a source of creativity.

The Commission also acknowledges the need for **long-term dialogue and cooperation** with the information industry. In this context and in line with the White Paper, a high-level forum has been created with publishers and other key figures of the electronic publishing chain. This offers a platform for dialogue between the industry sectors themselves and with the Commission.

The information engineering action

Finally, the Commission will stimulate **cooperative research and development** for new information-based applications through projects involving actors from the different sectors of the information industry. These projects will form the core of DG XIII/E's "information engineering" action within the Fourth Framework Programme (1994-1998). The aim of the action is to enable easier and more selective access to, and better usability of, electronic information in all its forms, through the innovative application of advanced methods and systems based on information and communication technologies. It addresses all the main links in the value-added electronic information chain: production, distribution, and retrieval and use.

Helping to meet users' needs

As regards electronic publishing, the "information engineering" action will address new applications involving **the creation of information products** (e.g., information repositories and electronic manuscripts), usable on any type of equipment, with any kind of software and for all types of publications, so that the requirements of different user groups can be easily met. Advanced applications will be developed to enable authors and publishers to describe the structure and format of the information in a generic fashion so that the information can be handled independently of the technology.

Regarding **distribution of information**, new methods of presenting information will be developed so that the user can find the information required without a precise knowledge of the structure or content of the sources. Research efforts will attempt to integrate in a single information service different forms of information (text, images, sound) from a number of diverse origins.

The development of **advanced information retrieval techniques** will be stimulated to improve user access to the increasing number of heterogeneous and dispersed information sources. These methods will help the user to find the information required by means of online resource discovery and navigational aids, to make the same search in a number of data banks, to browse through the content of information by association of ideas, and to extract and download information into the user's applications. The emphasis here is on delivering new forms of "user-tailored" information which is better focused on specific user requirements.

In implementing the "information engineering" initiative, a limited number of pilot/demonstration projects will prototype solutions to problems identified in the first phase of the action. These prototype projects should also act as a focus on important facets of the "information area" that will shape society in the future. According to the White Paper "Growth, Competitiveness Employment", establishing a Common Information Area will enable the European Union to better exploit the possibilities created by the emergence of an "information society". It is pointed out that the greatest efforts are needed at the "applications" level in terms of structuring of information and user-friendliness. It is through applications, their performance and conditions of use that the Common Information Area will have an economic and social impact and contribute to increased employment.

Think big, start small

Europe's information services industry has a crucial role to play in improving the competitiveness of Europe. The publishing community represents a vital sector of this industry. The CEC therefore supports European publishers in a number of ways to exploit the opportunities offered by new media to create a thriving, globally competitive European electronic publishing market. "Think big, start small." Gutenberg will survive, but not necessarily dominate the electronic product. ■

Frans de Bruïne *DG XIII*

The location of employment in IT&T activities

TODAY'S MARKET environment in the information technology and telecommunications (IT&T) industry is characterised by low and saturated demand, fierce price competition and significant financial difficulties for the majority of the IT&T companies. This is at least the situation in Europe, USA and to some extent Japan too, but not in other Far East countries. The fast market growth of the 1980s is not expected to reappear in the short-term. It will however, repeat itself when new technologies and products become available, based on convergence of the different IT&T sectors, stimulated by user needs and organised on wide regional information infrastructures.

In the late 1980s and early 1990s we witnessed a fast internationalisation of the activities of IT&T companies. This was a significant development in this industry since its international expansion reached far beyond exports and direct sales to foreign markets, to include manufacturing and in some cases R&D activities as well. Some of the main motives behind this have been new market opportunities, regional differences in the cost of production and the need to operate closer to customers. The formation of international alliances among companies and the wave of international mergers and acquisitions has further encouraged the internationalisation of activities. All these have created a new location pattern of IT&T activities around the world, mainly influenced by the behaviour of large companies. Together with radical technological and organisational changes, large companies have created a new regional distribution of value-added activities.

Having recognised the importance of such developments the Commission commissioned a study from Price Waterhouse on the location of employment in IT&T sectors. Employment is taken as a homogeneous proxy to all value-added activities, ranging from research and development (R&D) to manufacturing and assembly, and all other activities such as marketing and sales. The current debate and policy action on growth, competitiveness and employment[1] in the European economy makes the findings of the study a useful contribution.

The study analysed employment in the three main regions, Europe, USA and Far East. The rest of the world was also considered but it accounts for a very small part of global employment. Apart from the regional distribution of employment, the study made a detailed

Almost 40% of world employment and 60% of employment in R&D in the data processing equipment is located in the US.
Europe dominates the telecommunications equipment sector, accounting for more than 50% of world employment in this sector.

analysis by sector. Four main sectors were emphasised, accounting for the majority of employment in the IT&T industry: data processing equipment, telecommunications equipment, consumer electronics and electronic components. For a number of reasons the study did not consider employment in the services and software sectors. There is no real manufacturing activity in these sectors and therefore comparisons or aggregations would have been impossible. Also, these sectors are heavily populated by small and medium-sized companies which operate mainly in domestic markets and in any case they are rarely worldwide. Finally, focusing on a limited number of sectors enabled a fairly adequate coverage of employment in these at world level.

The global distribution of employment: a major shift to the Far East

Employment in the world IT&T industry increased by 20% during the 1980s, from 3 million in 1980 to about 3.6 million in 1991. Almost all of this growth was in the Far East, including Japan, which now has by far the largest share of employees (1.6 million).

The number of people employed in Europe in 1991 was 1 million (see figures in Table 1). This is equal to the figure for employment in Japan and slightly larger than that for the US. The gap with the Far East as a whole, however, is widening fast. This is mainly due to employment in the manufacturing and assembly activities in that region: almost 1 million people are employed in these activities there out of a world figure of 1.7 million.

Employment in the other two activities finds Europe at the two extreme ends: the lowest employment in R&D activities and the highest in marketing and sales activities among the three areas. Such an asymmetric position for Europe in the value-added chain creates a double risk. First, it threatens to weaken the technological and industrial capabilities of Europe in IT&T since marketing and sales rather than production of technologies and products weights heavier in Europe. Second, if this is not corrected it could potentially undermine the further health and growth of the European market, with negative consequences for the users of IT&T in Europe.

A final key element in the global distribution of employment, which also underlines the above observation, concerns the ownership of different activities by domestic companies. Employment in R&D activities is heavily located in the home region: 85% for the European and American companies and 95% for the Far East ones. This does not imply that regions could or indeed should be technologically independent and self-sufficient. It is nevertheless a strong indication that despite globalisation of technologies, industries and competition, the production of technology is very much a domestic affair. As long as the IT&T industry continues to base most of this activity in its home regions, Europe should ensure its own technological strength. According to one of the findings of the study, the technological capabilities of a region are a key factor in making it an attractive location.

Table 1 **Regional distribution of employment in IT&T, 1991, in thousand people**

	Europe	USA	Far East	World
Total employment	1,000	950	1,500	3,600
R&D	115	170	115	470
Manufacturing and assembly	395	385	965	1,700
Other activities	495	390	350	1,400

Source: Price Waterhouse

Table 2 **Sectoral distribution of employment in IT&T, 1991, in thousand people**

	Europe	USA	Far East	World
Data processing equipment	365	545	405	1,400
Telecom equipment	375	150	100	700
Consumer electronics	115	65	335	530
Electronic components	150	185	630	1,000

Source: Price Waterhouse

Manufacturing activities are much more internationalised for European and American companies who have 40% and 50% of their respective employment located outside the home region. This is not the case with Far East companies, which have only 10% of employment in manufacturing outside their region. This situation offers two challenges for Europe: to make Europe a more attractive place for non-European manufacturing investment, and to expand the manufacturing basis of European industry in order to exploit advantages in other regions.

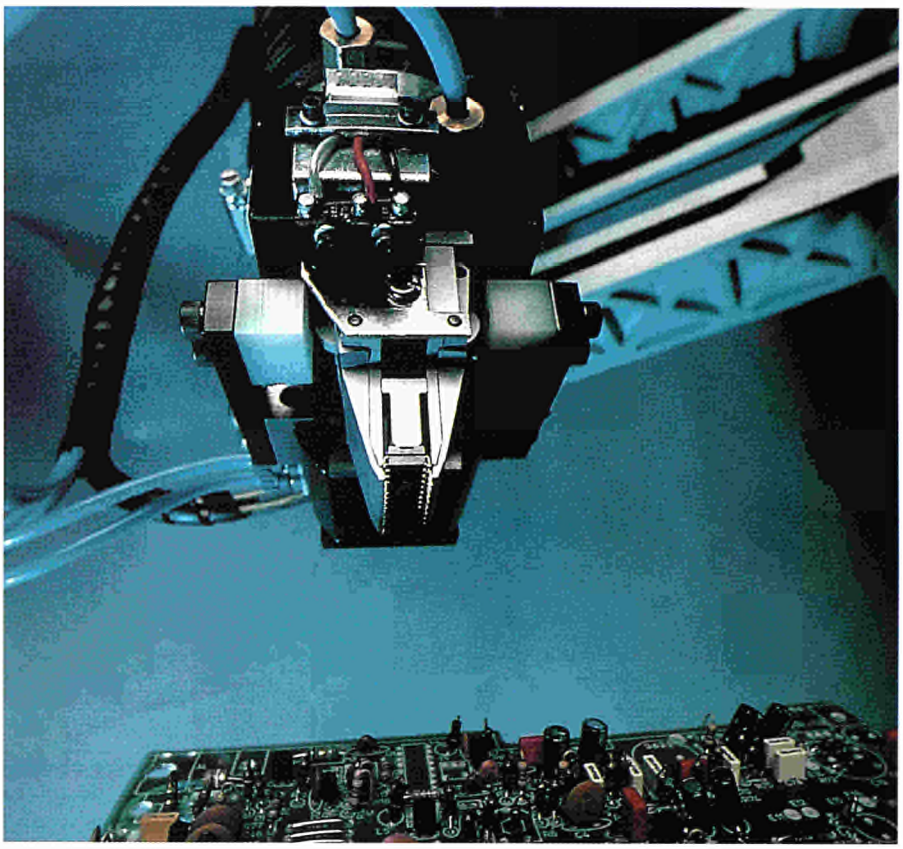
Important regional differences are also found in the location of employment in marketing and sales activities. In this case, European and Far Eastern companies have 80% or more of their employment within the home region. American companies have only 50% of their people within the US. Their presence in international markets is therefore much more advanced and this should be treated accordingly. The expansion of European companies in foreign markets has become a top priority in this respects.

The sectoral distribution of employment: data processing is the leading sector

The distribution of employment by sector is highly uneven. Data processing equipment forms the largest sector with 1.4 million people. It is followed by the electronic component sectors with 1 million employees. The telecommunications equipment sector employes 0.7 million people worldwide, and consumer electronics the remaining half million (see figures in Table 2).

There is also a clear pattern of sectoral domination by each region. The data processing sector is dominated by American industry. Almost 40% of world employment and 60% of employment in R&D in the data processing equipment is located in the US. Europe dominates the telecommunications equipment sector, accounting for more than 50% of world employment in this sector.

The Far East heavily dominates the remaining two sectors of consumer electronics and electronic components. In both of these, employment in the Far East accounts for 63% of world employment. Europe's share accounts for only 20% of the total in consumer electronics and only 15% in electronic components.



Key determinants of location

A wide range of factors influence company decisions about locations. They can be classified in three groups:

- the organisational structure and corporate strategy of individual companies;
- the overall market environment in each region;
- public policies for technology, investment and market growth.

Individual companies are as much responsible as any other factor for the developments observed, through the choices they make to invest, enlarge and locate their activities. The international organisation of these often takes the form of an inter-regional network of supplies and sales. However, whether however they decide to centralise a certain activity in one place or to distribute it across regions will influence the location outcome. Equally important is the strategy and performance of individual companies. Growth and diversification in dynamic market segments is often associated with international expansion. Nevertheless, the decisions by individual companies are always influenced by the prevailing market conditions and by government activity.

Today, such activity today is more important than ever. The Internal Market policy of the 1980s had positive effects in stimulating investment by European companies and in attracting foreign investment. The policies for the 1990s target the creation of an information infrastructure in Europe. This will enable the IT&T industry to fulfil emerging user needs and by so doing, improve the attractiveness of the European market and strengthen the competitiveness of European industry. This could boost investment and employment opportunities. The hope is that it could also remedy some of the regional and sectoral weaknesses presented above. ■

Thanassis Chrissafis *DG III*

[1] Commission of the European Communities: "Growth, Competitiveness, Employment. The Challenges and Ways Forward into the 21st Century" White Paper.

ETSI

After six years of work, ETSI has won its spurs and is going full speed ahead

THE EUROPEAN SINGLE MARKET officially got under way on January 1, 1993. However, it is still far from complete and there remains a great deal of work to do, particularly in the more technical areas. But the ball has started rolling, and in areas where policy is lagging behind, industry and market forces in particular are taking up the slack. One such area calling for attention is the introduction of technical standards. Telecommunications constitute the Single Market's nervous system and are at the forefront of the technical standards effort. The standardization of telecommunications was singled out in the 1987 Green Paper as essential and was given a boost by the creation in 1988 of the European Telecommunications Standards Institute (ETSI).

ETSI, an independent body, was set up at the initiative of the European Conference of Postal and Telecommunications Administrations (CEPT). ETSI quickly put forward the ambitious plan of bringing together all operators with a direct interest in telecom technical standards, including national administrations, industrialists, network operators and users, whether public or private, with the goal of acting as far as possible in step with the market. Today, ETSI has 330 full members, 9 associate members and 62 observers, coming from 28 European countries. Producers account for 58.36% of ETSI members; public network operators, 14.6%; national administrations and standardization bodies, 10.94%; users, 7.9%; and providers of services, research institutes and other interested parties, 8.2%.

Thanks to its open-mindedness towards industry and users, ETSI has managed to attain its first objective of being in direct contact with market realities. In the area of standards, ETSI has reason to be satisfied with the work it has carried out. More than 450 new European Telecommunications Standards (ETS) and Interim European Telecommunications Standards (I-ETS) have been published and some 15 standards already adopted will soon be published as well. At the same time, around a hundred ETSI Technical Reports (ETRs) approved by the Technical Committees have already been published and another twenty or so will be in the near future. These reports deal with ISDN, networks in general, private networks, terminal equipment, DEC (cordless digital communications) and Digital Audio Broadcasting. Standards on these are underway.

By applying project management techniques to standardization work, ETSI has succeeded in setting up structures to produce rapid results. Apart from the General and Technical Assemblies and the Specialized and Technical Committees, ETSI has set up teams of experts for particular projects and a specific period of time. These project teams, of which no fewer than 32 were up and running at the end of December 1993, comprise experts from industry, research and administrations. Their multifaceted makeup enables them to effect one-off adjustments in keeping with the needs of the moment. Co-funded in part by ETSI, the European Commission and EFTA, and with a significant share paid by industrialists, operators, users, etc. these teams have proved to be highly efficient.

Karl Heinz Rosenbrock, Director of ETSI, underscored the leading role played by the users, who are the true reflection of what is happening on the market. He asserted:
"Their active participation provides us with better information on the market and the broad trends; it's rather like having antennae helping us assess what's really needed. That's probably one of the most outstanding innovations

made by ETSI in the area of European standardization." He also emphasized the need to develop and publish a new "just-in-time" standard: neither too soon – which might hinder future technological development, nor too late – which might cause it to become obsolete even before it comes into existence.

In other words, one needs to move fast, but speed should be tempered by the obligation to publicise all new proposed standards. As Mr Heinz Rosenbrock pointed out, all standards must meet five essential requirements, one of which is that they must be made public. The other requirements are that a standard be voluntary, it must be open to all the directly interested sectors, it must be in step with state-of-the-art technology, and must comply with the general interest. The "public" nature of a standard, which means that it is the subject of a public inquiry, is absolutely essential, Mr Rosenbrock asserted. Its public nature guarantees that the standard is democratic, even if the inquiry slows down the overall procedure.

ETSI and the economic crisis

The general economic slowdown has also had its impact on ETSI. The Institute's rapid development, coupled with the growth in its workload and personnel – its permanent staff increased in three years from 30 to 75 persons – has meant that ETSI has had to increase its annual budget. In the past two years, ETSI has felt the effects of the crisis and its non-institutional members now pay a contribution directly based on their turnover.

Consequently, ETSI officials resolutely refrained from asking for an increase in the 1993 and 1994 budgets, despite the new activities that were taken on board. In addition, some of the members who defray directly a share of the costs of the experts on the project teams are thinking of cutting back on their numbers or on the time devoted by their experts on secondment to ETSI. It is also true that the higher the contributions demanded of the participants, the more they, especially companies, demand a real return in exchange for their contribution, in other words tangible results. Here again, ETSI is unavoidably linked direct to the market, because at the end of the day the market will be the judge and jury of ETSI's results. ETSI therefore is obliged to act from the vantage point of a businessman.

ETSI asserts itself on the world stage

As well as being open towards the market, ETSI is also open to the effects of upheaval in the world, and in particular of the shape Europe is now taking. Mr Rosenbrock maintains that it is obviously in the interest of all, from the political and economic viewpoints as well as from that of industrialists and operators, that European standards should also be applied in Central and Eastern Europe. The first step in that direction was taken when ETSI, which at the outset comprised the members of the CEPT (the 12 EC Member States, the 7 EFTA members plus Turkey, Malta and Cyprus), opened its doors to the Baltic Republics, Slovenia, Poland, the Czech and Slovak Republics, Romania, Bulgaria and Hungary. Croatia and Albania have also applied for membership. All these countries are experiencing immense difficulties and, while they generally display goodwill, they are lacking in financial resources, vision and tradition.

In order to get a good idea of what was happening on the ground, ETSI officials conducted a tour of capital cities at the end of 1993 with the aim of explaining the precise role, functions and goals of ETSI. A further aim was to establish close ties between these countries and ETSI and, lastly, to encourage them to take an active part in its activities, with an eye on the recruitment of future members, although this latter consideration was a secondary one during the tour.

The human resources are there: "We met people of superior technical training, especially in Bulgaria," Mr Rosenbrock pointed out. Some problems remain: in addition to the aforementioned problems of a lack of means and vision, their administrative structures are highly developed with the corollary that there is a dispersion of responsibilities. A veritable cultural revolution has to take place in these countries so that they can move from a tradition of regulations – there are thousands of statutory standards on the books – to a system of standards that are voluntarily applicable. Some cooperation projects are already underway, and others are on the verge of getting started. One such project involves the University of Bratislava, and another the participation by a young Czech woman in the work of ETSI in Sofia Antipolis during a 9-month stay.

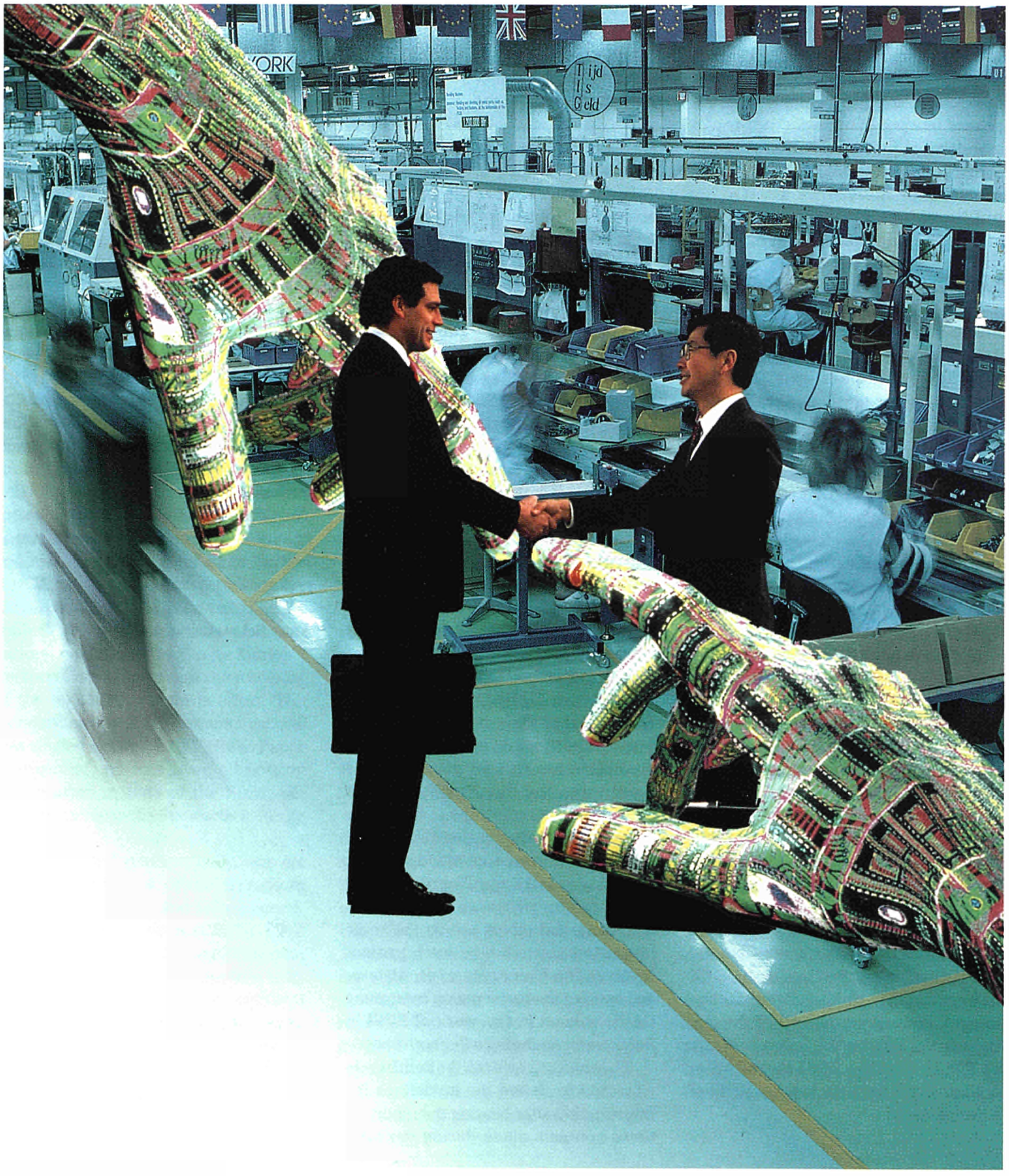
The next General Assembly is expected to define the guidelines for future action after hearing the report on these contacts made during the tour. Many issues have yet to be resolved. How should co-operation be formalized? Should the fact-finding and promotional tours to the East be continued? How and at what level should contacts with specialists be pursued in these countries and should the possibility of bringing these countries into ETSI be considered, and if so, under what conditions and in what framework? These are some of the questions being asked these days.

The second chapter in ETSI's international affairs concerns relations with the United States and Asia. Mr Rosenbrock underscored the importance of ensuring the full compatibility of networks and equipment and he pointed out that today, no one, regardless of his origin or his strength, is able to conduct the necessary research and development on his own and penetrate today's world market. That is why ETSI co-operates with both the United States and Japan as well as Australia, Korea and, naturally, the ITU (International Telecommunications Union). It does so in the sectors that have been assigned priority status: ISDN, narrow and broadband networks, smart networks, telecom management networks, Universal Personal Telecommunications (UPT) and the next generation of digital mobile telephones (GSM).

Cooperation is being given shape in the Global Standard Collaboration Group (GSC), which is a sort of summit meeting of regional standardization bodies from Europe, America and Asia. The GSC's objective is unambiguous: to create the competitive conditions indispensable to companies by genuinely opening up the market. ■

Anne Eckstein *journalist*

Consumer electronics: a European/Japanese project to help suppliers



DIRECTORATE-GENERAL III of the European Commission is responsible for industrial affairs at the Community level, including international industrial co-operation. It coordinates policy for the consumer electronics industry, and recently launched a pilot programme to develop subcontracting for this industry in Europe. This initiative was taken in conjunction with DG XXIII, which is responsible within the Commission for small and medium-sized enterprise (SME) policy. The following article illustrates how the European Commission is working to help Community suppliers and users of components become more competitive in today's market place.

In the early 1990s, faced with the economic downturn which had already started to affect Europe, the European Commission and the 12 Member States decided on action to help industry. The Community concluded that increased protectionism was not the answer and that only by improving competitiveness would Europe's long-term industrial health be ensured. Small and medium-sized enterprises (SMEs) were considered of prime importance to the industrial fabric, in particular the significant contribution made by subcontractors and component suppliers to the overall competitiveness of European industry.

The European consumer electronics industry was among the industries which needed to improve their relative competitiveness in an increasingly globalised market place. The dependence of manufacturers on external component suppliers in this industry means that such improvement can only be achieved using measures which involve close co-operation between them both.

The nature of manufacturing in this industry is such that up to 70% of the cost of manufacturing a typical consumer electronic product such as a video cassette recorder (VCR) can be represented by the cost of the components which a manufacturer assembles to make the finished product. As restructuring takes place, an increasingly larger proportion of those components are being subcontracted to external suppliers, and without a competitive external supply base the end product manufacturer will struggle to establish his own competitivity in the market place.

The mission was an unprecedented success, most importantly in the eyes of the suppliers themselves, some of whom had initially, and privately, expressed a certain scepticism about what they had to learn from their Japanese competitors.

For this reason, in identifying objectives for industrial policy in the electronics sector[1], the European Commission and the Member States attached particular importance to the need to improve the competitive position of European component suppliers (subcontractors). Emphasis was also laid on the importance of industrial co-operation as a means to improve competitiveness. The question was what could be done, and what form of co-operation would best serve as an instrument for improvement in the component supply infrastructure.

Industry's response

At the same time, the European electronics industry itself had already started to respond to the need to restructure. In the consumer electronics industry, the indigenous European manufacturers had for some time been discussing mutual interests with the Japanese companies manufacturing in Europe, in an effort to identify areas for mutual co-operation.

This co-operation between the European Association of Consumer Electronics Manufacturers (EACEM) and the Electronic Industries Association of Japan (EIAJ) involved all the major European based manufacturers – including Philips, Thomson, Nokia, Grundig – as well as Sony, Matsushita, Hitachi, Toshiba and Mitsubishi. Because of the increasing investment by the Japanese in Europe, areas of common interest were becoming increasingly easier to find, and one of the first and most important that they identified was the need to increase the competitive supply of components to ensure Europe remained a viable option for the manufacturing of their products in the future.

This existing dialogue between the EIAJ and EACEM, and the need for the Commission to respond in a practical way to the political approach decided by ministers, led the Commission in late 1991 to offer its support and encouragement to a joint Euro-Japanese initiative for a co-operative programme to develop competitive component supply in Europe for the consumer electronics industry.

The pre-pilot project for plastic components

The proposal for a co-operative programme was initially agreed by the consumer electronics manufacturers in October 1991. By December of the same year, a working group comprising the purchasing managers of the main European and Japanese companies had initiated discussions in Brussels. This group agreed to proceed quickly with a "pre-pilot" project to define an approach for collaboration which would focus on the generic technology of cosmetic plastic moulding. Cabinets for TVs and front panels for VCRs were key components for both products, and components where the manufacturers identified the potential for competitive improvement in European suppliers.

After this initial component selection, progress was much quicker than the participants had expected. It was decided not to dwell unnecessarily long on the reasons for the competitive disadvantage, but to select a limited number of plastic moulders who were already supplying the consumer electronics companies participating in the project, audit them to determine on an objective and common basis their strengths and weaknesses, and then to take the suppliers to Japan to allow them to assess at first hand the situation of the Japanese suppliers of the same components.

The selection of suppliers was made in February 1992, the audit was completed in April and May, and during two weeks at the beginning of July in the same year, 11 European plastic moulding companies visited Japan.

The mission was an unprecedented success, most importantly in the eyes of the suppliers themselves, some of whom had initially, and privately, expressed a certain scepticism about what they had to learn from their Japanese

competitors. The perception in Europe had been that any competitive advantage that might have been enjoyed by the Japanese suppliers was most probably due to structural differences such as longer working hours, lower labour rates, and ingrained relationships with customers which restricted competitive pressures. In fact, at the end of their mission the suppliers' conclusions were very different and in many ways more positive for the European industry.

Some interesting finds

The European suppliers concluded that the Japanese suppliers did in general enjoy a competitive advantage over their European counterparts, but that this was primarily due to more effective management, higher staff involvement in quality management systems and, perhaps most importantly, a closer relationship between suppliers and their customers which, rather than restricting competition, created an environment in which the supplier was assisted in their efforts to improve their competitivity by their customer. Certain technology differences were identified and duly noted by the European participants, but the differences often lay in the application of the technology rather than the technology itself. The differences in management style were also clearly a result of cultural factors, but the European suppliers concluded that Japanese practice was merely good practice, and most of the positive aspects could be introduced into European factories.

A return match

As part of their conclusions to the mission the European suppliers also asked whether Japanese experts might be available to visit their plants in Europe to assist in the definition of improvement programmes. This was agreed to by the Japanese side, and a delegation of experts spent three weeks visiting the 11 plastic companies during September 1992, only two months after the mission to Japan. It was also decided that improvement programmes would be agreed between the suppliers and their customers and which would be assessed in September 1993 (one year later) to determine the success in implementing the changes agreed. This follow-up audit has now been completed and has confirmed that significant improvements have been achieved by all the moulders.

In order to support and launch the programme, the European Commission provided support equivalent to approximately 40% of total costs. Included in this package was a subsidy of 50% of the costs of SME participants who visited Japan. This was the most expensive activity for the SME moulding companies and the subsidy made it possible for them all to participate.

Shortly after the plastics mission to Japan, the user group decided to initiate a second project. In response to this and to the early success of the pre-pilot phase, the Commission announced in November 1992 its intention to launch a more substantial European Community pilot programme, which would extend and build on the initiative already taken by industry.

Industry has responded admirably to the opportunity provided by the programme, and the programme has already exceeded initial expectations.

The pilot programme runs for two years, 1993-94, and provides 3 million ECU supporting up to 40% of project costs. In June 1993, the second mission took place, comprising 16 European suppliers of printed circuit boards, and the next projects have also already been selected, for electro-mechanical connecting devices and pressed metal parts (due in 1994 and 1995 respectively).

Pilot programme methodology

The purpose of the pilot programme was for the Commission to evaluate this type of industrial co-operation and to assess its suitability for application in other situations and industries. So why does it seem to work so well ? A key factor in its success has been the ownership of the project activities. Throughout the programme, the Commission and its Japanese co-sponsor MITI (Ministry of International Trade and Industry) have sought a minimal role in project selection, definition and implementation and has encouraged an industry-led approach to these activities. Meetings have been chaired by the companies themselves, they have decided what their priorities are, and how best to achieve them. The user companies have also had complete control over the selection process, and have decided to focus their efforts and resources on those supply companies which they believe have the most positive attitude towards improvement and consequently the best potential to benefit from the programme.

Disagreements about whether competitive advantage existed (as opposed to advantages derived from unfair competition) and the reasons for any such advantage were not dwelled on, and the European and Japanese manufacturers decided to let their suppliers go to Japan and decide for themselves what the situation was. This approach also accelerated progress, reduced conflict at the outset, and ensured rapid results from which the manufacturers could draw practical conclusions about what needed to be done.

It is hoped that the pilot programme will strengthen the European supply industry and avoid a situation where imports of components continue to increase and production moves off-shore, but its primary function was for the Commission to assess the potential of this type of industrial co-operation as a model for other industries. While the assessment phase will not be completed until 1995, the early results indicate that we have a viable format for such activities in the future. Already the IT and business equipment industry has initiated discussions on a similar project, and other sectors have also expressed interest in running co-operative programmes of this sort.

Industry has responded admirably to the opportunity provided by the programme, and the programme has already exceeded initial expectations. Enthusiasm has increased over time, and the programme now has its own momentum. It is particularly rewarding to see that the user companies involved are now building on the experience gained and are introducing their own in-house programmes to develop suppliers. Now we can look forward to the extension of these activities to other industries, and to the improvement of the supply infrastructure in Europe as a whole. ■

Bill Dee *DG III*

[1] Commission communication on "The European Electronics and IT industry: state of play, issues at stake and proposals for action", 3 April 1991.

Public policy and the financing of technological innovation

PUBLIC SECTOR financial assistance and incentives supporting innovation come in a wide variety of guises: grants, tax concessions, etc. How effective have these public sector financial measures been? What role do they play alongside the new financial instruments of the Community itself? Is there a need for new initiatives?

Innovation in the business world is generally defined as the successful marketing of new processes, products or services. It is now increasingly considered to be a key factor in competitiveness and economic growth, as demonstrated by M. Porter's Competitive Advantage of Nations (published by Macmillan, 1990) and the Technology Economy Programme (TEP) of the Organisation for Economic Cooperation and Development (OECD).

However, the innovation process has a number of characteristics which makes it particularly difficult to finance.

First, it is a long, complex and risky process. Success is never certain – quite the contrary. Out of a hundred initial ideas, only one or two eventually become successful innovations. As a consequence, investments in innovative projects require a higher return than other less risky business propositions.

Second, whereas other business investments often involve tangible assets such as buildings and machinery, investments in innovation generally have a large intangible component such as research, know-how, and intellectual property, and therefore do not yield the collateral required by traditional financing methods. Moreover, the importance of this intangible component seems to be growing rapidly.

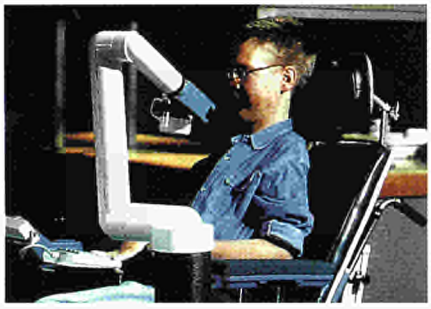
Third, small and medium-sized firms (SMEs), especially the growing ones, have particular difficulties in financing innovation. This is due to the absence or insufficiency of traditional guarantees as a result of their relatively limited asset base, and the high cash costs of introducing products into a sufficiently large market.

Because of this, all Member States have implemented a number of measures or schemes which aim to facilitate the financing of innovation, especially by small and medium-sized firms. This latter focus has been justified partly by referring to the difficulties mentioned above, but also with reference to numerous studies throughout the '80s which indicated that SMEs have a larger potential for innovation and job creation than large firms.

Public measures

Public measures to support the financing of innovation basically come in two forms: direct financial support and indirect measures mostly of a fiscal nature.

Direct financial incentives come in all shapes and sizes, but in essence reduce to subsidies, loans and guarantees. However, within these three categories there are probably an equal number of subcategories, due to widely ranging application modes. For example the category "loans" includes those with interest subsidies either through a grace period or an interest rate reduction, loans accompanied by a redemption guarantee, or even quasi equity instruments such as subordinated loans, advances which are reimbursable under certain conditions, etc.



These incentives are often restricted to firms which satisfy certain criteria such as being of the required small or medium size, being recently created, or taking part in regional, national or transnational R&D and innovation programmes. Also direct financial support tends to concentrate on particular sectors or technologies which public authorities feel they need to promote. In addition they mostly support the first stages of the innovation process, notably the research phase.

Examples of direct financial support schemes are the British SMART, the Dutch STIPT, the German TOU, the French ANVAR and the American SBIR schemes.

Indirect measures are mostly of a fiscal nature. Only those specific measures which have been taken in addition to the fiscal regulations for investments in general are considered. G. Bell of OECD classifies them in two groups: those which have a possible direct effect on firms' propensity to innovate by alleviating their tax burden, and those which have a possible positive impact on the environment.

Fiscal measures in the first group come in a wide variety of forms. In essence however, they reduce to three basic forms: tax credits, carry forward of losses and favourable fiscal – often accelerated – treatment of innovation expenditures. Examples of such expenditures are those related to R&D activities, exploitation and commercialisation of new technology – e.g. royalties.

Fiscal measures which aim to make the environment more amenable to the financing of innovation, in general, aim to promote or facilitate the creation of firms, the supply or utilisation of venture capital, the mobilisation of private capital, e.g. for R&D, the acquisition of new technologies and the development of non-profit making scientific organisations.

The following general observations apply to these government measures, both the direct and indirect ones. First, most Member States, as well as the US and Japan have implemented both types of measures throughout the eighties and the beginning of the nineties. Second, despite a few evaluation attempts, no clear conclusions can be drawn as to the effectiveness of each type of public measure.

The reasons for this are: a) the wide variety in which these measures have come; and more importantly, b) the dependence of their effectiveness on multiple parameters, including the overall fiscal system, the financial structure of the enterprise, the economic and financial environment. There is seldom a stand-alone effect.

During the latter part of the eighties and the beginning of the nineties, public authorities seem to have been turning away from direct financial support towards the indirect, mostly fiscal and legal measures. Despite this shift, direct support still constitutes an important part of public policy for financing innovation. Moreover, experts consider that a system combining both direct and indirect measures might be the most effective one, as it could cater for a wider range of needs.

The role of the European Community

Community activity with a visible output in this area is relatively recent. It started in 1984 with support for the launch and the initial years of operation of the European Venture Capital Association (EVCA), at that time a network of 34 venture capitalists.

Since then the EVCA has grown steadily and become financially independent. It currently contains more than 200 of the most prominent among Europe's 500 or more venture capital companies and has become the forum for venture capital and its further development in Europe.

From 1984 onwards the Commission focused its activities on direct financial incentives to promote venture capital as the vehicle for financing innovation. As far as the subsidiarity principle is concerned, it sees its role in this area as one of complementing initiatives developed by national and subnational authorities. It acts thereby as a catalyst rather than a substitute for the private sector and national authorities. It does this by providing transnational links to enhance the efficiency of these national or regional initiatives, or where necessary, by temporary pump-priming financial incentives.

Based on these principles the Commission has developed a range of initiatives. Each one focuses on specific gaps which remain despite the impressive growth of the European Venture Capital Industry during the last decade. The following inbalances can be identified.

In spite of an initial focus on early-stage high technology projects and companies, there has been a drift towards more conservative investments. In 1985 early stage investment represented 25% of the overall amount of European venture capital investment, of which 3% was in the seed stage, but in 1992 the share of early stage investment had dropped to only 5.9% of which 0.6% was in seed projects (see graph I). Even if in absolute terms the amounts have indeed risen, by now there is a relative shortage of funds for early-stage investment.

Similarly in 1985 investments in sectors that could be considered 'high technology'(*) accounted for 34% of the total venture capital investment, but in 1992 this figure gradually declined to reach 16% (see graph II).

The major reason for this relative decline seems to be the fact that the return earned by high technology investments has rarely been commensurate with the higher risks associated with this predominantly early stage activity. Success stories like APPLE and DEC are few and far between. There is a growing perception that venture capital, especially in high technology, has been oversold. This may further encourage venture capitalists to concentrate even more on short-term, less risky investments like management buy outs and expansion funding, rather than the start-up/early stage and/or high technology investment.

Moreover the high technology gap is even more acute for projects involving cross-border cooperation among Community firms.

Most important of all, there are substantial geographical gaps. The UK still accounts for more than half of the venture capital industry in Europe. Other major European countries such as Germany or Italy account for respectively less than one fifth and one tenth of UK venture capital industry (see graph III).

There are several reasons for this: the relatively short history of the venture capital industry in many Member states, except in the UK and to some extent also in France and the Netherlands; lack of awareness; reluctance of entrepreneurs to accept venture capital due to fear that they may lose control of their business.

Bridging the gap

Over the past years the Commission has launched several pilot schemes, each of which aims to bridge one of the gaps identified above.

As such there is the Seed Capital Scheme (for the early stage gap), the Eurotech Capital Scheme (for the technology gap and exploitation of transnational high technology projects), the various instruments supported by SPRINT such as the investment forums and the Training Institute, and by the Regional Funds (for geographical gaps).

In addition to its initiatives to promote venture capital, within the context of the SPRINT programme the Commission recently started paying attention to other types of financial institutions as vehicles for financing innovation and technology transfer. An example of this is the Technology Performance Financing Scheme (TPF).

The TPF scheme is designed to encourage commercial banks to play a larger role in the modernisation of industrial SMEs. Through it, banks advance funds – partly unsecured – needed to acquire new industrial technology, and are paid back in several instalments over a period of 2 to 3 years in relation to the results obtained with the new equipment.

The role of the Commission's SPRINT programme is to provide a partial safety net to participating banks by underwriting a proportion of their risk, and not to act as a funding service. It has signed up a group of core banks to manage the TPF scheme during a three-year pilot phase, after which it is envisaged that a number of these banks will continue with their TPF programme without further Commission support.

Insurance companies are examples of other institutions in the financial services area which could play a useful role in the financing of innovation. Establishing a system for insuring the technical rather than the managerial or commercial risks of innovations could provide some form of collateral to companies, notably SMEs, and in particular the New Technology Based Firms (NTBF), thereby complementing their often weak asset base.

What the future holds

Additional public initiatives, at regional, national and Community level will still be needed, as is further evaluation. Indeed the future environment for financing innovation looks rather worrying.

First, as indicated above, there is a steady increase in the importance of the immaterial components (e.g. know-how) and investments (e.g. in R&D, human capital, design, marketing) in the financing of innovation, thus making the provision of collateral for traditional bank financing more and more scarce.

Second, except for the large multinational corporations, the access of other European firms, especially SMEs, to financial markets is becoming more and more difficult. Secondary stock markets in Europe, including the once flourishing London USM (Unlisted Securities Market) are in demise.

Also the increasing concentration of capital markets in a few major centres (London, Paris, Frankfurt) – at the expense of more regional ones such as Dublin, Glasgow, Lyons, Barcelona, or Milan – is expected to lead these primary financial centres to concentrate almost exclusively on channelling international capital to large multinational companies. SMEs will face greater difficulties in obtaining access to capital. Also brokers in the existing regional or small national exchanges will find it increasingly hard to generate the volume of transactions required to stay in business.

If financial expertise becomes concentrated in the primary centres, SMEs – most of which still have a regional or local focus – will find it more and more difficult to secure the financial services they need at a level and price they can afford. Even the mechanisms for making the savings of the richer parts of the Community available for investment by the entrepreneurs of developing regions will be seriously damaged, should regional financial centres disappear.

In addition, three other unfavourable trends are identified in a recent FAST[1] report by Mr U.Muldur. First, industrial companies, especially the large conglomerates, are increasingly managed according to financial rather than industrial logic. Industrial logic emphasises investment in long-term growth, whereas financial logic stresses short-term profits, and tries to achieve growth through external acquisitions at the expense of investments for internal projects. In this context one only needs to refer to the wave of mergers and acquisitions during the late '80s and the early '90s.

Second, the average returns on investment in R&D and innovation in general may be heading downwards as a result of two opposing factors. On the one hand, R&D costs seem to be increasing, although substantially more in some sectors, e.g. pharmaceuticals, than in others. On the other hand, product life-cycles are becoming shorter, thereby increasing the pressure for globalisation and its corresponding high marketing costs. Also fierce competition is forcing prices downward. Finally markets for secondhand assets often do not exist any more, especially for high tech goods, which therefore do not have any resale value.

Assuming a flat cost capital, the possibility then exists, at least for some sectors, that at some future moment the average return on R&D investment will fall below the cost of capital.

There is consequently a need for continued and increased action at both national and Community level. Bearing in mind the principle of subsidiarity, examples of new Community initiatives are as follows.

- **Bringing together policy makers and managers of national programmes** to exchange experiences and identify "best practice" on direct financial incentives and fiscal and legal measures.

Within the context of SPRINT's European Innovation Monitoring System, the first such event – attended by all Member States – took place in March 1993, concerning public policies to finance New Technology Based Firms. Another policy workshop concerning schemes or measures for mobilising private capital to finance R&D is scheduled for the last quarter of 1994.

- **Development of more effective secondary markets and exit opportunities.** This could involve the development of a pan-European secondary market, to overcome the problems caused by fragmentation and limited size. It could be established by linking existing secondary markets telematically, by creating a European association of securities' dealers and linking them electronically similar to the NASDAQ[2] system in the US.
- **Launching small-scale experiments to mobilise private capital** for financing R&D, its exploitation and innovation in general.

These experiments could centre around the so-called "Business Angels," i.e. wealthy individuals often in the so-called "liberal professions" or successful former entrepreneurs, who invest in start-up businesses. Indeed research indicates that the total amount invested by these individuals is already several times larger than formal venture capital investments, i.e. up to three times in Europe, and seven to eight times in the

US . Moreover it also shows they would invest even more if they were aware of more investment opportunities. The main challenge, of course, is finding these "angels", as they tend to operate anonymously through informal networks.

Another type of experiment might involve the provision of minor financial support to financial intermediaries for technical project appraisal and managerial follow-up once the investments have been made. High technology projects not only require more technical expertise and skills but also more managerial assistance from the investors. They therefore are more costly. The cost/risk ratio of assessing small scale investments in technology related fields always counts as a major deterrent to investors throughout Europe.

A number of the above ideas are included in the proposed Fourth Framework R&D Programme, notably the part that deals with the financial environment for validation and dissemination of Community R&D results. ■

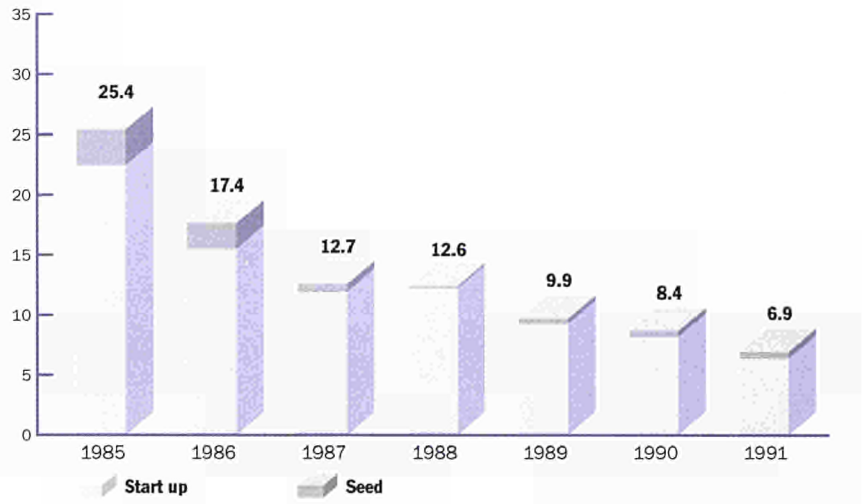
Dr D Janssens *DG XIII*

(*) i.e. telecommunications, computer related, other electronics related, biotechnology and medical/health related.

(1) FAST : Community action in the field of forecasting and assessment in Science and Technology, DG XII. Title of FAST report: "Le financement de la R&D au croisement des logiques industrielles, financières et politiques, Commission des Communautés Européennes, FAST/Monitor, dossier prospectif n° 2, novembre 1991"

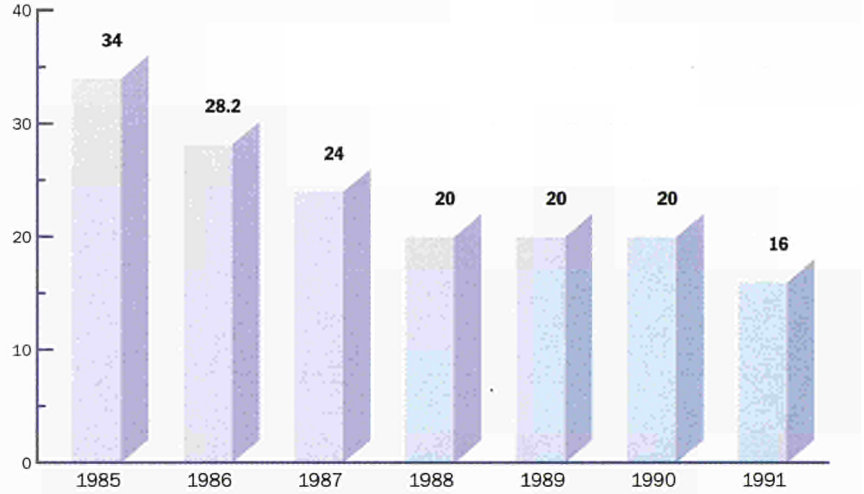
(2) NASDAQ = National Association of Securities Dealers Automated Quotation

Graph I **Early Stage Gap**
Early stage investments (seed and start-up)



Source of data: EVCA Annual Statistics

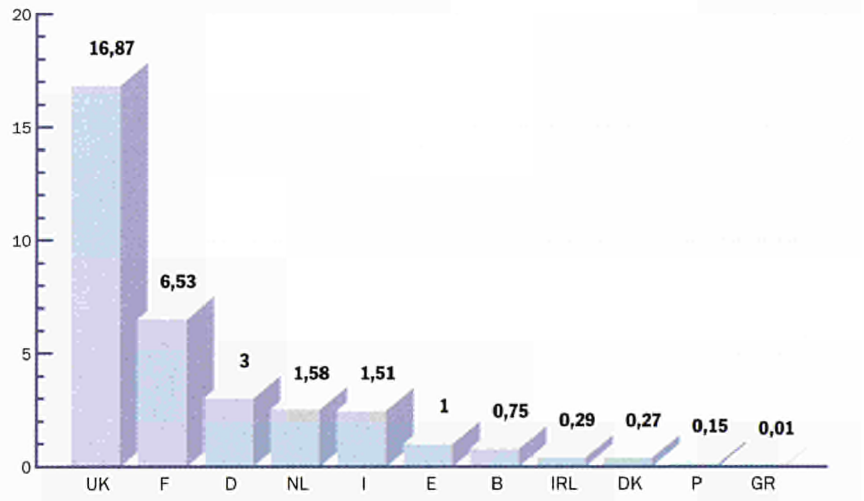
Graph II **High Technology Gap**
Investments in high technology sectors



High Technology sectors: telecommunications, computer equipment, office electronics, biotechnology, medical & health

Source of data: EVCA Annual Statistics

Graph III **Geographical Gap**
Cumulative funds raised to date (1991)



Source of data: EVCA Annual Statistics

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