

Innovation & Technology Transfer

4/96



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Inventing
a New

Green Paper on Innovation

Europe



C O N T E N T S



Source: ESN/Mathew Lowry

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Innovation Issues

Following the publication of the European Commission's Innovation Green Paper, the last few months have seen a Europe-wide debate on innovation that is unprecedented in scope. The article on the following pages offers a flavour of many of the points that have emerged. It can however give only an impression of the richness of the debate, as anyone who had the good fortune to attend any of the consultation seminars organised in each of the Member States to discuss the Green Paper, or the final summing-up conference in Rome at the end of May, can testify.

The article also looks forward to an innovation action plan which the Commission is preparing to put forward later this year.

Also in this issue, the article on page 21 reports that even in a technologically sophisticated area such as software development, innovation can depend heavily on organisational and managerial factors. This is indeed a point which emerges strongly from the Innovation Green Paper and the subsequent debate. The human dimension is just as much a key element in innovation as research and new technologies.

Finally, this issue's Dossier, beginning on page 10, demonstrates how a wide range of European Union initiatives are developing innovative solutions to provide a more integrated, safer, and more efficient transport network for Europe. ■

ABOUT INNOVATION & TECHNOLOGY TRANSFER

Innovation & Technology Transfer is published six times a year in English, French and German by the European Commission's Innovation Programme, which aims to strengthen Europe's innovation infrastructure and disseminate research results to industry.

The emphasis is on timely news relevant to these objectives and in-depth 'Case Studies' of successful projects. Each issue also includes a major Dossier on one topic. Subscription is free - please fill out the request form on the back page and fax or post it back to DG XIII/D-2.

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Address

DG XIII/D-2, EUFO 2291, L-2920 Luxembourg
Fax: +352 4301 32084

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Inventing a New Europe

Launched last December by European Commissioners Edith Cresson and Martin Bangemann, the Green Paper on Innovation drew an unprecedented response from more than 5,000 people. Individuals, companies and institutions agree: innovation is hugely important to Europe's future. At the synthesis conference held in Rome on 29 May to mark the end of the four-month public consultation process, however, it was clear that opinions differ on what should be done to strengthen and support innovation in Europe.

Like an old-established business that can only survive by adapting to the modern world, Europe is struggling to re-invent itself as an environment in which innovation can flourish. The promotion of innovation illustrates the process of innovation itself, and demands the same skills.

The Green Paper on Innovation demonstrated that innovation is hugely important to Europe's future. The response to the Green Paper has shown that thousands of European companies and institutions agree: a Community analysis of innovation is overdue.

On the details of the Green Paper there has been much debate, and priorities clearly need to be set. In particular, the discussion has highlighted the importance of cultural factors, including education, as well as the role of small and medium-sized enterprises (SMEs) and the regional dimension that they represent. In some cases, these factors need to be addressed at national or local level rather than by the Community as a whole, but the Green Paper has done a useful job in bringing them to the attention of the individual Member States.

In any case, the follow-up to the Green Paper promises concrete help in at least three important areas: better access to and use of new ideas and technologies by disseminating information and encouraging people to make use of it in innovative ways; easier access to risk capital;



Charles Leonard, MIFC

and simpler rules for setting up new companies and protecting innovations. Big businesses, and small businesses that depend on high technology, look certain to benefit.

Action Plan on the Way

Market-oriented research, promoting capital investment and a simplified regulatory framework are the three main themes of the EU's future approach to innovation, according to Edith Cresson, Member of the European Commission responsible for research, education and human resources. Mme Cresson was speaking at the conference, held in Rome on 29 May, that marked the end of the four-month public consultation process on the Green Paper. The conference, organised under the Italian

Presidency by the Ministry for Universities and Scientific and Technical Research, was supported by the Commission's Innovation Programme.

These themes will form the basis of an innovation action plan which the Commission will put forward this autumn when it has digested the results of the Green Paper discussion. Mme Cresson said that the plan will cover not only research, notably the preparation of the next framework programme, but also training, finance, the internal market, regional policies, and activities benefiting SMEs.

The action plan aims to provide an initial response to the need to boost innovation. However, said Mme Cresson, the plan should also pave the way, in collaboration with the Member States, for a more ambitious, long-term, innovation policy for Europe. ●●●

Speaking at the synthesis conference in Rome in May, Commissioner Cresson stressed the importance of improving Europe's capacity to benefit from already available knowledge and know-how. On Mme Cresson's right is Luigi Berlinguer, Italian Minister for Research.

"Academics want to publish and to gain the recognition of their peers, while business people need commercial advantage and confidentiality," - Dr Sean McCarthy (left), Chairman of the Irish National Advisory Panel for the Innovation Programme, seen here speaking with another conference participant, Mr Argyropoulos.



ESN/Charles Butcher

and the setting of research priorities conducted at a national, rather than Community, level.

Mme Cresson also stressed the importance of improving Europe's capacity to benefit from already available knowledge and know-how, through a new approach to dissemination policy. This could involve support for training, mobility, strengthening of interactions between enterprises of all sizes, and actions supporting SMEs. One suggestion is to merge, in a single programme, technology stimulation meas-

Research: Doing and Telling

The co-ordination of national and European research policies begun under the current framework programme must continue in the new programme, Mme Cresson said, so as to make the best use of restricted research budgets and avoid duplication.

The Green Paper debate tended to confirm the relevance of the research-industry Task Forces⁽¹⁾, set up under the current framework programme to bring scientific and industrial circles closer together, Mme Cresson said. The European Parliament has welcomed the Task Forces, though it criticised the way in which they were set up. New Task Forces have also been suggested, especially in areas where the market has not spontaneously responded to social needs: these include the environment, health, and innovation and technology transfer.

Yet the Task Forces are not universally supported. Speaking at the Rome conference, Professor Dr H J Warneke, president of Germany's Fraunhofer Gesellschaft, said that task forces would certainly help to promote research. But, he continued, they are not the main way to create innovation; he would prefer to see both technology foresight studies

Who was consulted and who replied?

The contributors to the debate on the Green Paper range from individuals and small companies, through large firms, universities and professional institutions, to the European Parliament and other EU institutions.

The process involved the distribution of more than 30,000 copies of the Green Paper. The consultation which followed was unprecedented in scope. Within a period of four weeks in April and May, 5,000 people all across Europe were making their views known through a series of 17 national seminars in all the Member States of the EU, plus Norway and Iceland.

Many hundreds of written responses were received from individuals and representative bodies. Together with reports of the debates at the national seminars, these formed the basis of the 'public' response to the Green Paper.

With many of these responses coming from large companies, it is not surprising that the single most popular topic - apart from a general welcome for the objectives of the Green Paper - was how best to direct research towards innovation. Finance for innovation and the regulatory framework also attracted plenty of interest. Comments on the better use of human resources and public action to support innovation were fewer.

Apart from the national responses, several EU institutions have added their conclusions to the debate:

European Parliament

- Committee on Research, Technological Development and Energy (CERT)
- Committee on Economic and Monetary Affairs and Industrial Policy
- Committee on Social Affairs and Employment
- Committee on Culture, Youth, Education and the Media

Council of the European Union

- Research ministers
- Industry ministers

Economic and Social Committee

Committee of the Regions

Advisory Bodies

- IRDAC (Industrial Research and Development Advisory Committee)
- ESTA (European Science and Technology Assembly)

ures of the CRAFT⁽²⁾ type with the work of the Innovation Programme.

The Green Paper makes it clear that not all innovation depends on research. Nonetheless, some people think that its recommendations still focus too much on research and high technology. "Research and technological development are not synonymous with innovation", said MEP Stelios Argyros at the conference as he presented the report of the European Parliament's Committee on Research, Technological Development and Energy. "The most important [factor] is economic; innovation is characterised not so much by new technology as by commercial success."

Mme Claude du Granrut of the EU's Committee of the Regions gave further support to the low-tech viewpoint. Research is not decentralised enough, she told the conference, with the result that much research is too remote from potential users. She stressed the importance of innovation relay centres to keep SMEs informed at the local level.

Dr Sean McCarthy, Chairman of the Irish National Advisory Panel for the Innovation Programme, agreed on the importance of innovation relay centres. There is no shortage of research results, he said, but converting university research into marketable products can be difficult because the needs of academics and of business people are almost diametrically opposed. "Academics want to publish and to gain the recognition of their peers," he said, "while business people need commercial advantage and confidentiality."

The growing number of 'campus companies' set up to exploit academic research shows that academics can succeed in the business world. In general, though, Dr McCarthy feels we should not force academics to become entrepreneurs. We must ensure instead that they



ESN/Charles Butcher

Edith Cresson and Luigi Berlinguer discussing innovation policy at the Rome conference in May.

have access to management skills and business partners if they wish, he said.

Liberating the Risk Market

The Green Paper's argument that the financing of innovation should be made easier was widely supported, even though this may be difficult at the Community level.

Mme Cresson cited the need to encourage the investment of risk capital in innovative businesses, support the development of trans-European capital markets, ease conditions for access to long-term financing, and generally improve the interface between technology and finance.

In these areas, private initiatives and action at national or regional level are essential. The Commission could help by promoting 'good practice', for example, by supporting pilot projects and through the structural funds. The harmonisation of accounting procedures was another suggestion to come out of the consultation process.

There were several suggestions that financial risks should be limited by state-backed insurance schemes. Some European banks - including Banque Générale de Placement, Landesbank Berlin, Deutsche Bank - already finance innovation by

such methods. Professor Dr Warneke, however, was sceptical about the role of banks in financing innovation. Simply because they are lending other people's money, he said, they are always going to be reluctant to invest in risky projects.

Laws and Regulations

A legal and regulatory environment more conducive to innovation centres on the

fact that European companies could make better use of patents to protect their innovations, but the high cost of patents is clearly a problem. "Patents are too expensive for SMEs to defend against companies which could be half the size of Ireland," said one contributor to the Irish national debate in Dublin.

The time taken to set up a new company is not just an administrative headache for entrepreneurs; it is often a real handicap in the race to stay

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Patents are too expensive for SMEs to defend against companies which could be half the size of Ireland.
 ”

Report of the Irish seminar, Dublin

simplification of administrative procedure and on intellectual property rights.

Mme Cresson cited the Commission's recently-launched SLIM initiative (Simpler Legislation for the Internal Market) which, she said, should also be implemented in the innovation area.

The Green Paper highlighted

ahead of the competition. Even when there is a prospect of financial aid at the end of the tunnel, six months is 'an eternity' to wait for action from the bureaucrats, said a delegate in the UK's national debate. ●●●

(1) See edition 5/95.

(2) See edition 1/96.

Comments from the European Parliament

The European Parliament has welcomed the Green Paper and is keen that measurable results should follow.

In a 35-point resolution, passed just as *Innovation & Technology Transfer* went to press, the Parliament calls among other things for:

Dissemination and Exploitation of RTD Results

- Better diffusion of technical know-how, including more support for the Innovation Programme and the programme for the Stimulation of the Training and Mobility of Workers.
- A new Task Force to foster dissemination and exploitation of RTD.
- Focus on research that is interdisciplinary, application-oriented and network-driven.
- Greater use of information technology, the foundation to be laid by having Internet access for all schools.
- Priorities to be set based on a better knowledge of the innovation process, founded on quantitative innovation indicators.
- A permanent review of national 'best practice' encouraging innovation.

Monitoring of RTD

- Improved co-operation as regards national and EU research policies.
- The Joint Research Centre's Institute for Prospective Technological Studies to have a key role in developing links between centres engaged in similar activities.

Economic and Financial Considerations

- Member States to review their fiscal regimes with a view to promoting innovation. Suggestions include Japanese-style regulation of domestic financial markets, longer payback periods for investment, and cheap loans to innovative companies.
- More competition within the internal market, preventing large companies from dominating markets and subsidies.
- Independent technical assessments to give banks a better understanding of technology-based firms.

Administrative and Legal Constraints

- Simplification of administrative procedures at both national and Community level. The Commission's SLIM initiative (Simpler Legislation for the Internal Market) is welcomed, and the Parliament also calls for consideration of further administrative simplification of the research framework programmes.
- Early adoption of the European Company Statute.
- Patent protection periods that vary according to the product type, so as to balance innovation (helped by patents) with competition (hindered by patents).

Encouraging SMEs to Innovate

- Support for innovation at the regional level, and programmes to encourage SMEs to co-operate with universities, industrial research centres, and big enterprises
- Attention to be paid to the role of intermediary organisations such as banks, consultants, marketing co-operatives and technical colleges in helping small firms.
- Structural Funds to be oriented towards innovation.
- Recognition that SMEs are not a homogeneous group - policy should respect their differences and be targeted on the basis of size and sector.
- Help for SMEs to reduce the financial risks of innovation.

Social, Educational and Training Aspects

- Better communication between researchers and the public. Funding should carry a responsibility to communicate research findings to the public.
- A more consumer-oriented research policy.
- Greater involvement of the workforce in the innovation process, through education and direct participation.
- Attention to 'incremental' innovation, which can be just as important as products that are fundamentally new.
- Emphasis on the integration of innovation in education and vocational training.

Task Forces and Innovation

- Debate on the goals of the Task Forces and the establishment of clear links between their work and the Green Paper's Action Routes.



ESN/Charles Butcher

Stelios Argyros, MEP and presenter of the European Parliament's findings.



The Human Dimension

The human dimension is at the heart of the whole innovation debate. As the report of the Danish seminar in Copenhagen says, "We need a change of attitude in the school system, with more focus on individual entrepreneurship. Young people leave school with their minds set on becoming

public money to spend on basic research.

The Green Paper's ideas on personal mobility also attracted comment. Ula Birgitta Sirkeinen, speaking for the Economic and Social Committee, pointed out that mobility between European companies is already quite high; what is lacking, she said, is the mobility within companies that Japanese firms promote so suc-

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We need a change of attitude in the school systems with more focus on individual entrepreneurship. Young people leave school with their minds set on becoming employees. Their role models are the well-paid employees.

”

Report of the Danish seminar, Copenhagen

employees. Their role models are the well-paid employees.”

Yet the ingrained nature of cultural attitudes could make change difficult. "The Green Paper shows an obsession with the USA and Japan," said Jean Paul Richter, innovation director of Burmah-Castrol. American children learn about entrepreneurship almost from the cradle, he said, and to transplant similar attitudes to Europe would need a major cultural shift.

In the short term, innovation can cause job losses, but in the long term the consensus is that it creates jobs, especially in SMEs. Robert Verrue, the Commission's Director-General for Telecommunications, Information Market and Exploitation of Research, reminded the conference that while Europe's balance of payments is comparatively healthy, unemployment remains one of our most serious problems. The most important - and most difficult - question, he said, was how much

successfully. "Investing in personnel pays off, but greater mobility [between firms] means more staff lost, and higher training costs," added Dutch trade unionist Jan Jacob van Dijk.

Since SMEs are so important to innovation, says the report of the Economic and Social Committee, the Fourth Framework Programme should spend more money on disseminating research results.

But the EC's Industrial Research and Development Advisory Committee (IRDAC) takes a different approach. For a start, says IRDAC, the Green Paper is too much concerned with SMEs and the regional dimension. As one of the participants in IRDAC's discussion put it: "Let's not forget that 70% of current RTD is done by multi-national enterprises; 700 of these companies file 70% of all patents."

IRDAC stands firmly behind education and shares the doubts of many SMEs about the Green Paper's emphasis

Timeline for the Innovation Debate

December 1995	Green Paper completed
January 1996	First publication of the Green Paper
February 1996	Green Paper published on the CORDIS World Wide Web site
Late April - early May	17 national seminars co-ordinate national responses
10 May 1996	Deadline for comments
29 May 1996	Synthesis conference in Rome brings together national comments with those of the Community institutions
6 June 1996	European Parliament vote
Autumn 1996	Comments assimilated and an action plan presented to the Council of the European Union
	The action plan's short-term measures are to be backed up by a long-term plan to improve innovation in Europe, said Edith Cresson at the Rome conference

The Chairman of the UK consultation seminar, the TV and radio journalist and presenter Nick Ross (right), in conversation with Professor Peter Goodall, Director of the European Network for Integrated Materials Management.



Charles Leonard, MIRC

on high technology. But IRDAC represents mainly large companies, and its members would rather see tax breaks for innovation than regional innovation centres and other direct public spending. Europe already has a 'support culture', says IRDAC, and some of the measures in the Green Paper would only drive us further from the US model of genuine competition.

The most fundamental part of the innovation debate - the social and cultural question - is the most difficult to translate into proposals for action. Of those measures that can be

taken, many will devolve to the national governments of the Member States, so existing national differences in attitudes to innovation are unlikely to disappear.

Money, as always, is tight. As the debate draws to a close, however, we are left with several workable, concrete proposals as well as a better understanding of the place of innovation in European society. It has been a worthwhile exercise. ■

▶ INTERNATIONAL

New Research Agreements

Research organisations from Israel and South Africa will soon be able to participate in the non-nuclear RTD programmes of the Community's Fourth Framework Programme (FP IV).

Similarly, organisations from the EU will be able to take part in the other countries' equivalent programmes. As *Innovation & Technology Transfer* went to press, the Scientific and Technical Co-operation (ST) agreement with Israel was expected to enter into force this summer and that with South Africa by the end of 1996.

Israel will gain the 'Associated' status already enjoyed by the EEA-EFTA countries⁽¹⁾. Research organisations from these Associated countries can participate in and receive funding for all of the non-nuclear FP IV RTD programmes.

Organisations from South Africa will also be eligible for all non-nuclear FP IV programmes but the country will have the same status as Australia⁽²⁾ and Canada - both of which have ST agreements for a range of research areas - insofar as funding must come from the non-EU country and not the Community.

Third Countries

Research organisations from the so-called 'European Third Countries' - the Central European Countries (CEC)⁽³⁾, NIS⁽⁴⁾, Cyprus, Malta, Switzerland and Turkey - may participate in all FP IV programmes (except the 'Training through Research' part of the Training and Mobility programme) provided their participation can be shown to be in the interest of Community policies. Since the individual



Pens in hands, Edith Cresson, Member of the European Commission responsible for research, and Israeli ambassador to the EU, Mr Efraim Halevi (left), sign the RTD Association Agreement in March. Centre is Mr Giorgio Salvini, representing the European Council.

Source: European Council

RTD programmes cannot provide funding to such organisations, financing should normally come from the Third Country concerned.

Financial support may be available from the Community, however, in order to facilitate the participation of organisations from the CEC, NIS and developing countries, subject to the conditions laid down by the Community's programme for co-operation with Third Countries and international organisations.

Switzerland is unique amongst Third Countries and non-EU countries in that it has a separate association agreement with the Community's thermonuclear fusion RTD programme. As *Innovation & Technology Transfer* went to press, Switzerland was negotiating to gain full Associated status as now exists with Israel.

Non-European Countries

Research organisations from non-European countries without an ST agreement may participate in about 50 per cent of the FP IV programmes, provided their participation can be shown to:

- be in the interest of Community policies;
- provide an effective contribution to the programme's implementation;
- benefit both EU and non-EU participants.

Financial support may be available for organisations from developing countries, again subject to the conditions laid down by the Community's programme for co-operation with Third Countries and international organisations.

Finally, note that a project's consortium must, in all cases,

include a minimum of:

- two legal entities from different EU states; or
- one legal entity from the EU and one Associated country; or
- one legal entity and the Joint Research Centre⁽⁵⁾.

Participation of Third Country research organisations can only take place in consortia containing this minimum. ■

(1) Iceland, Liechtenstein and Norway.

(2) See edition 3/94.

(3) Albania, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

(4) Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, the Ukraine.

(5) See edition 5/95.

► INDUSTRIAL COMPETITIVENESS

Europe's Performance Analysed

The European Commission's Directorate-General for Industry has published the sixth edition of the 'Panorama of EU Industry'.

The Panorama, which was produced in collaboration with the European trade associations, provides an extensive review of the situation in the manufacturing and service industries of the European Union. Available both on CD-ROM and as a book of approximately 1,500 pages⁽¹⁾, it is divided into two parts:

■ **Special Features** comprises 13 in-depth analyses of topical

of recent trends in demand and supply, employment and market share - are presented for 170 industrial and service sectors.

Services Outperform Manufacturing

According to the Panorama, 64 per cent of all Europe's employed people work in the public and pri-

In the electronic information market too, European firms should prepare to meet significant increases in demand. The number of CD-ROM drives installed world-wide is expected to increase from 60 million in 1996 to over 108 million in 1999. In addition, sales of interactive CDs in Europe are forecast to leap almost tenfold, from 59.8 MECU in 1994 to 5,676 MECU by 2000.

The Panorama credits service industries such as these, as well as commodities, with much of the spectacular rise in the EU's overall trade balance, which has risen from a steady surplus during the last decade to 3.6 per cent of GDP in 1994 - higher than in Japan. This has hidden poor performance in the manufacturing sector, however.

According to the Panorama, the EU is losing out to its competitors due to a lack of hi-tech sectors amongst its trade specialisations and too few links with newly industrialised countries and Latin America. It also has too few sectors with a strong research specialisation and a clear technological edge. In particular, the EU's largest exporting sectors - mechanical engineering and the automotive industry - have registered worrying falls in competitiveness.

Europe is also underperforming in terms of R&D expenditure and staff (see graph). Most R&D effort is concentrated at the medium technology level but even in manufacturing, a medium technology industry where the EU is strong, R&D expenditure is lower than in Japan.

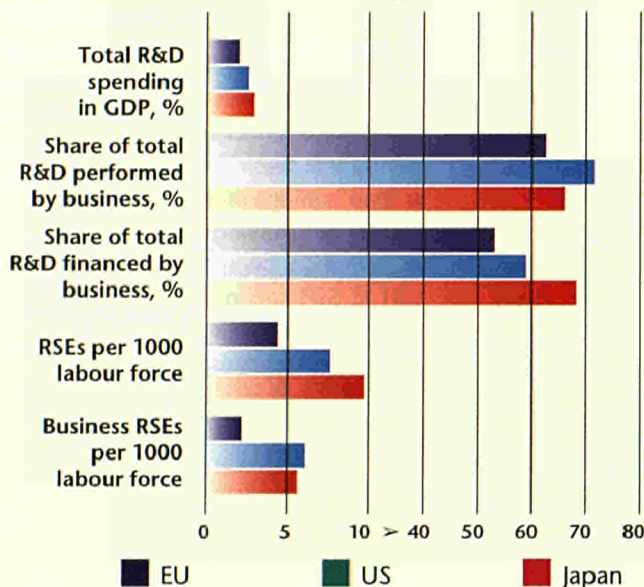


Intangible Factors

Another analysis of US and European firms confirms that investment is better directed towards R&D and other so-called 'intangible' factors. It concludes that quality of products and services, innovation, marketing effort, R&D investment and intellectual property are more powerful drivers of medium-term business growth than tangible, macro-economic factors. Innovation and intellectual property, in particular, are the strongest drivers of competitive achievement.

The Panorama also reveals a shift towards more equal distribution of technical resources and know-how across Europe. This is equated with the spread of modern production technologies that are reducing regional differences.

Structure of R&D Spending in the EU, US and Japan, 1991*



*European Commission, DG XII.

Europe spends less on R&D and has fewer Research Scientists and Engineers (RSEs) amongst its workforce than Japan or the US.

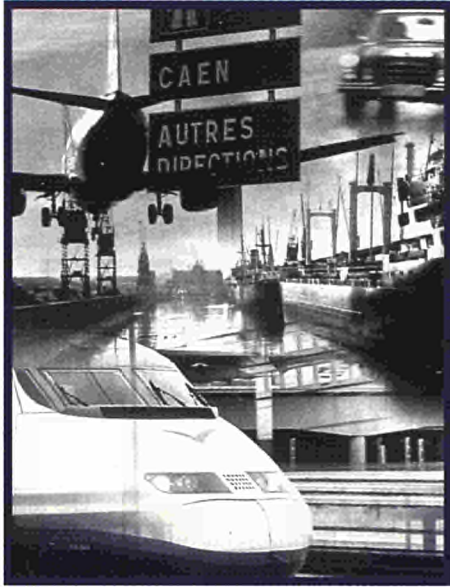
issues affecting European industry, including SMEs and employment, strategic alliances and changing patterns of employment;

■ **Reviews and Forecasts** - including detailed descriptions

private service sectors. Here, the outlook is generally good. Engineering consultancy services⁽²⁾, for example, should see their business increase as private contracts are increasingly used for infrastructure projects.

(1) 'Panorama of EU Industry - 95/96' is available from EURO-OP Sales Agents. Book: (130 ECU), catalogue no. CO-90-95-356-xx-C (where xx=EN, FR or DE). CD-ROMs (English, French and German): Standard Edition (300 ECU), catalogue no. CO-91-95-552-3A-Z; Professional Edition (1000 ECU), catalogue no. CO-92-95-207-3A-Z.
(2) See edition 3/96.

Trends in Transport



Benelux Press

“
**The total market
 for in-vehicle
 telematics
 equipment is
 expected to
 reach 18 billion
 ECU, cumulative
 1987-2010.**
 ”

Advanced transport technologies and a profound shift in the way society views mobility are essential if Europe - and the rest of the world - are to achieve the twin goals of economic growth and a sustainable society. A wide range of EC initiatives, including a dedicated research programme and five industrial Task Forces, are assembling resources to meet the challenge.

An efficient European transport infrastructure is vital to the EU's future. The inefficiencies in the current system, for example, lead to congestion estimated to cost around 120 billion ECU every year in wasted resources. Effective transport infrastructure is also crucial to Europe's social cohesion and regional development, while the impact on human health and the environment must be improved dramatically.

But an efficient European transport network cannot be developed without a fully European perspective. Up until recently, this perspective did not really exist, with transport infrastructure being planned from purely national priorities. To make matters worse, the different transport modes were developed separately, rather than as the different elements of an integrated system.

The result is a patchwork of road networks, railway systems, waterways, ports and airports which neither interface well nor, in many cases, even use the same technical standards. This poorly built jigsaw puzzle simply cannot satisfy the needs of a continental-sized economy and society.

What is more, this patchwork has been built up based on incomplete cost analyses - the environmental benefits of cycle paths, for example, have not been considered, and neither have the health costs associated with inner city traffic pollution. The result has been a heavy emphasis on road development and the use of the private car.

Thus while the 1970-1993 period saw transport activity grow by well in excess of 50%, this growth was not spread evenly among the various transport modes (see opposite). The final result is today's inefficient, unbalanced and positively dangerous transport system.

Approaching Gridlock

As Neil Kinnock, Commissioner for Transport, noted in a speech to the High Level Meeting of the Transport Intermodality Task Force (see below), "the results are catastrophic in terms of accidents, congestion and pollution. In 1995, in the Union alone, 45,000 people were killed in road accidents, 1.7 million more were injured and 150,000 were permanently handicapped. This is clearly unacceptable ... and leads us to one inescapable conclusion: the present transport system is no longer efficient and has become unsustainable."

The future is even more grim: in the 'business as usual' scenario, where the transport system is allowed to continue to evolve unchecked, the 1990-2010 period will see:

- road haulage increase by 42%, significantly outgrowing rail (33%);
- private car ownership increase from 381 to 503 cars per 1,000 inhabitants, and total car mileage increase by 25%;
- air passenger transport increase by 74%.

The same scenario sees the transport sector's energy consumption and CO₂ emissions both grow by 25% from 1990 to 2000. With the EU committed to stabilising CO₂ emissions at 1990 levels by the year 2000, much work obviously remains to be done.

Towards Sustainable Mobility

Many of these problems are not unique to Europe, so the opportunities for companies with innovative solutions are significant. A number of EC initiatives can help these companies develop their technologies to the demonstration phase. All of them exist in the frame-

Technology

work provided by the EU's Common Transport Policy (CTP), adopted in 1993. Its overall aim is to achieve sustainable mobility for people and goods.

Implementing the CTP will involve opening up transport markets to greater competition, applying environmental impact assessments to all major infrastructure projects, using new information technologies to manage traffic flows better and raise safety standards, and encouraging a better balance between the different transport modes. It also involves the development of the trans-European transport network (see **Context - TENs**, page 13).

Research and development play a key role in this European vision. The 240 MECU Transport Research Programme, administered by DG VII (Transport), for example, focuses on studying the transport situation to help Europe's decision-makers introduce new transport policies and technologies. Apart from carrying out these studies, the programme also funds field trials to examine their feasibility and implications.

New technologies for the transport industry, on the other hand, are mainly developed under several other Specific

RTD Programmes, particularly Industrial Technologies, Telematics, Information Technologies, Energy, and Environment and Climate. Most feature specific action lines dedicated to transport technologies, while all are developing new technologies which could find useful applications in the transport sector.

Coordinating Transport Research

For this reason this Dossier does not exhaustively list the multitude of individual EC activities supporting some form of research relevant to transport. In fact, with the creation last year of industrial Task Forces on trains and railway systems, intermodal transport, cars, aircraft and maritime systems⁽¹⁾, this is no longer necessary - each Task Force offers Europe's researchers and industrialists a 'one stop shop' to all European research activities in its particular field.

The Task Forces are much more than that, however. They were created because Europe's research effort is as fragmented as its transport system, and for the same reason - almost 90% of public research in Europe is funded by national

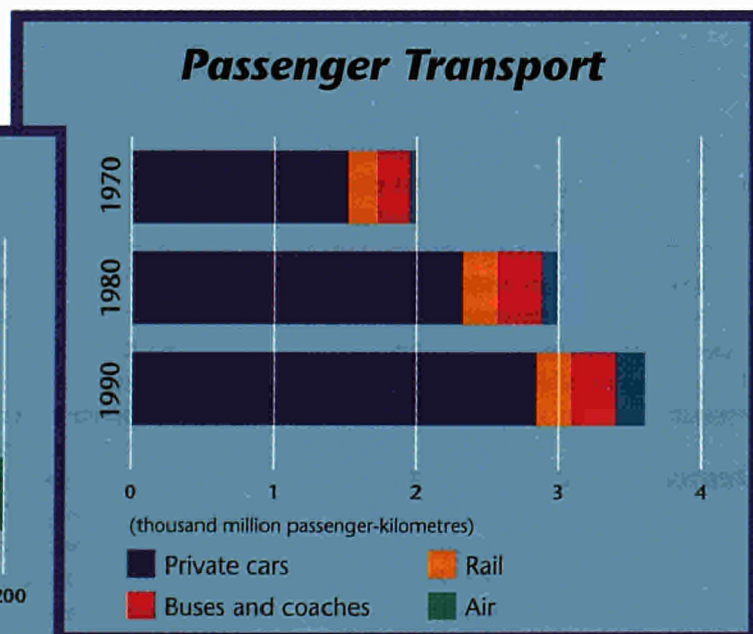
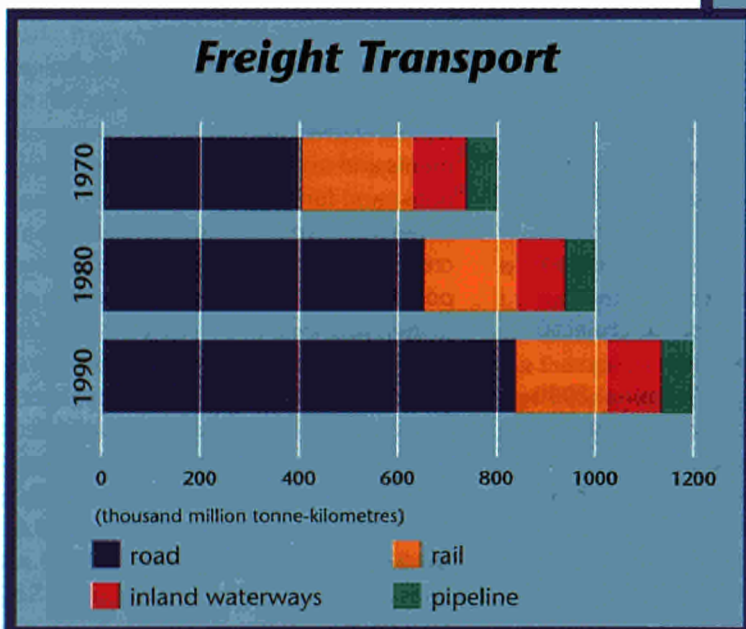
governments. By coordinating the research across Europe in these key areas, the Task Forces are carrying out in the field of European research what is necessary on a wider scale - Europe-wide consultation to manage a Europe-wide issue more effectively.

While each Task Force carries out its mission according to the nature of its subject, the first step has essentially been the same - to identify the priority areas for research, in consultation with industry, the national authorities and user groups. All the Task Forces have now achieved this, thereby establishing transport research priorities for the Fifth Framework Programme (1998-2002).

The next step is to coordinate the research undertaken through the different Community RTD programmes along the identified themes. Some Task Forces have already begun putting projects which are working on similar themes under different Programmes in touch with one another, in the hope that they will find economies of scale ●●●

(1) See edition 5/95. The other Task Forces are 'Vaccines and viral diseases', 'Environment-friendly water technologies' and 'Educational software and multimedia'.

EU Transport Growth, 1970-1990



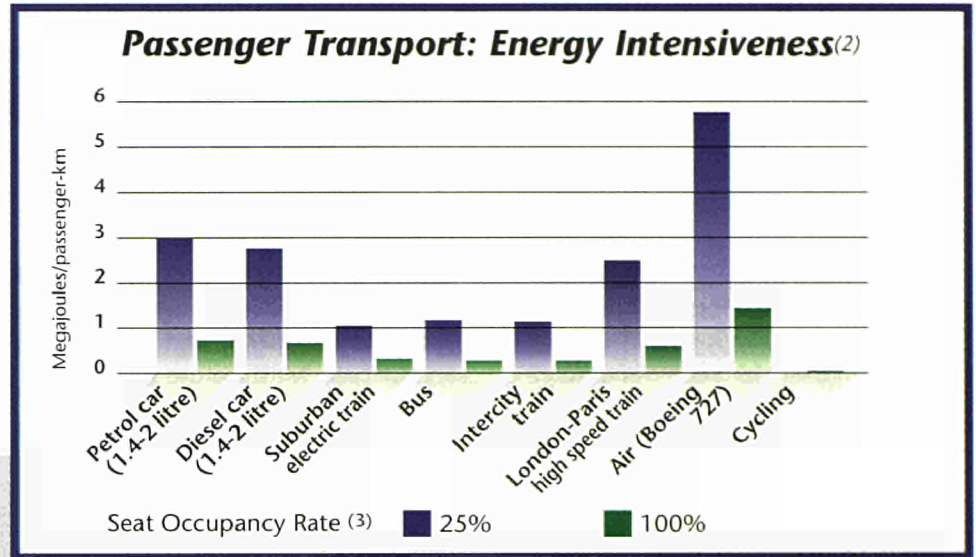
Transport activity increased by more than 85% from 1970-1990, with most of the increase attributable to private car use.

and other benefits from cooperation.

Actual financial support for coordination under five of the eight Task Forces may be possible if a 'top-up' budget to the Fourth Framework Programme is forthcoming. A decision was being made as *Innovation & Technology Transfer* went to press. Given the financial support, many Task Forces then aim to support large-scale projects to demonstrate and validate several new technologies at a time.

(2) The energy intensiveness (measured in megajoules of primary energy per passenger kilometre) accounts for energy losses during the production and transmission process.

(3) The percentage of seats used. Buses and trains therefore have seat occupancy rates higher than 100% whenever there are standing passengers.



The case for urban public transport: in rush hour, train and bus seat occupancy⁽³⁾ often exceeds 100%, while for cars it is very low (1-1.2 passengers/car). In addition, rush hour congestion drives up car energy consumption even further.

I. Intermodal Transport

The development of truly intermodal transport - where the different transport systems are integrated seamlessly together to provide door-to-door services - is essential to achieving sustainable mobility. According to Commissioner Kinnock, "intermodal transport is not directed against one mode or another ... it is rather based on customer-oriented integration of the strengths of the different modes."

Intermodal transport is a top priority for Europe. Last March, for example, the Research Council identified the Task Force on Intermodal Transport as being of the highest priority⁽⁴⁾, and is therefore at the top of the list for receiving up to 90 MECU of the top-up budget, if this is made available. Its original scope, however, has been extended to include interoperability, allowing the possible funding of rail research.



Linking together different transport modes is a key European transport priority.

Demonstration Environments

According to the Intermodal Transport Task Force's 'Inventory Report', almost 100 MECU worth of intermodal research is currently being supported by the EC's Transport, Telematics and THERMIE Programmes. Projects range from mobile traffic information systems

to smart card payment technology.

What shape will future research take? The Task Force's 'Priority' report proposed a coherent intermodal RTD strategy to both address the gaps in today's research and help validate existing research results through demonstration projects. It identified six action lines - essentially, operating environments within which demonstration projects should be developed:

- **Intermodal Freight Terminal 2000+**: cost-effective services for transferring goods between modes;
- **Intermodal Freight Network 2000+**: a seamless freight transport logistics system;
- **Transport Town 2000+**: focusing on sustainable urban mobility, integrating

private car use and freight haulage with other, more environmentally friendly and energy efficient transport forms;

■ **Intermodal Traveller 2000+**: providing customers with reliable information on using urban and inter-urban transport systems;

■ **Passenger Interchange 2000+**: attractive, passenger-friendly interchange facilities;

■ **Research studies and support activities**: studying the structure of the intermodal market to analyse supply and demand, ensure equal access to the market and

fair competition, and so on.

For each of these proposals a technical panel has been created, composed of representatives from industry, governments and user groups, to validate, prioritise and further develop these themes.

The Task Force is also considering creating a European Intermodal Transport Reference Centre to gather and disseminate best practices, transfer information between users and operators and validate research results. Moreover, national round tables will also be created to discuss the obstacles to developing intermodal transport, as will a network of universities and research institutes specialised in the field.

(4) The other Task Force of equal priority was 'Vaccines and viral diseases'.

II. Trains and Railway Systems

European railways are presently undergoing one of the most turbulent periods of their history, with long-standing national monopolies and protected markets being abolished. Urgent cultural and structural changes are required to move the sector towards a customer-focused model building on rail transport's natural advantages - high-density, environmental friendliness, land-use efficiency, safety and energy conservation.

Not that there are no disadvantages - rail's high fixed costs (the rolling stock and track) often make short rail journeys uncompetitive compared with

road, particularly with freight customers demanding more frequent trips to satisfy modern manufacturing techniques such as 'Just in Time'. Operators also usually have 'public service' obligations and suffer from debt, decades of insufficient investment, low financial returns and unwieldy management structures.

Increasing cross-border trade across the Single Market should boost long-distance demand, however, while high-speed trains, improved rail interoperability and better intermodal transport should reduce the 'break-even distance', increasing competitiveness. Other factors, such as increasing air and

road congestion and pricing regimes that favour rail's environmental benefits, may make the potential reward for innovative rail operators significant.

Interoperable Networks

Plans exist to renew and upgrade existing main lines and to build thousands of kilometres of new high speed tracks on the Trans-European Network. Tapping rail's potential relies on making this network fully interoperable, allowing continent-sized economies of scale. The Transport Programme's basic aim is therefore to help make the

Context

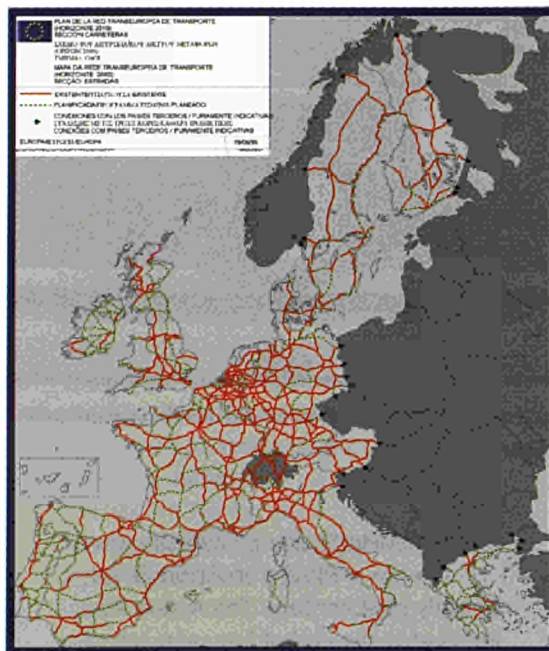
The Trans-European Transport Network

The trans-European transport network is being designed to link the national networks together, make them interoperable and link the EU's peripheral regions with the centre.

The plan, first outlined in early 1994, takes the form of guidelines, developed in a Europe-wide partnership between the European Commission, national governments, transport operators and users, financial operators and environmental organisations.

They outline:

- a road network system totalling 56,000 kilometres of motorways and high-quality roads, equipped with traffic management systems, providing access to all European regions;
- a rail network of around 70,000 kilometres, parts of which would comprise the High-Speed Train Network and corridors devoted to combined transport, giving access to regions and ports;
- a combined transport network based on specific rail, road, inland waterway and maritime shipping corridors, together with trans-shipment facilities for switching freight from one form to another;
- an inland waterway network of 12,000 navigable kilometres;
- a trans-European airport network of 267 designated airports;



The Trans-European road/rail links proposed in June 1995.

- efficient and competitive sea ports through projects emphasising improved access and infrastructure;
- a European maritime traffic management system to increase safety and efficiency and reduce environmental impact in sensitive areas;
- an air traffic management network integrating existing surveillance and communications systems together with air traffic control centres;

■ an information and management system employing modern IT and communications technologies, including satellites, to achieve as smooth a flow of traffic as possible.

400 billion ECU

The projects identified by these guidelines will cost an estimated 220 billion ECU by 1999 and 400 billion ECU by 2010. Only around 90 billion ECU of the finance required by 1999 will be met from public sources, so the Commission and national governments are seeking a partnership with private finance to develop the network.

The EU, however, does have 300 million ECU for financing pre-investment feasibility studies, interest subsidies on loan finance and guarantees. The aim is to use this fund to leverage access in capital markets to very much larger sums and to encourage other forms of private sector involvement.

Finally, there is also the Cohesion Fund, the European Regional Development Fund, the European Investment Bank and the European Investment Fund, all of which can provide financial support to developing transport infrastructure.



entire European electrified network, presently 15,000 km long, accessible to high-speed trains and interoperable for traditional trains.

The Task Force has set ambitious targets for rail transport, including a 50% cost reduction, a 40-50% reduction in equipment life cycle costs and an order of magnitude drop in door-to-door freight delivery time. Five priority areas have been identified:

■ **Modular High-Speed Train:**

While Europe is a world leader in this field, developers have until now focused on performance, not cost. Modular technologies to achieve economies of scale are now vital;

■ **Urban Citizen's Network:** global urban mobility systems which balance public and private transport and different



Photo: Eurostar

High-speed rail links are beginning to compete with road, air and ferry transport.

modes. Priority research ranges from decision support systems to power supplies;

■ **European Freight Logistics System:** towards global interoperability for train

control and traffic management systems;

■ **Virtual Factory:** customer-driven, multi-firm manufacturing systems for the rail supply industry;

■ **Train Cargo Liner:** optimising freight transport and integrating it into intermodal transport chains will require better rolling stock designs, automated trans-shipment systems and consignment tracking information systems.

Technical panels are currently examining these areas in detail, with a view to bring the diverse technologies required together into coherent demonstration testbeds.

III. Car of Tomorrow

Personalised transport has been a part of society since the horse was tamed, and so is unlikely ever to disappear. The major problem is that today's form - the automobile - takes a terrible toll on human health and the environment. Moreover, road transport is set to continue the growth it has enjoyed for several decades, holding out the threat of even more accidents, longer delays and greater landscape destruction and atmospheric pollution in the future.

Cleaner vehicles, better traffic management and closer integration with other transport modes are therefore vital. Meeting these challenges will entail research and cooperation between car makers, transport operators, research centres, traffic managers, public authorities from city to European level and specialists in information and communication technology.

Cleaner Cars

At stake is an industry which employs over 4 million Europeans and which has an annual turnover of more than 300 billion ECU. Between them, EC research programmes cover most aspects of this industry, from road telematics systems to advanced battery technologies.

The 'Car of Tomorrow' Task Force's vision is to integrate these research ac-

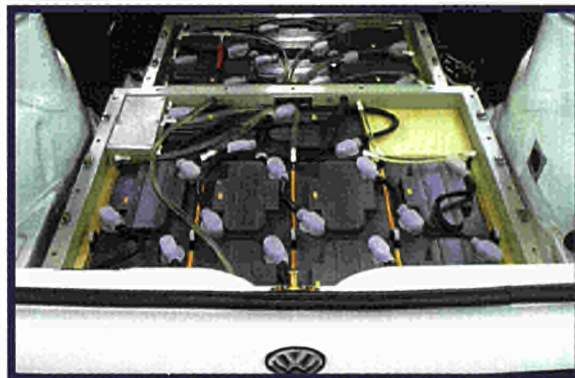


Photo: Volkswagen

Batteries - a priority area for environmentally friendly vehicles.

tivities to help European industry develop ultra-low and zero emission vehicles by early next century. The Action Plan, finalised at the end of last year, set technology performance targets and RTD priorities in 'key areas' where breakthroughs will make these vehicles competitive:

■ **batteries:** range, performance, recharging times and cost must be radically improved if electric and hybrid vehicles are to succeed. Material recycling, energy management systems and high efficiency vehicle systems (heating, etc.) are also priorities;

■ **fuel cells:** combining hydrogen with oxygen to generate electricity and water, fuel cells are potentially the most efficient and cleanest long term propulsion technology;

■ **hybrid vehicles:** combining batteries, electric motors and internal combustion engines, this technology offers zero-emission urban and low-emission, long-range transport in one vehicle;

■ **the internal combustion engine:** fuel efficiency and emissions can still be significantly improved through technologies such as sequential direct injection, real-time electronic engine control, catalysts, particulate traps and new fuels (methanol, natural gas, hydrogen, methane);

■ **design:** weight and drag must be reduced while maintaining crash-worthiness;

■ **road telematics systems.**

The final Action Plan priority is for a Europe-wide demonstration programme of these technologies, extending from prototype technology demonstrators right through to testing on fleet scale. The Task Force has already identified over 100 relevant European RTD projects. Clustering these projects will begin after the summer.



Case Study: Rail Traffic Management

Networking Europe's Railways

The EC has brought together some of Europe's largest railway operators to improve Europe-wide rail interoperability.

High-speed, cross-border rail links are fundamental to Europe's future transport infrastructure. The few that already exist, however, are based on 'one-off' agreements between the countries concerned. A flourishing Europe-wide network must await agreed European standards for signalling and communication systems - the trains using the Channel Tunnel, for example, carry three sets of signalling equipment to ensure compatibility with the Belgian, French and UK systems.

The EC launched an integrated research programme to develop a European Rail Traffic Management System (ERTMS) in 1989. In 1995, after considering existing examples of best-practice, the ERTMS consortium of European railway signalling companies, in collaboration with Europe's major railways, produced a preliminary, generic definition of the systems needed for safe, pan-European high-speed links: EURO-CAB (onboard command/control), EURO-BALISE (track-side transmissions) and EURORADIO (radio communication protocol).

ERTMS Users' Group

Although the general specifications and requirements have been established, it is up to the operators themselves to put them into action. ERTMS has therefore encouraged the formation of sub-projects involving collaboration between train operators. For example, the ERTMS Users' Group - a European Economic Interest Grouping (EEIG) which was launched in 1995 - brings together some of Europe's largest railway operators, including SNCF of France, DB-AG of Germany and FS of Italy.

"The Users' Group is working on a number of key operational features, such as the compatibility of the new train control systems with existing technologies, essential to phasing them in," explains Mr Carlo Carganico, its director. "In addition, the approach must

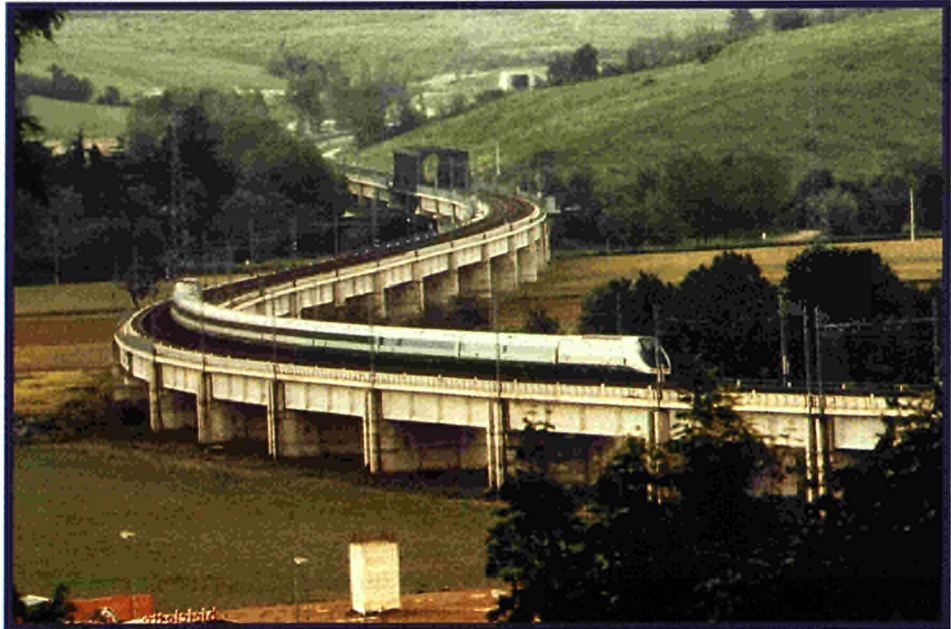


Photo: Ente Ferrovie Dello Stato

ERTMS: swift, safe rail transport on a pan-European network.

allow less sophisticated networks and trains to be upgraded in a modular fashion, as demand increases."

The technologies investigated by the Users' Group include GSM telephony, 'spot transmission' systems similar to the beacons and transponders already used by aircraft, and sensors which allow a train to locate itself on a pan-European network.

Compatibility, Competitiveness and Collaboration

Costs and complexity are being minimised by ensuring that only those modules strictly essential for safe interoperability require standardisation, allowing each railway to design the purely domestic elements of the system, such as points and traffic control.

Some systems are already being validated on national networks and much of the hardware will be available by the end of 1996. Provided the software and site preparation goes as planned, real ERTMS applications could be in place across Europe by 2001. But successful interoperability is more than just a question of getting the technology

right - it is about getting the same basic technology used by everyone.

The fact that the ERTMS programme involves all the industries from across Europe should go a long way to reaching this goal. The result should be a more integrated European industry producing railway command/control systems for the entire continent, improving the signalling industry's global competitiveness and producing economies of scale for European high-speed rail services.

C o n t a c t
■ ERTMS
Mr A. Colaço, DG VII/E-3

Fax: +32 2 296 83 50

■ EEIG ERTMS Users' Group

Mr C. Carganico,

Tel: +32 2 673 99 33

Fax: +32 2 673 41 50

IV. Air Transport

The European aeronautics industry - one of the earliest examples of successful European cooperation - holds around 30% of the market and employs around 400,000 people. It faces stiff international competition for a growing market, with world-wide air traffic expected to double by the year 2010, requiring an estimated 17,000 new large-capacity aircraft over the next two decades.

Public research support for this industry in Europe, however, is only one quarter of that in the USA. Closer cooperation between both the companies and the national and European programmes is therefore absolutely essential. The 'New Generation Aircraft' Task Force has identified three priority themes for the short term:

- applying network and data exchange tools to reduce design and production costs, allowing the thousands of companies involved in designing and producing a new aircraft to work together concurrently;
- technologies to reduce construction and operational costs, ranging from

improved aerodynamics to better avionics systems;

- integrating together the wide range of technologies capable of reducing environmental impact - engine efficiency and volume, flight controls, fuels, etc.

Around 100 EC research projects are already being clustered along these themes. Under the first theme, for example, four 'Integration in Manufacturing' projects, funded under the Information Technology Programme, have been clustered together with 10 projects under the Industrial Technology programme's 'Integrated Design' and 'Flexible Manufacturing' areas.

A new Call for Proposals organised jointly by and involving some or all of these programmes may be published at the end of this year. With the coordination of the EC's programmes well underway, the Task Force is now concentrating on defining objectives for the Fifth Framework Programme and studying the possibility of networking together research projects from the various national programmes.

V. Maritime Transport

With only two landlocked Member States and a wide network of inland canals and rivers, Europe is well placed to exploit the most environmentally friendly transport system available.

However, Europe's once dominant maritime industry is in decline - the EU's share of the world's flagged fleet has halved since 1970, the shipbuilding sector is losing market share to Asia and Eastern Europe and the fisheries sector must face painful readjustment in order to survive. With over 2.5 million Europeans deriving their living from maritime industries, competitiveness must be renewed.

The Maritime Systems Task Force recently published its first, interim report, where it identifies five priority areas for research, development and demonstration:

- **Maritime Information Society:** one of the 11 Information Society projects launched by the G-7 in 1995, MARIS aims to stimulate and demonstrate the application of information and telematics technologies to the maritime sector.
- **enhancing shipbuilding engineering and production** through better de-

sign tools, production processes, standards, materials and so on, with an emphasis on high-speed ships and medium speed coastal vessels;

- **improving safety and environmental impact** through designing for safety, risk assessment and management, technologies and operational techniques to reduce pollution, traffic management and more;

■ **developing key technologies to improve the services** maritime transport offers manufacturing industry, such as closer integration into intermodal transport chains, improved logistics management and better port and terminal systems;

- **improving the exploitation of maritime resources**, particularly floating production platforms, offshore wind energy systems, fishing and aquaculture technologies, and deep sea exploration and operational technologies.

The Task Force will start identifying EC projects which could be clustered along these themes in the second half of this year. □



Europe's aeronautics industry has been reaping the rewards from working together for many years. Further networking of private, national and European aeronautics research support will build on this success.

Contacts

■ **DG VII - Transport**

Tel: +32 2 296 82 45
Fax: +32 2 296 83 51

■ **Transport Research Programme Help Desk**

Tel: +32 2 295 43 00
Fax: +32 2 295 43 49

■ **Trans-European Networks, DG VII**

- Policy: Mr J. Rees
Fax: +32 2 296 96 32
- Projects: Mr A. Gonzalez-Finat
Fax: +32 2 295 65 04

■ **Intermodal Transport Task Force**

Mr M. Dudding, DG VII/E
Fax: +32 2 296 83 50

■ **Train and Railway Systems Task Force**

Mr A. Colaço, DG VII/E-3
Fax: +32 2 296 83 50

■ **Car of Tomorrow Task Force**

Mr D. Miles, DG XII/F-2
Fax: +32 2 295 06 56

■ **New Generation Aircraft Task Force**

Mr D. Bunch, DG III/D-4
Fax: +32 2 295 68 51

■ **Maritime Systems Task Force**

Mrs P. Anaboli, DG III
Fax: +32 2 295 68 51

Case Study: JOULE

High Efficiency Fuel Cells

The FEVER project is demonstrating European excellence in fuel cell design, likely to be a vital technology for tomorrow's electric vehicles.

Originally developed for the space sector in the 1960s, fuel cells silently combine hydrogen and oxygen to create electricity and water, making them one of the most promising electric vehicle technologies. A wide variety of prototype systems are under development - while some car makers, for example, are storing compressed hydrogen and oxygen at normal temperatures on board, others take in air and store methane, using integrated 'reformers' to convert it into hydrogen.

European research into fuel cells was revitalised in 1985 when the EC's original JOULE Programme for unconventional energy technology research was launched. More recently, in 1994, the EC launched a ten year strategy involving the current Non-Nuclear Energy and Industrial Technology programmes⁽¹⁾ to develop and demonstrate commercially realisable fuel cell technologies. One of the first projects to receive funding was FEVER (fuel cell powered electric vehicle for efficiency and range).

Demonstration Vehicle

Co-ordinated by the French car manufacturer, Renault, the project aims to develop and build a demonstration passenger car powered by a small, 30 kW, liquid hydrogen-fuelled solid polymer fuel cell. Fuel cells of this type are relatively cheap to run and, because they use compressed air from the surroundings rather than pure oxygen, mean that the cars only need to carry hydrogen on board.

JOULE is funding 50% of the estimated 4.3 MECU cost of the project, which brings together Renault, Air Liquide and École des Mines from France, De Nora and Ansaldo from Italy and Volvo from Sweden. The FEVER vehicle - based on Renault's Laguna estate - should have a top speed of around 120 km/h and a range of about 500 km at 100 km/h. It is due to be tested and completed in 1997.

Photo: Renault



Renault's Laguna estate car will be the basis for the FEVER consortium's fuel cell powered passenger vehicle.



"The fuel cell should be ready this July," says Dr Griesemann, the project's co-ordinator at Renault. "Both its size and weight are less than half those of preceding models and the efficiency is high - around 56 per cent." This is an important result in itself because the unit can be used as a basic module for larger vehicles.

Optimised Motor

The partners have already developed an electric motor designed to get the best performance out of the fuel cell. While Renault works on incorporating the fuel cell, the cryogenic hydrogen tank, the electric motor and other components into the Laguna, the electric motor has already been tested on a similar car powered by conventional batteries.

The results so far are promising. "Overall, the energy efficiency for the vehicle - taking into account the fuel cell, electric motor and power train - should be about 40%, compared to 20% for a petrol car and 38% for a diesel," explains Dr Griesemann.

He estimates that another six to seven

years of work will be necessary following the launch of the demonstration vehicle to miniaturise the components to acceptable proportions. He is confident, however, that this can be achieved.

"One of the most important things about this project is that it got key producers of fuel cell and related technologies working together long before a commercially viable partnership was possible," he says. "As a result of this and similar projects, European fuel cell cars could be on the roads by 2010."

⁽¹⁾ See the Dossiers of edition 1/95 (Industrial Technology) and 3/95 (Non-Nuclear Energy).

C o n t a c t
 ■ Dr J. C. Griesemann,
 GIE Renault Recherches et
 Innovations
 Tel: +33 1 47 77 94 99
 Fax: +33 1 47 77 92 05

► CASE STUDY: TECHNOLOGY DISSEMINATION
THE INNOVATION PROGRAMME IN BRIEF

The Innovation Programme implements the Third of the four Activities of the Fourth Framework Programme (1994-1998). Run by DG XIII/D, the Innovation Programme encourages the exchange of research information and the absorption of new technologies by European companies. See edition 1/95 for a brief profile.

C o n t a c t

- **Unit D-1:** technology transfer and validation projects, JRC liaison, intellectual property
Fax: +352 4301 34129
- **Unit D-2:** Community Information and Dissemination Service
Fax: +352 4301 34989
- **Unit D-3:** Relay Centres and other services
Fax: +352 4301 34129
- **Unit D-4:** innovation policy, regional aspects, financing, EIMS
Fax: +352 4301 34544

C o n t a c t

Mr M. Gianfranchi,
Citer
Tel: +39 59 681 398
Fax: +39 59 682 151
E-mail: gmarco@citer.it

Designs on the Market

Europe's SME-dominated clothing industry saw its profit margins slashed as a result of cheap imports. Now an EC-funded design aid is helping it to cut a profitable new line.

Manufacturers of basic clothing items can trade successfully with as few as ten different mass-produced designs per year. For such garments, manufacturing costs outweigh design costs and economies of scale yield low unit prices.

That is a basis for fair competition. But add cheap labour into the equation and some manufacturers operating outside EU regulations can price their competitors out of the market.

The only alternative facing Europe's clothing industry - about 55,000 firms, almost all (95 %) of which are SMEs - has been to concentrate on high quality, designer wear clothes. These are difficult to imitate cheaply because of the wide variety of fabrics and colours used.

The difference here is that manufacturers must create as many as 200 new 'looks' per season. Mass production is out of the question and the main expenditure is on design.

From Engineering to Clothing

The EC's SPRINT Programme supported projects that aimed to improve Europe's ability to innovate and transfer technology between regions and business sectors. These aims are now continued by the Innovation Programme through Innovation Projects (see page 19) and other initiatives.

SPRINT project, Citera Plus, aimed to diffuse computer



With its tinting and 3D texture mapping modules, Citera Plus produces 'virtual photographs' to show the same models in any number of fabric designs.

aided design and manufacture (CAD/CAM) technology used by clothing and textiles firms in Italy to similar SMEs across Europe. This meant developing interfaces, manuals, training systems and so on for the international market.

The project's Italian lead partner, Citer, is no stranger to technology transfer - its original product, Citera, was developed from CAD/CAM technology designed for the engineering industry. Like its predecessors, Citera required a dedicated workstation. "This was too expensive for some smaller companies," explains Mr Marco Gianfranchi, project leader at Citer. "And the level of operating knowledge required kept us from expanding our product support beyond the 30 firms using Citera in our region."

Tailoring to SMEs' Needs

This changed as personal computers became faster and more powerful as well as cheaper and easier to use. "We wanted to develop a PC-based system more suited to SMEs," recalls Mr Gianfranchi. "This seemed the perfect opportunity to adapt the technology for users in other countries."

The SPRINT programme agreed and the project started out in 1992 with Citer and two 'National Centres': CITEVE in Portugal and Cetemmsa in Spain. Through their contacts, prototype systems were distributed to eight SMEs at an early stage. The National Centres provided the users with training and fed back their comments to Citer, who adapted the tech-

nology accordingly.

By 1995, this collaboration had resulted in:

- a user-friendly, non-specialist interface;
- a modular package to meet SMEs' needs and means;
- compatibility with many European knitting machines, making the most of firms' existing hardware and expertise;
- a graphical 'fashion base' of around 500 garment templates.

Citera Plus was then extended to a further two National

Centres. The UK's De Montfort University has already developed 3D texture mapping software and Celac/Cefret of Belgium is currently producing a French language version. The project represents a total investment of 2 MECU, with around 40 per cent funding from the EC.

Virtual Models

When proposing a new garment to a retailer, a company needs to present it in around

five different fabric designs. Rather than going through the expensive process of making and modelling each variation, Citera Plus users need only model a single garment in a plain fabric. The tinting and 3D texture mapping software then processes the image and produces 'virtual photographs' of the garment in each of the fabric designs. "One Italian firm now makes around fifteen demonstrations a year to Japanese customers using this technique," says Mr Gianfranchi.

Success has not been restricted to the clothing industry. Citera Plus modules are now in use by more than fifty European firms, including a wetsuit producer and three upholstery makers. And as the infrastructures for on-line shopping come into place, Citera Plus could find new customers wishing to create 'virtual catalogues'.

► CALLS FOR PROPOSALS

Innovative Proposals

Two Calls from the Innovation Programme last December attracted a total of 150 proposals. A new call for Innovation Projects is expected in September.

The calls - **Innovation Management Techniques and European Networks and Services** - were launched last December⁽¹⁾. Both closed on 15 March, although the latter has set a second closing date for 13 September.

The Innovation Management Techniques call attracted 107 proposals of which 71 were for projects and 36 for accompanying measures. As *Innovation & Technology Transfer* went to press, around a third were expected to be selected in July to share at least 9 MECU of EC funding.

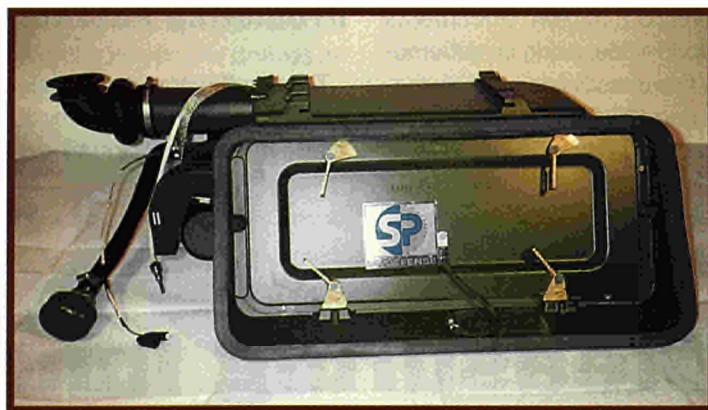
The European Networks and Services call received 43 proposals by its March deadline. This is an ongoing call, however, and proposals are still invited from organisations involved in technology diffusion at the regional and national level to add a European dimension to their activities or to create new ties between professions and services.

New Innovation Projects

The second call for proposals for Innovation Projects⁽²⁾ will open on 15th September. Unlike the last call, there will not be separate technology transfer and technology validation categories. This is based on the observation that some of the best projects currently under way actually feature both aspects. The successful two-phase approach will continue, however⁽³⁾.

The call may also invite organisations familiar with projects launched under the Innovation Programme, its predecessors, SPRINT (see opposite page) and VALUE, and other Community programmes, to propose 'accompanying measures'. For example, activities could be launched to promote success stories.

A total of approximately 40 MECU funding will be available, with a maximum of 10 per cent for the accompanying meas-



A good example of Innovation Projects are 'dual use technology' projects - putting military technologies to civilian use. One current project, for example, is fitting anti-biochemical warfare filters to agricultural machinery to protect farmers from pesticides.

ures. The call will be closed by 15 December, meaning that successful proposals will enter the demonstration phase by the end of 1997.

- (1) See edition 6/95.
- (2) See edition 2/96.
- (3) Following a 1-9 month definition phase with up to 75,000 ECU funding, some projects enter a 2-3 year demonstration phase and receive 30-50% of the total costs.

C o n t a c t

- Innovation Management
- Techniques and European Networks and Services: DG XIII/D-4
- Fax: +352 4301 34544
- Innovation Projects: DG XIII/D-1
- Fax: +352 4301 34129

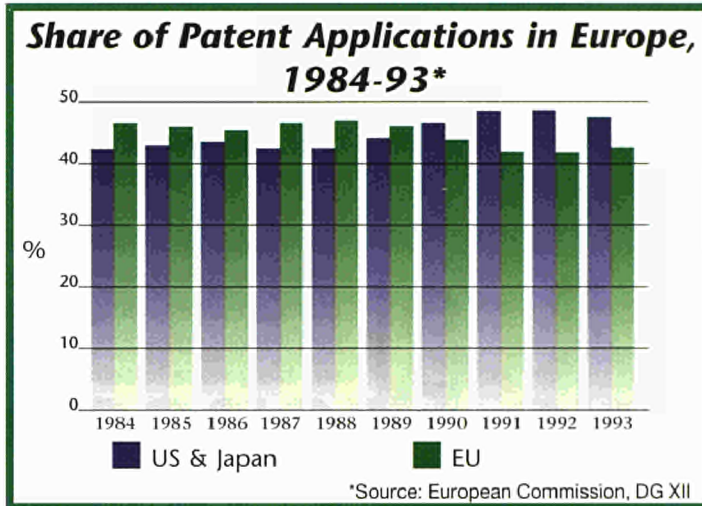
Patent Search Service

A new patent search service for Innovation Projects was launched successfully in the first half of 1996.

One hundred selected Innovation Projects⁽¹⁾ have now all entered their Definition Phases, during which the Innovation Programme supplies a range of accompanying measures to help them better focus their work programmes.

One of these measures is QUICK SCAN, a joint service from the Innovation Programme and the European Patent Office (EPO). Each proposal is sent to the EPO's search branch in the Netherlands, where multilingual patent examiners use various databases to examine the state-of-the-art in the proposed technical field.

This allows a search through over 30 million documents world-wide, using an extremely fine classification system featuring 120,000 different technical subdivisions.



According to the Panorama of EU Industry (see page 9), there is a clear decline in the EU's share of the total number of patent applications in Europe.

Promoting Patents

The result helps identify relevant future technological trends, alerts the proposers to any

similar work already performed elsewhere, provides useful information on targeting products and services, and so on.

QUICK SCAN is a particular-

ly useful service to the SMEs behind the proposed projects - small European companies are more ignorant of patents than their counterparts in Japan and the USA, and two thirds of the SMEs generating inventions have no access to the patent system whatsoever.

Despite the fact that proposals often arrive in a form unsuitable for a patent search - lacking the right keywords, etc. - 90% of them could be processed by the EPO's examiners. Apart from helping the proposers direct their work, the Commission services are alerted by QUICK SCAN to proposals that aim to 'reinvent the wheel'. A final analysis of the EPO's efforts will help streamline proposals for the upcoming second call (see page 19).

(1) See edition 2/96.

C o n t a c t

■ Mr M. Schmiemann, DG XIII/D-1
 Fax: +352 4301 32073

■ Mr W. Kütt, Technical Assistance Unit
 Fax: +352 43 38 90

► CONFERENCE

Measuring Innovation

A two-day international conference entitled 'Innovation Measurement and Policies' was held jointly by the Statistical Office of the European Communities (Eurostat) and DG XIII (Telecommunications, Information Market and Exploitation of Research) in Luxembourg in May. About 300 participants discussed the state-of-the-art in innovation measurement techniques, how data should be interpreted in terms of policy and what new data are required in response to policy changes. The conference

was opened by the Directors-General of DG XIII and Eurostat, Robert Verrue and Yves Franchet respectively.

The conference covered both statistical and theoretical approaches to innovation measurement and highlighted major issues in the field, such as the links between innovation and employment, industry and SMEs. Many examples were drawn from the European Innovation Monitoring System (EIMS)⁽¹⁾ and, specifically, from the EC's Community Innovation Survey (CIS).

Progress has been made in some areas of innovation indicators - e.g. measuring the costs involved, technology transfer and the barriers to it - the conference concluded. However, more has to be done to investigate innovation and its links with the service sector, employment, intangible assets, organisational factors and regional aspects.

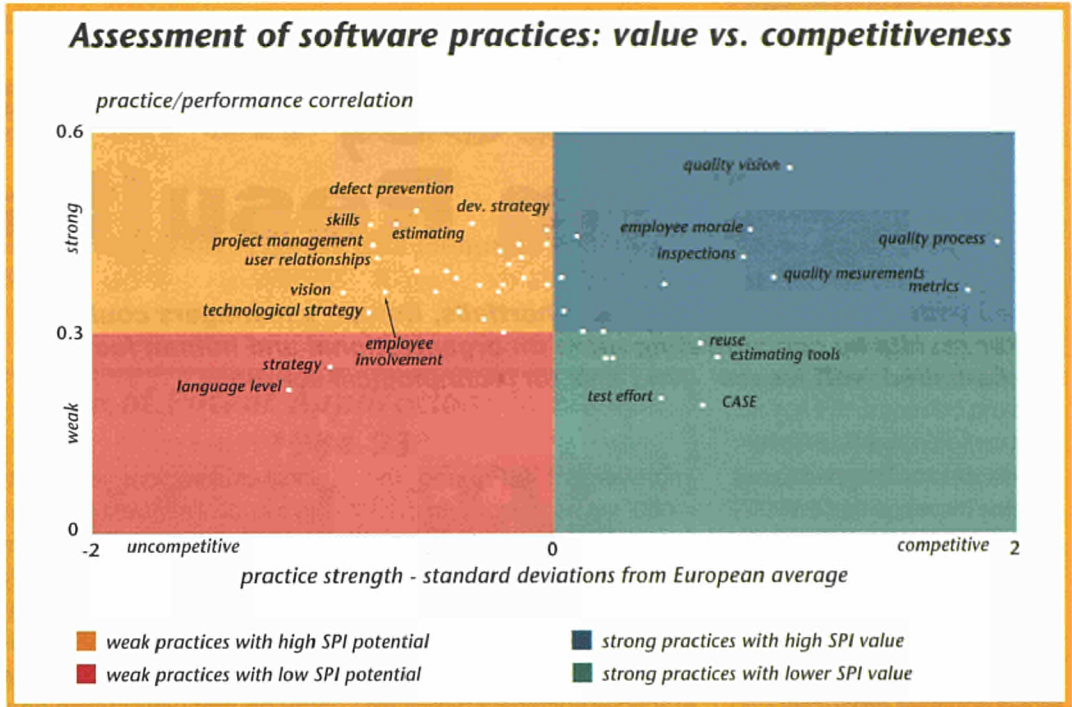
In many cases, this will require greater organisation of data collection, including the promotion of a favourable legal base for it amongst EU countries,

harmonised surveys and updated collection systems. Stronger collaborative ties are needed, therefore, between DG XIII, Eurostat, and the different organisations involved in innovation measurement, such as the Organisation for Economic Co-operation and Development (OECD). The consensus was that results should be produced on a regular basis, perhaps every two years.

(1) See edition 1/96 for a list of EIMS publications.

●●● assessment is about improving processes and teamwork. Participants heard how many managers consider it only as a way to lay off less productive staff - not an attitude likely to improve another important factor in productivity and quality: staff morale.

ESPITI's members are now looking at the possibility of a follow on project. The major challenge facing any future initiative will be to persuade Europe's hard-line managers of the importance of soft issues. As Peter Goodhew, responsible for IBM's survey, commented, it will not be easy to convince some of Europe's senior managers that their own skills should head the list for training expenditure. □



According to an IBM survey, the software industry's 'laggers' are uncompetitive in areas of highest SPI potential (top left) - including 'soft' issues such as employee involvement and user relationships. The 'leaders', on the other hand, strike a balance between human and technological factors.

► INTERNATIONAL

Small Steps to Success

Japan's manufacturing industry has had great success using 'Kaizen' - small step improvements - on the shop floor(1).

The growth of manufacturing in Japan has been supported by a concerted effort to master production technologies and to achieve manufacturing excellence.

In Japan, the Kaizen approach facilitates product development and cost reduction in a continual incremental pattern, drawing on the talents of the shop floor employees, a larger proportion of whom are qualified engineers than in Europe. This is much safer and less expensive than Europe's favoured 'out with the old, in with the new' approach to technological change.

Europe's philosophy of original, basic research has led to innovations such as the transistor, the VTR and the CD, but it is techniques such as Kaizen management that have led to the success of Japanese companies in manufacturing and selling products using these technologies.

Key Issues in Product Development

As part of the Kaizen approach, Japanese firms use concurrent engineering (CE), whereby several problems are solved simultaneously by dif-

ferent engineering teams. Compared to the traditional, linear problem-solving approach, CE:

- is faster and more flexible;
- is more sensitive to market changes;
- diversifies skills and improves communication;
- reduces the risk of expensive modifications at the advanced development stage.

However, CE can lead to ambiguity amongst those carrying out the various tasks and hence it increases the need for effective co-ordination.

In conclusion, many European companies have strong sales networks and attractive

products but for some their Achilles heel is manufacturing. Here, a higher level of shop floor competence is required. This can be achieved, at least in part, by allocating Kaizen engineers to the shop floor. □

(1) This text is based on a presentation by Professor H. Yamashina at a recent EU-Japan Centre workshop (see conference, "Kaizen and Production Management in Japan", facing page).

► CONFERENCES

Pan-European Co-operation and Technology Transfer 28 August, Zakopane (Poland)

This event, which is being organised by the Silesian Technical University of Poland with the EC's support, will consist of two sessions on co-operation, a panel discussion and a session on technology transfer.

The event will:

- review the essential elements of the EU's RTD programmes;
- disseminate experiences from collaborative projects run under COST, ESPRIT and other European programmes;
- investigate how advanced Internet applications can be used to enhance collaboration;
- focus on getting the most out of ties between research and industry.

It will be followed by two technical workshops - 'Design methodologies for signal processing' and 'Hard-

ware/software co-design' - which will run simultaneously between 29 and 31 August. Further details are available on the WWW.

Contact: Mr. M. Cecchini, DG III (Industry)

Tel: +32 2 296 80 28

Fax: +32 2 296 83 87

E-mail:

Marco.Cecchini@dg3.cec.be

WWW:

<http://www.kp.dlr.de/IT-NCP/benefit/e95wosp.htm> and

<http://www.kp.dlr.de/IT-NCP/benefit/eve95wo.htm>

RESTPOR'96 - Global Comparison of Regional RTD Strategies for Development and Innovation 19-21 September, Brussels

Organised this year by DG XII (Science, Research and Development), this is the third in a series of global conferences and workshops on regional RTD strategies, and the first to be held in Europe.

The aim is to provide a global analysis and comparison of innovative regional systems for RTD, and present specific examples of the positive benefits to be gained through the development of networks and co-ordinated strategies between the business sector, universities, research institutes and public authorities. The topics covered by the conference will include:

- innovation systems;
- the role of industry in regional technological development;
- the regional economic and social impact of RTD and innovation policy;
- evaluating RTD in the regions: methodologies and indicators;
- technology transfer and RTD networks;
- the human dimension in regional RTD;
- between co-operation and competition: science and technology policies towards neighbouring countries;
- regions in the global information society.

Contact: Ms. R. D'Amario, DG XII/A-2

Fax: +32 2 296 05 60

E-mail:

rosanna.d'amario@dg12.cec.be

SME Technology Days 30-31 October, Brussels

DG XII (Science, Research and Development) is organising the first SME Technology Days, aimed at stimulating SME participation in the Community's research programmes.

The Technology Days will present the special measures introduced to help SMEs take part in the Community's research programmes (see also edition 3/95):

- **Exploratory Awards**, providing SMEs with financial support for the preparation of project proposals (partner search, market and innovation surveys, feasibility studies);
- **co-operative research** - or **CRAFT awards** - whereby groups of low- and medium-tech SMEs facing similar problems but with little or no research capacity are brought together with an RTD supplier (e.g. a university or research organisation).

During the event, SMEs with ideas for proposals may benefit from a free pre-screening service offered by the Commission. The event will be addressed by Mrs Cresson, Commissioner responsible for research, education and training.

Contact: First SME Technology Days

European Congress Consultants and Organisers (ECCO)

Fax: +32 2 640 66 97

E-mail:

d.shanni@ecco-congress.be

Kaizen and Production Management in Japan 24 November - 5 December, Tokyo

The workshop aims to show Europe's managers how their Japanese counterparts have used 'Kaizen'⁽¹⁾ with great success on the shopfloor.

It will take place at the EU-Japan Centre for Industrial Co-operation in Tokyo and is the latest in a series of training programmes run on behalf of the European Commission and the Japanese Ministry for International Trade and Industry. Targeted at senior managers from large, medium sized and small EU firms, these two-week courses aim to provide European businesses with an understanding of Japan's in-

dustrial structure, markets and business culture in order to promote industrial co-operation between the EU and Japan.

The workshop will include six in-depth visits to companies in various sectors. Leading the course will be **Professor Hajime Yamashina**, who is a member of the Department of Precision Engineering at Kyoto University, an adjudicator of the Japanese Association for Total Productive Maintenance and an Associate Professor of the London Business School.

Participants must bear their travel expenses from and to

Europe as well as their living expenses whilst in Japan. The EU-Japan Centre will cover the participants' travel and accommodation expenses for the field trips. There are no tuition fees.

Contact:

European Office of the EU-Japan Centre

Tel: +32 2 282 00 40

Fax: +32 2 282 00 45

WWW:

<http://www.iac.co.jp/~eujapan/>

(1) See 'Small Steps to Success', facing page.

► PUBLICATIONS

■ CAR OF TOMORROW TASK FORCE NEWSLETTER

The European Commission's Car of Tomorrow Task Force (see page 14) has published its first newsletter. Aimed at all those who wish to be kept informed of, or participate in, the Task Force's activities, the newsletter contains details of recent work undertaken in the Task Force, and advance notice of planned activities, including the dates of relevant calls for proposals under Community RTD programmes. In addition, it contains brief news articles on developments and events within the motor industry which are likely to be of interest in the context of the Task Force. A listing of forthcoming events in the motor industry is also included. The newsletter is currently published in English and French, with future editions expected in German. It is also available on the World Wide Web.

Contact: Mr. E. Ponthieu, DG XII (Science, Research and Development)
Fax +32 2 299 18 47
WWW: <http://europa.eu.int/en/comm/dg12/tf-aut-h.html>

■ Information Technologies, Productivity and Employment

Published by DG III (Industry), the report examines the impact of information technology (IT) on productivity and employment and acknowledges

that short-term job destruction is an inevitable result of the growth in application of IT. It argues, however, that increased productivity resulting from the use of IT tends to lead to sustained employment growth in the long term.

The report discusses the need for structural changes in organisations and in education and vocational training. A more flexible labour market is essential if the opportunities offered by the information society are to be grasped. In particular, the possibility that IT can be used to export work to economies with lower labour costs outside Europe requires Europeans to ensure that they master developments in the information society.

The report is free of charge and available in English only.

Contact: DG III, Information and Communications Office (ICO)
Tel: +32 2 299 16 73
Fax: +32 2 299 19 26

■ 'Information Europe' Launched

The European Bureau of Library, Information and Documentation Associations (EBLIDA) has launched a new quarterly magazine, 'Information Europe', covering the latest developments within the European institutions in the fields of copyright, culture, education, and information technology.

The magazine also contains

information on opportunities for Central and East European co-operation and a special section on newly initiated European projects and requests for European co-operation.

Topics covered in the first issue include the results of the Commission's hearing on copyright management systems, a European workshop on national deposit collections of electronic publications, a list of multimedia publishing studies and much more.

A free sample is available from EBLIDA and more information can be found on the WWW.

Contact: Ms. B. Schleihagen, EBLIDA,
Fax: +31 70309 07 08
E-mail: ebilda@mailbox.nblc.nl
WWW: <http://www2.echo.lu/libraries/en/ebilda.html>

■ Overview of Energy Research, Demonstration and Development Options for a Sustainable Future

EUR 16829, ISBN 92-827-6359-5, free of charge
This DG XII (Science, Research and Development) report is the result of a project to develop RTD strategies in the energy sector, funded under the Community's JOULE programme (see page 17) in the field of non-nuclear energy.

The project aimed to develop

NOTE

If specific contact information for obtaining a publication is not supplied, refer to the 'Quick Reference Guide' (1/96). Publications are free unless otherwise stated.

strategies which would promote a sustainable energy system, taking account of considerations such as the effect on employment, security of energy supply and the possibility of exhaustion of resources, as well as environmental issues.

The report, which is available in English only, discusses a range of sectoral and research issues and examines various forms of energy, including:

- biomass energy;
- photovoltaic solar energy;
- solar thermal energy;
- wind energy;
- geothermal energy;
- combined generation of heat and power;
- fuel cells;
- clean coal technologies;
- carbon dioxide removal.

Contact: Mrs. K. Wittevrongel, DG XII/F-1
Tel: +32 2 295 66 76
Fax +32 2 299 49 91
E-mail: katrien.wittevrongel@dg12.cec.be

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