

# Innovation & Technology Transfer

6/94

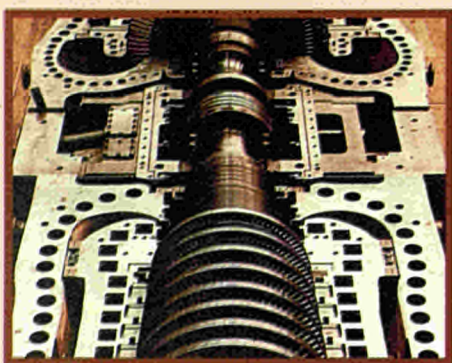
## COST: COORDINATING NATIONAL R&D

+ VALUE NEWS • SPRINT NEWS  
• ESPRIT: PARALLEL SUPERCOMPUTING • AND MORE





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## Time to Prepare Research Proposals

The Implementation of the Framework Programme gathers momentum.

*With the approval of a further tranche of Specific Programmes by the Council of Research Ministers, half of the Fourth Framework Programme is now in place (see page 7). The Council, Euro-*

*pean Parliament and European Commission are working together with the aim of adopting the remaining ten Specific Programmes before the year's end.*

*The next step for each adopted Programme is a Call for Proposals. For the sake of simplicity and clarity, Calls from Specific Programmes are published on only four dates: the 15th of March, June, September and December. Thus December 15 this year is likely to see the announcement of a large batch of Calls, resulting from the latest set of Specific Programmes and two others adopted by the Research Council in June.*

*The closing date for these Calls is expected to be March 15, 1995. If the remaining Specific Programmes are indeed adopted towards the end of this year, a further batch of Calls can be anticipated on that date.*

*Naturally, the Commission wants to see as many high quality research proposals as possible. With this aim, it has set up information and advisory services and issues explanatory publications. VALUE Relay Centres, present in all Member States, can give advice to potential applicants. A new guide to the Relay Centres and their services (see page 11) has just been published.*

*CORDIS, the Community R&D Information Service, offers detailed information highly relevant to proposal preparation, such as the aims of the Specific Programmes, news of current and forthcoming Calls, projects currently receiving support and organisations interested in forming research partnerships. CORDIS Customer Service helps users make the most of CORDIS through both new services designed to simplify access (see page 11) and various publications.*

*EU research is not research simply for its own sake. The VALUE Relay Centres and CORDIS therefore also promote the dissemination and exploitation of research results. The Relay Centres bring results to the attention of companies in their local area, while CORDIS includes information on useful results and prototypes. Both services assist researchers at every stage, from the proposal phase right through to the successful exploitation of the project's results.* ■

### INNOVATION & TECHNOLOGY TRANSFER

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► ESPRIT

# Supercomputing: Breaking US Dominance

*The recent installation of a new supercomputer, wholly designed and built in Europe, at the European Centre for Nuclear Research (CERN) marks a turning point for European high performance computing.*

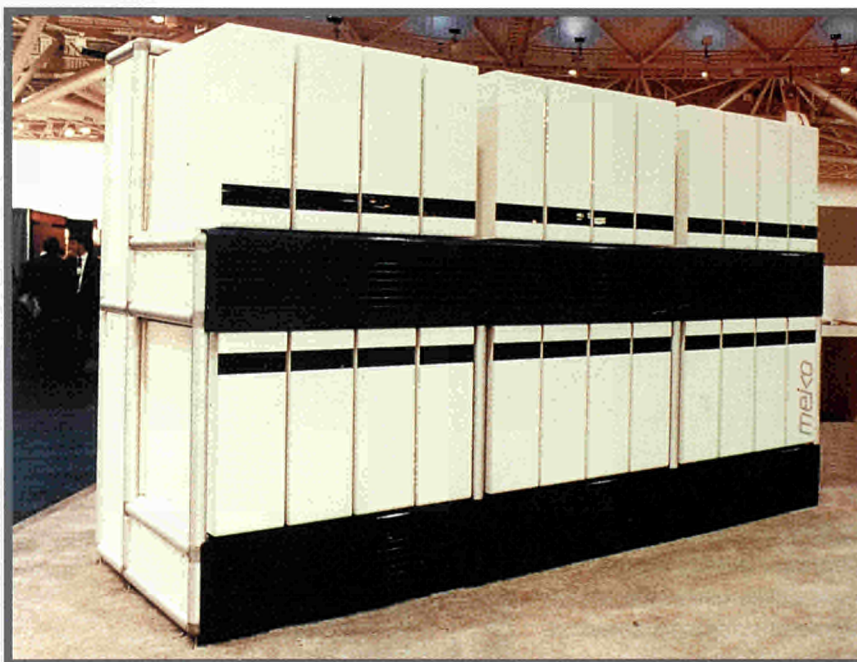


Photo: courtesy Meiko Ltd.

## **The Meiko CS-2 supercomputer.**

With the funding for the USA's planned Superconducting Supercollider cancelled, CERN is now the world's most powerful facility for probing the secrets of matter. However, the power of its particle colliders must be matched by that of its computers, which have to examine enormous quantities of data to improve our understanding of matter, energy and the universe.

For the first time in 30 years, CERN's most powerful computer has been designed and built in Europe. The new CS-2 supercomputer was installed as part of ESPRIT project GPMIMD2 (General Purpose Multiple Instructions Multiple Data II). A second CS-2 will soon be delivered to the European Centre for Advanced Research

and Training in Scientific Calculations in France as part of the same project, where it will be used to analyse meteorological data and develop climate models.

## **Massively Parallel Computing**

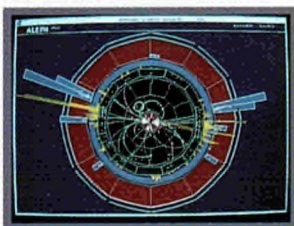
CERN's CS-2 is a massively parallel processing (MPP) computer consisting of 32 processors, or nodes. Applications are written so that every node works on a small part of any given problem simultaneously. Unlike traditional sequential computers, MPP computers can be expanded without limit by adding more nodes and data storage capacity, increasing processing power and data handling capacity, and so represent the future in high performance computing.

The company behind the CS-2 is Meiko Ltd, a British-owned SME with research facilities in Britain and the US. "We focus almost all our energies on R&D," explains Andrew Spencer, Meiko's director of marketing. "We are the only European company in the field, and are in direct competition with AT&T and IBM, two of the largest information technology organisations in the world."

Meiko have been involved in a number of ESPRIT projects. Two of them played a role in the CS-2's development: PUMA, which helped Meiko nail down some of the important conceptual issues in parallel computing, and GENESIS, which was essential in prototyping the 'ELAN ELITE' chips, which transfer data between the CS-2's nodes. ELAN ELITE's high bandwidth and speed are essential to the CS-2's performance.

PUMA and GENESIS finished in 1991. By early 1993 Meiko had sold CS-2s to Lawrence Livermore Laboratory in the US, defence research centres in the UK and Germany, a number of universities, an oil company and other organisations.

This success rests partly on the company's strategy. "We use industry standard technologies wherever possible, including micro-processors, operating system and peripheral interfaces, rather than reinventing the wheel. We also subcontract manufacturing and customer support," Andrew Spencer continues. "We let the market produce the most ●●●



**A Z<sup>0</sup> decays via a quark-antiquark pair into many particles**

CERN photo



●●● competitive components for us, and focus on our core expertise."

GartnerGroup, an American IT consultancy, emphasised the success of this approach in an analysis of the CS-2 earlier this year. "The CS-2 system design is clearly oriented towards maximum flexibility, standards compliance and reliability, while holding on to some significant performance features," they reported. "... there are no technical barriers to its continued success."

**The Commercial Market**

So by March 1993, when CERN started work on GPMIMD2, the CS-2 was already a commercial success. According to Andrew Spencer, the project will build on this success even further: "CERN's data handling requirements are immense - they create hundreds of megabytes of data every day. For Meiko, working closely with such a demanding customer will improve our product immensely. It is of enormous strategic value to us. And CERN, of course, get the benefits of cutting edge computing."

David Williams, Head of Computing and Networks at CERN, agrees. "The CS-2 has already shown its potential in running simulation events for NA48, a high-precision experiment due to start taking data in one year," he says. "The results are excellent, fulfilling our goal of producing 16 million events every night. We are very pleased that a European company can meet these standards."

Applying massively parallel computing to scientific research, however, is just part of the story. "Our main market is commercial, not scientific," Mr Spencer explains. "Companies with large numbers of customers or transactions - or indeed both - need to analyse more and more data on one database to refine their products and promotional campaigns. And they're hitting a performance barrier with traditional computing systems. For example, mainframe computers simply cannot handle more than, say, 50 gigabytes of data."

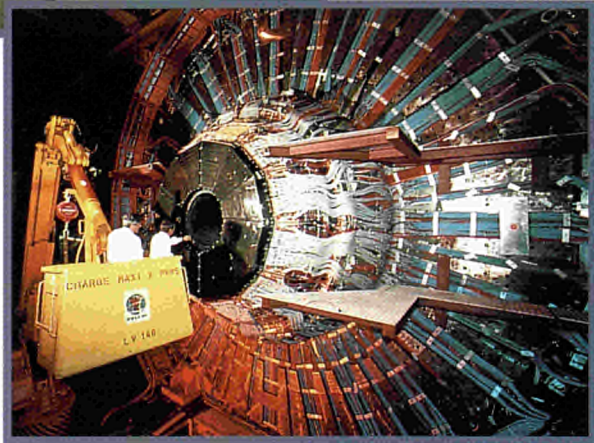
Bass Taverns, one of Meiko's



*CERN's planned LEP (Large Electron Positron) experiment will be one of the largest physics experiments in the world.*

customers, provides a classic example. By introducing a retail information system that provides precise information on who is buying what, where and when, the company has already achieved the highest liquid turnover per pub.

"Bass is committed to 'process orienting' their business, so the next stage - an enterprise information system - was vital," Andrew Spencer continues. "It could tell them, on practically a real-time basis, which promotions produce the highest and lowest volumes, revenues and margin. They could analyse product profitability, the most profitable product mix for each outlet, and any number of other parameters, allowing them to fine tune the competitiveness of their



"Meiko's system offered the best solution to our problem," confirms Bass Tavern's IT Director. "The system's scalability - allowing it to be expanded practically indefinitely - and its open systems nature were clear advantages, and minimised the risks inherent in introducing a new system."

Meiko have in fact recently installed a system supporting a 150 GB database, the largest Oracle database in Europe, and are currently discussing a customer's requirements for a terabyte-sized (10<sup>12</sup> bytes) system. They are working on the next generation super-computer, and are looking well-placed to capture a share of a market estimated to be worth many billions of ECUs by 1997.

"The ESPRIT projects worked for us," concludes Mr Spencer. "So we will seriously consider future participation under the Fourth Framework Programme. There's no doubt that ESPRIT's strategic funding played a role in ensuring that Europe now has a presence in the international supercomputer market." □

entire operation. This sort of system is becoming vital for any large company - our customers range from shoe suppliers to banks and phone companies."

However, Bass had insufficient computing power to turn their data into management information - their existing mainframe computer system could not be 'scaled up' to cope with so much data. The CS-2, on the other hand, can be extended by several orders of magnitude beyond the level of traditional mainframe systems.

*The forward ring counter of CERN's DELPHI detector.*

**C** o n t a c t  
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## ► INDUSTRIAL COMPETITIVENESS

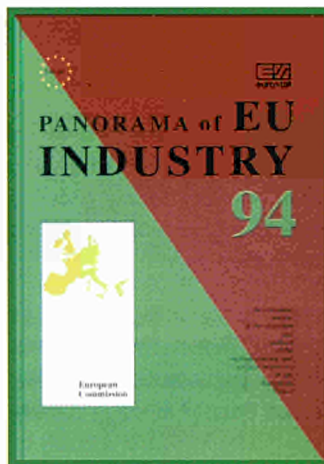
# Towards a European Industrial Policy

*The European Commission adopted «An Industrial Competitiveness Policy for the EU» in September.*

**B**efore any industrial policy can be developed, factual data must first be collected and analysed. Accordingly, DG III (Industry) of the European Commission, in collaboration with the European trade associations, published the fifth edition of the 'Panorama of European Industry' on August 24. Available both as a 1,400 page book and on CD-ROM (1), it is divided into two parts:

- Special Features, which takes a global view of a number of subjects of particular interest to Europe, including analyses of the importance of service industries and SMEs in the changing EU economy, sectoral patterns in strategic alliances involving EU companies, and more;

- Sectoral statistics, analyses and forecasts of approximately 190 industrial and service sectors, including detailed descriptions of recent trends in production, employment, trade, demand and supply,



structural changes and the most prominent aspects of the relevant legislative and regulatory framework.

## R&D: A Key Factor

The Panorama thus gives a comprehensive picture of the state of Europe's industry as the European economies emerge from recession. One of its most significant

conclusions is that labour costs are not the key factor explaining the lack of competitiveness of EU producers on domestic and world markets. Other factors - such as the firms' organisation, relationship with suppliers and distributors and the relative importance and success rate of R&D - are more important.

Other principal conclusions are:

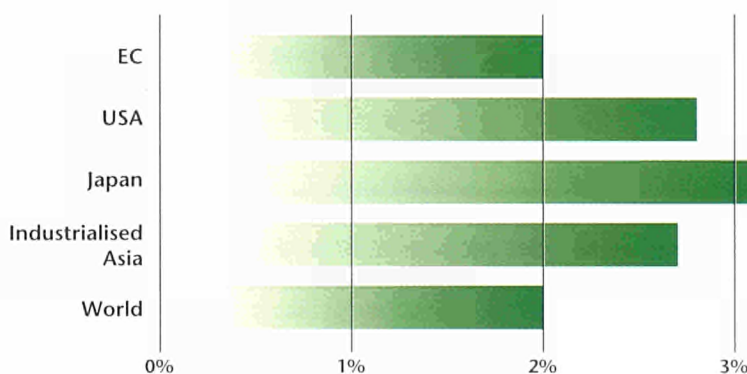
- The fastest growth areas in the 1986-1992 period have been fuelled by the demand for health services, the drive towards electronic information and expansion in the transport sector. Therefore, while the investment goods sectors (notably mechanical engineering and transport equipment) grew slowly, the following six sectors grew the fastest: pharmaceutical, medical/surgical, telecommunications, computer and office equipment, plastics processing and rubber products (the latter two benefiting from the rapid expansion of the car manufacturing and electronic engineering sectors).

- Foreign direct investments by EU companies continue to increase, but most (60%) are still concentrated within the EU. While European companies remain far behind Japan and the US in investing in Asia, they hold a commanding position in Eastern Europe, although total foreign investment in this region is concentrated in a few countries and in a few sectors, notably manufacturing and trade.

## Policy Priorities

As the data presented in the Panorama constitutes the basis of the EC's new Communication on Industrial Policy (2), the conclusions regarding the importance of R&D to a firm's competitiveness ●●●

### R&D Investment by Region (ratio R&D expenditure to GNP, 1991)

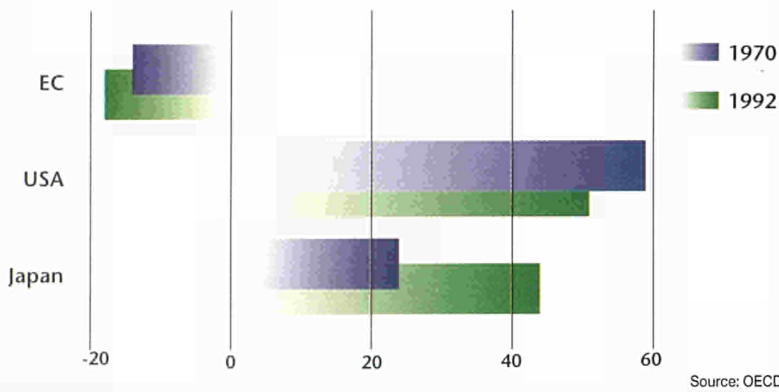


Source: OECD

*Total EU expenditure on R&D relative to GNP is barely equal to the world average, and is much lower than that of Japan, the US and the new industrial economies of Asia.*



### Specialisation in High Tech Industries (relative share of hi-tech exports)



*By specialising in relatively unsophisticated products for which world markets are not growing, European industry is becoming increasingly exposed to price competition, particularly from South-East Asia.*

●●● are given high priority. In this the Communication, which will be on the agenda of the next Research Council meeting in early December, follows on closely to the Commission's White Paper on Growth, Competitiveness and Employment (see issue 2/94) and Commissioner Bangemann's report on the Information Society (see issue 5/94).

oping an integrated approach to the exploitation of intellectual property;

- developing industrial cooperation: including identifying and reducing the obstacles blocking industrial cooperation, organising industrial round tables and developing support mechanisms;
- ensuring fair competition;
- modernising the role of the pub-

four aims. Many of them are relevant to the Commission's activities in R&D and promoting innovation, including:

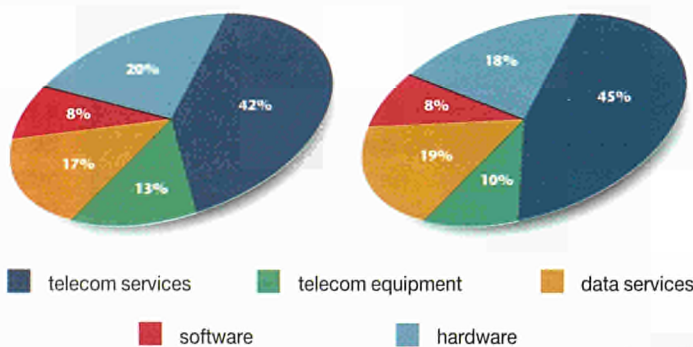
- stepping up research, taking greater account of market needs in RTD policy, modernising the approaches to produce more effective industrial spin-offs from research;
- developing industrial cooperation tools, allowing Latin American and Mediterranean countries to participate in the Fourth Framework Programme, developing scientific and technological cooperation schemes with Asian countries;
- establishing an Industrial Assessment Mechanism, strengthening the internal markets in gas, electricity and telecommunications;
- further deregulation, developing partnerships between big businesses and small firms, speeding the establishment of trans-European networks for data interchange between administrations.

"Of course, our Communication is not exhaustive. It relies on a number of limited priorities, which seem to us to be essential points on which it is presently necessary to concentrate in order to reinforce the industrial competitiveness of the European Union," summarised Commissioner Bangemann as the Commission unveiled the Communication. "It is an important stage in order to contribute to strengthening growth and job creation, and to ensure that the EU remains an efficient and attractive production site. There is a strong link between job creation and industrial production growth, and it is imperative that the EU remains an attractive site for producing and investing."

### Data Processing and Telecommunications Industries (1995)

WORLD MARKET = ECU 880 BN

EUROPEAN MARKET = ECU 290 BN



*The world market for the data processing and telecommunications industries will be worth 880 billion ECU in 1995. The European market is expected to account for more than a quarter of this figure.*

The Communication on Industrial Policy sets out four priorities:

- promoting intangible investment: improving vocational training and the promotion of human resources, for example, as well as devel-

opment of public authorities: among other activities, legislative and administrative procedures will be simplified and made more transparent.

The Communication proposes over 50 Actions to achieve these

(1) Panorama of EU Industry - available in English, French and German from the Sales Agents of the Office for Official Publications (see issue 1/94). CD-ROM (1,000 ECU); Catalogue No. CO-83-94-498-3A-Z; Book (130 ECU); Catalogue No. CO-80-93-468-X-C (where X = DE, EN or FR, depending on language required).

(2) An Industrial Competitiveness Policy for the EU. Official Journal, COM 319 final.



## ► FOURTH FRAMEWORK PROGRAMME

# More Specific Programmes Adopted

**The first Council of Research Ministers under the German EU Presidency adopted another eight Specific Programmes.**

With two Specific Programmes already adopted in June (Industrial and Material Technologies and Advanced Communications Technologies and Services), the meeting in September brings the number of Specific Programmes now adopted to ten.

The eight new Programmes are:

- Telematics: 843 MECUs
- Information Technology: 1,911 MECUs
- Standards, Measurements and Testing: 173 MECUs
- Marine Science and Technology: 228 MECUs
- Agriculture and Fisheries: 607 MECUs
- Non-Nuclear energy: 967 MECUs
- Cooperation with Developing Countries and International Organisations: 540 MECUs
- Thermonuclear Fusion: 794 MECUs.

The meeting's success therefore greatly increases the likelihood that a large number of Calls for Proposals will be issued on 15 December, ensuring maximum continuity in European R&D. Mr Antonio Ruberti, the Member of the European Commission responsible for R&D, said that the half-way stage had been reached and that he was hopeful that the remaining Specific Programmes would be adopted by the Research Council at its meeting in December.

The eight Programmes approved by the Council in September represent 49.3% of the Framework Programme's total financial allocation of 12,300 MECUs (a further 700 MECUs could be added in just over 18 months). Within this global amount there is scope for adjusting figures from Programme to Programme. This gave rise to a

wide gulf between the Council and the European Parliament on how much the Non-Nuclear Energy Programme should receive. In the end, the rational use of energies and renewable energies were increased while the amount allocated to fossil fuels was reduced.

The President of the Council pointed to the 25% increase in these areas over the amount allocated under the Third Framework Programme. Mr Ruberti explained that allocation of money within this area of research was being constantly reviewed because of plans for work on biomass, a form of renewable energy.

## Participation by 'Third Countries'

The Council discussed other issues in addition to the Fourth Framework Programme. These included statements by the Presidency on genetic engineering and deregulation, as well as a proposal on agronomic research put forward by the French delegation.

The EU Research Ministers also gave the green light to the European Commission to negotiate a cooperation agreement on science and technology with Israel. Like previous agreements with non-European countries (one with Australia was signed earlier this year), the agreement will, once negotiated, help Israeli researchers participate in the Fourth Framework Programme.

However, access to nuclear research will not be permitted under the terms of the proposed agreement, and there will not be any 'flow' of funds in either direction: Israel will have to cover all the costs of their involvement in the Fourth Framework Programme.

Considerable political importance is being attached to the agreement, which acted as a precursor to a broader discussion on research cooperation with Third Countries. The Presidency insisted that Third Country involvement was wanted, but not at the cost of a loss of know-how from the EU.

For the foreseeable future, there-

fore, it will be possible for organisations from Third Countries to participate in the Fourth Framework Programme on a 'project by project' basis in the following Programmes:

- Information Technology;
- Standards, Measurements and Testing;
- Marine Science and Technology;
- Non-Nuclear Energy. □

## Further Information

General information and Information Packs for the upcoming Calls for Proposals can be obtained by contacting (where available, E-mail is preferable):

Programme	Contact
Industrial and Material Technologies	Help Line Fax: +32 2 295 8046
Advanced Communications Technologies and Services	ACTS Central Office Fax: +32 2 295 0654 E-mail: raco@postman.dg13.cec.be
Telematics	Horst Hünke Fax: +32 2 296 8398 E-mail: telematics@dg13.cec.be
Information Technology	Gerda Colling, DG III Fax: +32 2 296 8388
Standards, Measurements and Testing	David Gould Fax: +32 2 295 8072
Marine Science and Technology	MAST Programme Fax: +32 2 296 3024
Agriculture and Fisheries	Susan Möller Fax: +32 2 296 4322
Non-Nuclear Energy	Michel Poireau Fax: +32 2 295 0656
Thermonuclear Fusion (1)	Regis Saison Fax: +32 2 296 4252

(1) For general information only (the European Commission does not issue Calls for Proposals under the Thermonuclear Fusion Programme).



## ► SMEs

# Analysing Europe's SME Sector

**The publication last May of the Second Annual Report of the European Observatory for SMEs will contribute significantly to the Commission's Integrated Programme for SMEs.**

The Observatory was originally set up in December 1992 as part of an effort to improve both enterprise policy and the statistical coverage of the SME sector, as well as to analyse the impact of the Internal Market on SMEs.

According to the Commission, the SME Observatory has an important role in its overall SME and enterprise strategy: 'it is one of the most analytical sources on which are to be considered practical proposals for the implementation of the Integrated Programme in favour of SMEs and the craft sector'.

The first Annual Report was published in November 1993, while the current one appeared last May. Produced by the twelve partner institutes of the European Network for SME Research (ENSR), it points out that SMEs provided 67 million jobs in 1993, an increase of around 2.6 million since 1988. It also confirms that 'the Internal Market will stimulate processes of concentration and restructuring, resulting in a smaller number of enterprises with a larger average firm size.'

## Strategies for Competitiveness

As for R&D, the report shows that SMEs account for around 18% of the total, although this is not seen as a true reflection of the extent and quality of their innovative capacity. It also points out that the most innovative SMEs generally embrace three essential elements in their corporate strategy:

- project assessment and strategy of the enterprise;
- business planning;
- cooperation.

Stimulating the R&D activity of SMEs and disseminating 'techni-

cal know-how' are urgent priorities, according to the Observatory. To achieve this, it recommends that SMEs and innovative craft enterprises be better integrated into the EU's technology programmes.

According to the Commission, the Observatory is clearly in line with present EU priorities, and should work towards monitoring the internal market in relation to SMEs. Such

ideas as the development of a European programme for promoting entrepreneurship could, the Commission feels, be examined in the context of the implementation of the Integrated Programme, while new Programmes like SOCRATES and LEONARDO should ensure an adequate response to most of the Observatory's recommendations regarding education and training. □

## ► EUROPEAN SCIENCE & TECHNOLOGY ASSEMBLY

# ESTA Begins Work

The European Science & Technology Assembly (see issue 3/94) held its first plenary session in Brussels on September 6-7. Formed to ensure direct and permanent contact between the European Commission and Europe's industrial and scientific community, it is comprised of 100 leading representatives of European science and industrial research, including six Nobel prize winners.

The Assembly will be systematically consulted for opinions on the scientific and technological contents of the European RTD Programmes, criteria and methods of evaluating positions and more. Moreover, it will be allowed to prepare reports and air opinions on different aspects of EC research policy on its own initiative.

The plenary session was opened by Commissioner Antonio Ruberti (responsible for Science, Research and Development), who stressed the Assembly's representativeness not just in terms of re-



**Commissioner Ruberti flanked by Nobel prizewinners Ilya Prigogine and Carlo Rubbia at the first plenary session of the European Science and Technology Assembly.**

search institutions but also in terms of scientific sectors and disciplines.

During the meeting, the Assembly elected a 20-member bureau who, in turn, elected a vice president and president. The latter post is held by Dr Jan Borgman, Chair-

man of the Board of the Netherlands Organisation for Scientific Research since 1988.

According to President Borgman, one of the key strengths of the Assembly is its diversity. «My first priority will be to find ways to take advantage of this diversity without losing sight of the need to work on a collective identity,» he said. «Although we have appeared too late for an effective involvement with the definition of the Fourth Framework Programme, the Commission has asked us to formulate comments on a number of Specific Programmes where final decisions are still pending. That, and the need to adopt rules of procedure and a workplan for 1995, will probably dominate our next meeting on December 7-8.» □

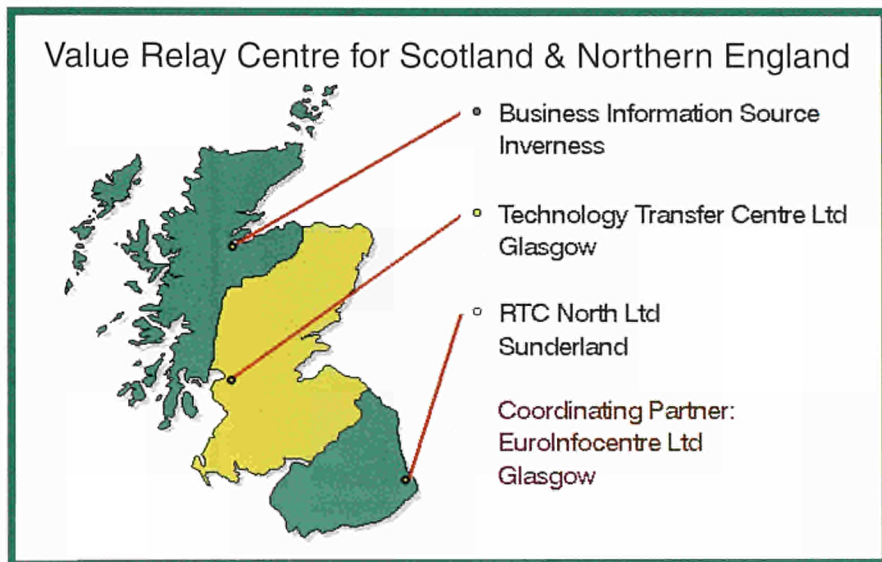
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# One VRC, Four Offices

*The VRC for Scotland and Northern England is actually a consortium of four different organisations that serve widely differing regions in the north of the United Kingdom.*



*The VRC for Scotland and Northern England is distributed among four region-specific offices.*

## Technology Transfer in Textiles

Further south in Glasgow are two more offices of the VRC: EuroInfoCentre and Technology Transfer Centre (TTC). As its name suggests, the former is the region's centre for disseminating all sorts of information from the EC. It also coordinates the entire VRC.

"We are the interface between the other three offices and the European Commission and other relevant agencies," explains David Cranston, EuroInfoCentre's Relay Centre manager. "We leave the actual day to day contact - the company visits, etc - for the rest of Scotland to TTC. However we do have some specialised contacts, and organise major events, such as the Fourth Framework Programme Roadshow and the Technology Transfer Day on Textiles last September."

The Technology Transfer Day focused on new developments in the textile and clothing industries. "We decided to focus on one area as closely as possible," explains Ian Traill, EuroInfoCentre's Director. "Therefore we and the Scottish College of Textiles, who hosted the event, selected just four results, but allowed them to be presented in depth and left the attendees enough time to approach the result owners informally."

The four research results presented came from both the BRITE-EURAM and ESPRIT Programmes, and included a real-time data gathering system for textile industry shop floor control, a system for detecting and marking defects in woven or knitted materials, a 3D Fashion and Modelling Design System to help designers and engineers work together ●●●

The logic behind splitting the VRC four ways lies in the nature of the entire region, according to Calum Davidson, the Relay Centre manager at Business Information Source, which, from its base in Inverness, serves the Highlands and Islands of Scotland. "The Highlands and Islands may cover 30% of the UK, but we only have 1% of the population, which is in stark contrast to, say, Northern England," he explains. "Therefore the traditional means of disseminating information, such as the seminars and workshops which can and do work further south, are not as effective up here, so there's a genuine need for an office specialised in each area."

Perhaps not surprisingly, the business and research communities of the Highlands and Islands are particularly interested in information and communication technologies and environmental, agricultural and fisheries issues. There is also a strong interest in specialised engineering and biotechnology sectors.

Business Information Source concentrates on individual company visits. "Ongoing personal contact with individuals in each company or research institute is vital," Mr Davidson stresses. "Phones and faxes are important, but it's always difficult to catch the typical owner/manager of an SME or micro business at their desk. But we can't always be on the road, which is why we launched the EURALERT service."

EURALERT collates information on topics of interest from the wide variety of sources the VRC has access to, and then transmits it electronically to interested businesses and organisations over the Internet.

"At the moment we have over 300 people on-line, extending as far as two agricultural researchers in Russia, and the numbers are growing constantly," Mr Davidson notes. "It's an excellent example of using advanced communication technologies to solve the problem of isolation."

## VALUE IN BRIEF

The EC Programme for the Diffusion and Utilisation of Scientific and Technological Research Results, VALUE was extensively covered in issue 1/94 of Innovation & Technology Transfer.

**C** o n t a c t  
**VALUE, European Commission, DG XIII**  
 Tel: +352 4301 33 610  
 Fax: +352 4301 34 129



●●● using virtual reality and a Continuous Colour Control and Measurement Unit.

The event also included a presentation on the CRAFT II Programme, which is targeted at SMEs without any research facilities of their own. Under a CRAFT project, a research centre performs research for a consortium of these SMEs with similar research needs, ensuring the widespread distribution of cutting-edge research directly to the companies that need it the most.

"There are many SMEs in our region, as well as a number of excellent research organisations like the Scottish College, so CRAFT was greeted with a lot of interest," Mr Traill concludes. "Promoting both specific research results and CRAFT in one day proved to be a very successful formula, something we will continue."

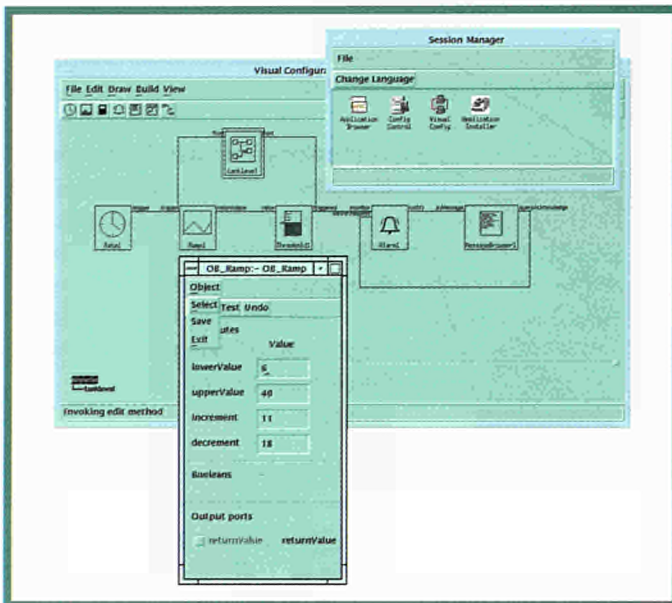
### Exploiting Academic Research

The TTC is equally active, continuing its successful programme of Academic Awareness Days. "We have many world class universities and research centres in our area," explains Robina Fisher, TTC's Information Director. "It's vital that we help the academics transfer their research results to regional industry."

For this reason TTC pioneered the Academic Awareness Day format. "The objective is specifically to encourage academics to exploit the results of their research," Robina Fisher continues. "The Day covers all aspects of exploitation, from ensuring protection of intellectual property rights to sources of funding from the VALUE Programme. They are focused on particular fields - the first two events, for example, were aimed at the Medical and Bio-Science Department of Glasgow University and the Engineering and Physical Sciences Department at the University of Strathclyde. Each Day is therefore different, with presentations on venture capital, regional enterprise grants and, of course, support provided by the VALUE Programme. Both events were well attended - it is obvious that the ac-

ademics are keen to have their results used by industry."

The Academic Awareness Day format is obviously a success - the period from mid-October to early 1995 will see no less than another five such events. In addition, on November 1 TTC held a seminar on drug delivery systems as part of the UK's LINK Nanotechnology programme, including presentations from scientists from the UK, Russia and Italy.



**The OpenBase visual programming language makes powerful object-oriented programming methods simple to implement.**

### RTC-North

According to Sarah Too-Chung of Regional Technology Centre North (RTC-North), "the great strength of being a VRC is that we can work with local, regional, national and European information sources and funding mechanisms."

A typical example is the way RTC-North, which serves Northern England from their office in Sunderland, helped the innovative software company PRISM Technologies win regional, national and European funding.

"To begin with, we helped them approach Northern IT Research - a fund which focuses on promoting information technology development in the north of England," Sarah Too-Chung explains. "The resulting start-up funds were needed for the management buy-out which was essential to create the firm."

Three years later, the new company unveiled OpenBase. "OpenBase provides what is known as a visual programming language," explains John Russell, R&D manager at PRISM Technologies. "It helps companies to develop their software systems using the object-oriented method, where different software components are written and then assembled in a modular way. Object oriented programming brings enormous efficiency gains

programme, ESPRIT III. ESSI aims to promote productivity-enhancing methods and tools for software development, and runs a number of small-scale projects which do not need partners from different countries.

With the help of RTC-North, PRISM Technologies and ICI, one of their long-standing research partners, put together a successful ESSI proposal. The SIPTOOLS project, to which ESSI is contributing almost 400,000 ECU, is now well under way.

"In SIPTOOLS we are investigating the effect of object-oriented programming on two different software applications," Mr Russell explains. "Both systems - a statistical processing package and an environmental monitoring and compliance system - had already been developed by ICI. By re-doing these systems using object-oriented programming, we hope to get an objective idea of how efficient this form of programming is. ESSI will then help disseminate the results, improving the efficiency of the entire European software industry. And as we are using OpenBase, the project will also help demonstrate the power of our product." □

to software development and maintenance, and OpenBase makes it very easy - the system developer actually sees the various software components as coloured blocks on the screen. The market includes any company that regularly spends small fortunes writing and maintaining large software applications, from chemical industries to banks."

A review by *Software Development Monitor* in 1993 described OpenBase as one of the most exciting developments in software writing and maintenance. "It made quite an impact," Mr Russell notes. "However, we needed to investigate further the actual impact of object-oriented programming. At that point RTC-North drew our attention to ESSI."

ESSI, or the European Software Systems Initiative, is an 'accompanying measure' within the EC's Information Technology Pro-

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► VRC NETWORK UPDATE

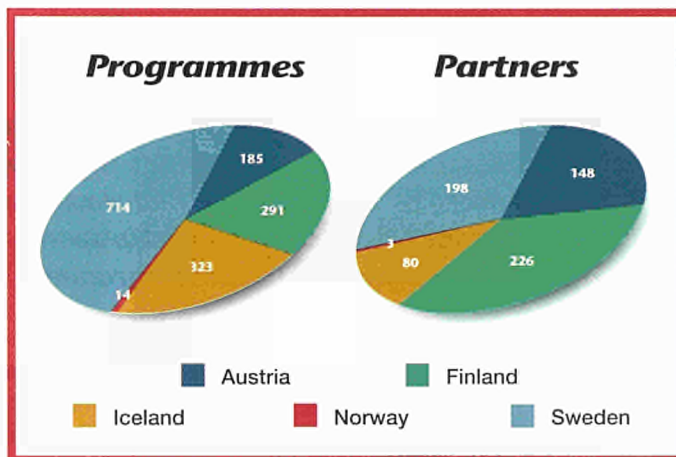
# VRC Network Enlarged

**Five new VRCs from as many EEA countries were welcomed to the network at the VRC's 'Good Practice' Meeting.**

The annual 3-day meeting was held last September in Brussels to take stock of the VRC network's progress over the past year, swap experience between centres on successful practices, launch new publications and services and welcome the new VRCs, which come from Austria, Finland, Iceland, Norway and Sweden.

These countries already boast a significant number of participants in the EC's research programmes (see graph), a proportion which can only increase when the Fourth Framework Programme gets under way.

Their contact details are included in the «Who's Who of the VALUE



**Research institutes and companies from Austria, Finland, Iceland, Norway and Sweden are already well-represented in the EC's Research Programmes (left) and the CORDIS RTD-Partners database (right).**

Relay Centres» (1), a new publication launched at the meeting. The 40-page booklet is dominated by 1-page profiles of each of the 32 VRCs, providing information such as:

- geographical area covered;
- organisations involved in the VRC, and their roles;
- activities/services/expertise;
- participation in other European programmes;
- contact persons and address. □

(1) Available free by sending a fax to Mr Leopold (+352 4301 32129) quoting 'Who's Who', Catalogue No: CD-84-94-185-X-C, where X = EN (English) or FR (French).

► CORDIS UPDATE

# Less Paper, More Access

**Users can now register on CORDIS and add entries to the RTD-Partners database from their keyboard. Accessing CORDIS through the Internet is also possible.**

The European Commission Host Organisation (ECHO), which hosts the CORDIS service, now offers on-line registration, a new development which allows individuals and organisations to become new users without paperwork or delay.

- On-line registration is simple:
- log on to ECHO using the public password 'ECHO' (dial +352 42 03 47; 300-2400 baud; full duplex; 7e1 or 7n1; TTY or ANSI-BBS terminal emulation);
  - select option 9, 'on-line registration', from the main menu;
  - choose option 1 for more information on on-line registration, or option 2 to proceed;

- respond to the questions (contact details, main company activities, databases of interest and working language, etc.), pressing ENTER after each. If a question does not apply, enter a dash (-);
- your new registration number and private password are displayed on the screen. Make a note of them;
- log off from ECHO. Your new registration number and password are valid immediately.

Similarly, the entry form for the RTD-Partners database is now available in electronic form. The process is as follows:

- send an e-mail message to:

- cordis-cp@lcd.co.uk. There is no need to include any text in the message;
- you will receive two files - 'readme' and the electronic entry form - which you then download into your wordprocessing software;
  - follow the instructions in the 'readme' file on filling out the entry form, and e-mail the form to the address provided in the 'readme' file.

Lastly, thanks to the addition onto the Internet of I'M-EUROPE, a World-Wide Web Server dedicated to the IMPACT Programme (see Programme Briefing, page 22), access to all 20 ECHO data-

bases - including the nine CORDIS databases - is now available to more than 25 million users worldwide. □

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# COST: Coordinating Research Across Europe



*The first eight months of 1994 saw the launch of an unprecedented 27 new research Actions under COST - the French acronym for 'European Cooperation in the Field of Scientific and Technical Research'. This brings the total number of ongoing Actions to over 100 for the first time, underlining the increasingly important role played in pan-European R&D by this, one of the earliest European research programmes.*

COST is a Europe-wide programme to assist the co-ordination of the COST Member States' national research programmes. Founded in 1971 at a ministerial conference in Brussels, its scope has broadened over time and now includes 15 disciplines, ranging from fundamental chemistry to the social sciences. Starting with 19 participants in 1971, the membership has broadened to 25 countries.

COST can be characterised by its four basic principles:

■ **Openness:** all COST countries, both inside and outside of the EU, as well as

the European Commission, can propose research Actions;

■ **Flexibility:** participation in Actions is voluntary for all COST Member States according to national research priorities;

■ **Decentralised funding:** all research is paid for by the participating countries themselves;

■ **Concerted Action:** national research activities are coordinated at the European level;

This approach has several advantages. It allows COST to help avoid duplication of research within Europe, making the various national schemes more efficient

## COST: A History

The idea of COST was first mooted 25 years ago, and was formally inaugurated as a programme in 1971 by the Ministers of Science and Technology of the 19 participating countries (today's Member States of the European Union, the six EFTA countries and Turkey). It therefore pre-dates the European Community research programmes, which began in 1974, and was the first programme to involve non-EU countries.

Originally restricted to telecommunications, computer science, materials and metallurgy, oceanography and meteorology and the environment, COST's scope has now been extended to cover many more fields: agriculture being introduced by Yugoslavia in 1974, food technology by Sweden in 1975 and the social sciences by Finland in 1981.

In 1989, the co-operative nature of the programme was widened to allow organisations and institutes from non-COST countries to participate in COST activities where this was justified, reflecting the new political priorities and scientific opportunities opened by the then recent fall of the Iron Curtain.

This process continued at a Ministerial Conference in Vienna in 1991, when full COST status was granted to Czechoslovakia, Hungary, Poland and Iceland. In June 1992 Croatia and Slovenia joined the COST programme - a special situation arising from their status as part of the former Yugoslavia. This decision, in addition to the creation of the Czech and Slovak Republics, brought the number of countries involved in COST to the present figure of 25.



# ing National Research

and permitting any potential gaps in European research to be efficiently filled. For participating countries, COST's flexibility means that they can focus on research that they are particularly interested in, and although an individual country only funds the activities for which they are responsible, results are shared between all participating countries.

In this way COST is complementary to both the EUREKA Initiative (see Dossier, last issue) and the EU's Framework Programmes. Together these three initiatives provide a coherent structure for European research in the nineties and beyond. But where, exactly, does COST fit in, how does it work, and how can European laboratories and companies get involved?

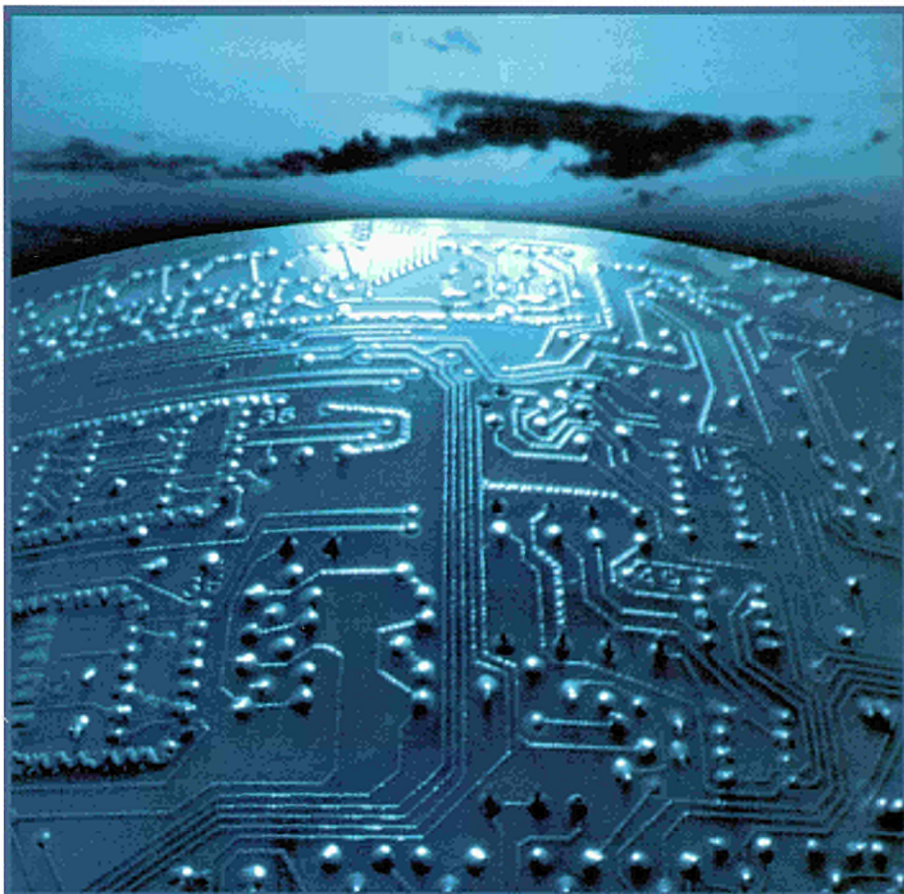
## **Basic R&D, Bottom-Up**

Like the research projects run under the EC's Framework Programmes, COST research is fundamental in nature. Each 'Action' is usually an umbrella under which there are a number of individual projects directed towards the same broad goal. On average, each Action includes participants from twelve of the 25 COST Member States (the absolute minimum is five) and has a life-cycle of five years.

One of COST's main principles, however, is the 'bottom-up' method for project generation, administration and funding, making it similar in some ways to the EUREKA Initiative, which was launched over a decade later. Like EUREKA, any research organisation from a Member State can propose a COST Action. This gives a balanced approach that has led to COST successfully coordinating European-wide research over a period of 23 years with over 200 successful Actions, 110 of which were currently under way in October 1994.

COST Actions usually address:

- global concerns (e.g. oceanography, the environment and meteorology);
- issues of interest to the majority of Member States, (e.g. information technology, agriculture and food technology);



**INFORMATICS Actions include: Remote cooperation • Advanced communication concepts • Multimedia communications • Design of cooperation technology • and more.**

■ areas where extremely close co-operation is necessary so that Actions are harmonised throughout Europe, (e.g. telecommunications, transport, meteorology).

## **Administration and Funding**

A COST Action is coordinated and directed by the Management Committee, which is composed of representatives from the countries participating in the Action. Information is disseminated among the partners through workshops, seminars, conferences and, of course, direct correspondence. COST can also fund short-term scientific missions (less than one month) from one partner to another.

COST research is funded nationally, with each participating country ensuring

that the financial means necessary for research co-operation are provided. Generally, being accepted into a COST Action helps, and in the case of a few countries, guarantees public funding.

Funding from the European Commission covers only the co-ordination costs, including the COST Secretariat, workshops, meetings, seminars and publications, plus reimbursement of the travel costs of the national delegates of the EU countries acting as members of the COST Management Committees.

Until 1991, the total annual Community budget for administering COST never exceeded 0.5 million ECU. In 1992 this was increased to 2.2 million ECU. Exceptionally, at the request of the European Parliament, a sum of 5 million ECU ●●●



## Getting Involved

How does an R&D idea become a COST Action? The steps are as follows:

■ **Developing Support:** The 'proposer', whether it be a research centre, laboratory or other research institution, first develops support for the idea among its counterparts in both its own country and elsewhere. If the proposer is a private company, then they should approach the appropriate research institutions in their country.

■ **First Draft:** The proposer's National Coordinator is then contacted. Together, they complete a description of the proposal and produce a preliminary draft of the technical annex to the Memorandum of Understanding (MoU), which will, eventually, form the basis of the Action.

■ **Distribution:** These two documents are then distributed to all National Coordinators or, where appropriate, to a technical committee. If any of the other National Coordinators are interested in the proposal they determine to what extent national funding is available and reply to both the Secretariat and the National Coordinator within 45 days.



**TRANSPORT Actions: Urban, Road, Inter-regional and Maritime transport • Logistics.**

■ **New Actions Group:** Once four favourable replies have been received, the New Action Group (NAG) is convened. It is in principle composed of the interested National Coordinators and the relevant technical experts, although all COST States are invited.

■ **Examination:** The NAG, together with interested National Coordinators,

examines the proposal at the international level, assesses its content and, within 45 days, drafts a new version of the technical annex to the MoU. This is distributed to all the National Coordinators.

■ **Final Draft:** This draft is discussed during a consultation period (another 45 days), after which the proposer's National Coordinator has 30 days to forward the final draft of both the MoU and its technical annex to the COST Secretariat and the Committee of Senior Officials (CSO).

■ **Action Launch:** Once the MoU is approved by the CSO the Secretariat must receive five favourable written replies from COST States wishing to take part in the Action before it is informally launched. The Action is considered to be officially underway

after at least five countries have signed the MoU.

■ **Joining an Active Action:** Lastly, any other COST State can unconditionally join an Action within the first six months of the signing of the MoU. After that, States may join subject to the agreement of the Action's Management Committee, which may attach specific conditions.

●●● was also provided, in that year only, to assist research institutes in Central and Eastern Europe take part in COST Actions. For 1994 the European Commission's budget for administering COST stands at 8 million ECU.

The total funding provided by all 25 Member States for the research Actions, however, is estimated at 2.5 billion ECU over an average five year period, so COST's management overheads are only 1.6%.

### A Successful Initiative

The most recent evaluation of COST was carried out between October 1990 and May 1991. It involved a general survey of the views and perceptions of the research teams, Technical Committees and National Coordinators taking part in a representative sample of 15 COST Actions, twelve of which had either recently been completed or were still in progress.

Three similar questionnaires were developed, pilot-tested in various COST countries and then sent out to the 567

participants. The average response rate was 50%, with lower response rates confined only to the past Actions.

The report revealed that participants came from a wide range of research establishments, including higher education institutes, government laboratories and the private sector. Significantly, they were generally experienced international collaborators, and therefore well able to assess the merits of the different European collaborative mechanisms.

Overall, the evaluation elicited a positive view of the COST mechanism, in particular:

■ 90% of the participants were satisfied with the quality of the research teams with whom they were collaborating and with the results produced. 70% intended to apply for further COST Actions.

■ Over 40% rated their results as being of moderate interest, while 54% considered them to be of great scientific interest. 74% stated that they had achieved or surpassed the Action's objectives.

■ COST was viewed as a major tool for

scientific cooperation in Europe, meeting real needs and acting as an important vehicle for developing new partnerships. 87% wished to see full membership extended to Hungary, Czechoslovakia and Poland, which has since occurred.

■ The COST framework was chosen primarily to exchange information and ideas at an early stage of the R&D process. The Actions generally function smoothly and it was considered as a comparatively quick route for developing collaborative research, unhindered by excessive bureaucracy.

### Industrial Participation

Although COST research is basic research, many companies have contributed to COST Actions in order to increase their basic technological ability and knowledge. This is particularly the case in areas such as Materials, Power Engineering, Agriculture and Biotechnology, where the time lag between basic research and a profitable product is becoming increasingly short. ●●●



## Case study

# European Weather Forecasting

*COST has played a major role in developing Europe's continent-wide meteorological forecasting infrastructure.*

*COST Actions in this field include a large number of industrial companies.*

**M**eteorology is by nature transnational and multidisciplinary, so COST is well suited to improving data gathering and transmitting techniques and harmonising this data on a European level.

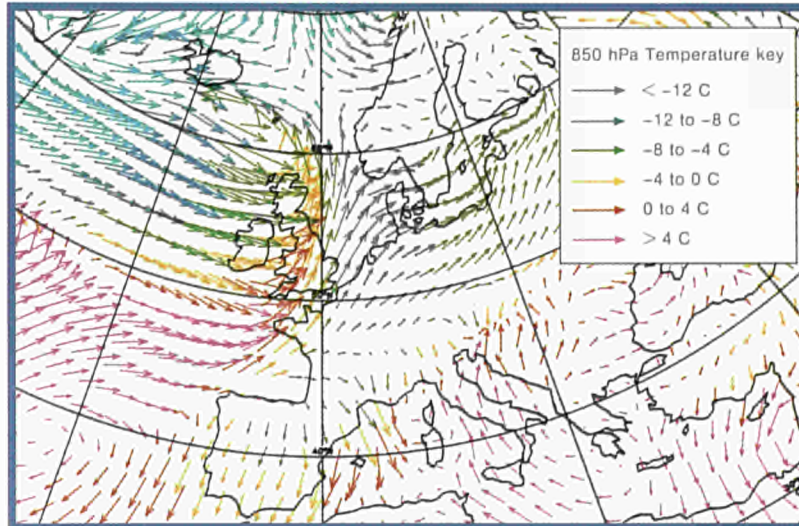
The first COST Action in this field was Action 70 - European Centre for Medium-Range Weather Forecasting, which successfully concluded with the establishment of the Centre implicit in its title in 1975 in Reading (UK). The Centre develops and improves models and numerical methods for medium-range weather forecasting (i.e. up to ten days ahead) and distributes these forecasts to the 17 Member States.

## Weather Radar Systems

The other COST Actions in this field focus on weather radar systems, and include a significant industrial contribution due to the size of the international market. Completed Actions in this field are:

■ **Action 72** - Measurement of Precipitation by Radar: Launched in December 1979, this 12-country, six-year effort studied the feasibility of a European weather radar network. Harmonisation proposals were drawn up, pilot projects performed and data exchanges made. The Action confirmed the network's technical and financial feasibility, and found that the benefits outweighed the costs.

■ **Action 73** - Weather Radar Networking: One of two Actions following on from Action 72, Weather Radar Networking aimed to further the establishment of an operational weather radar network in all 14 Member States by harmonising operations and data processing. Among its



**A surface wind forecast from the European Centre for Medium-Range Weather Forecasting. Arrow length and colour represent wind strength and air temperature, respectively.**

major achievements was a standardised format and protocol for data exchange, which has been adopted by the World Meteorological Organisation. The Action ended in 1992.

■ **Action 74** - Strato-tropospheric Radar for improving weather forecasts: Also leading on from Action 72, this 12-country Action was launched in September 1987 for six years. Its focus was the 'windprofiler' - a vertical radar that provides 3D profiles of wind velocity up to 16km in altitude. Work included analysing the user requirements of and benefits from a Europe-wide network, which could replace balloon measurements with a cheaper, more frequent service. As such a network would require European, and preferably international, frequency allocations, the Action defined and promoted the most suitable and realistic frequencies for European users, in coordination with the World Meteorological Organisation.

## Healthy Industrial Contribution

The current Action in this field - Action 75: Advanced Weather Radar Systems - held an International Seminar on the sub-

ject last September. The expenses were met equally by the COST Secretariat, the registration fees and the companies involved, demonstrating the importance European industry attaches to COST collaboration.

The four-day seminar featured over 80 papers, ranging from overviews of weather radar networks in Russia to presentations of the latest techniques in weather radar technology. Industrial participants in both the seminar and the exhibition held

alongside it came from Western Europe and the USA, while public sector researchers came from as far afield as Japan, Romania, Brazil and Russia.

One of the exhibitors was French company Degreane SA, which began developing wind profilers in the mid 1980s. "METEO-FRANCE has already used experimental wind profilers, and will use our first operational 'PST 50 VHF' profiler," explained Pierre-Henry Lamarle, a Degreane engineer. "Our profiler operates in the VHF band, as opposed to other UHF systems, so one of the benefits of being involved in COST 74 was to discuss and be able to demonstrate the benefits of VHF. The resulting access to the European standardisation body was very important to us. We attended this exhibition to further our case."

Action 75 will finish in 1997, while Action 76 - Development of VHF/UHF Windprofiler and Vertical Sounders for Use in European Observing Systems - was launched in March 1994. Degreane SA is one of the partners. "Like most COST participants, we want to continue working in new Actions," Mr Lamarle concludes. "COST is strategically very important to us."



●●● Only one area - Social Science - lacks any participants from the private sector, for obvious reasons.

A COST Action's Management Committee defines the Action's aims and content, divides the work up into projects and decides who does what within each project. This is essential to conserve the fundamental nature of the research. Despite the fact that private companies are not in the driver's seat, however, they can influence the course of the Action or project.

Intellectual property rights have become a more important issue within some COST Actions in some areas over the past few years, as private companies - particularly large ones such as heavy engineering or pharmaceuticals internationals - get more and more involved in basic research. COST is in fact considering issuing further guidelines on the subject.

For the time being, although basic research usually requires the complete flow of information among the partners, and indeed between them and the outside world, private companies can limit this flow in order to protect knowledge sensitive to their commercial interests.

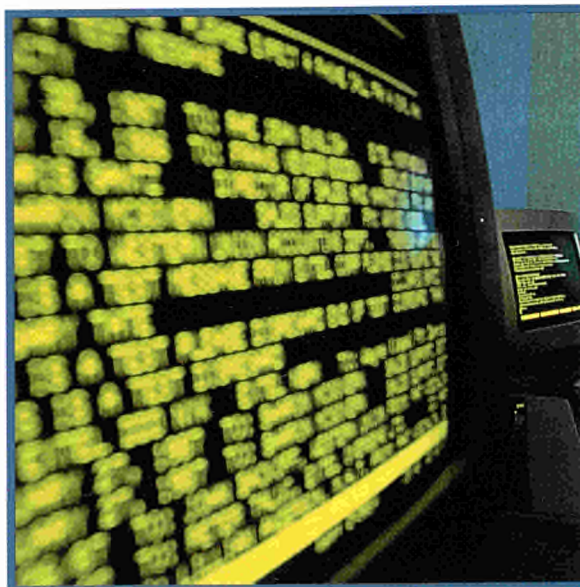
In the final analysis, the sheer transfer of knowledge from working in these high-level, international basic research projects must have considerable benefits for private companies. COST Actions frequently involve all of Europe's industrial leaders in the concerned field, and the percentage of private company participation has not slackened over the years. If it were not worth their while, this would not be the case.

### The Future

One thing is almost certain regarding COST's future - requests for future participation by countries - both as full members and in individual Actions - will continue to increase. For example, the Committee of Senior Officials (see 'How COST Works') has recently accepted requests for participation in individual Actions from:

- the University of Melbourne, Australia;
- the Cluj-Napoca Technical Research University of Romania;
- the Radio Research and Development Institute in Moscow;
- the Institute of Terrestrial Magnetism of Izmiran (Russia);
- the Smith Drexel University, Philadelphia (USA);

## Further Reading



**The multilingual, user-friendly COST Database provides descriptions of Actions and participants, information on COST publications, legal references, contact information and more.**

- Introduction to COST Cooperation, updated regularly and available from the COST Secretariat.
- COST Cooperation: Objectives, Structures, Operations. EUR 13914
- A Review of COST Cooperation since its Beginnings. EUR 11640

- Inquiry on COST Efficiency and Mechanisms. EUR 13992, English, French and German in the one volume.

In addition, there are almost 1,000 COST publications available, primarily technical reports.

Currently, the European Commission's COST Secretariat oversees around 15 scientific secretariats, who in turn oversee the lion's share of the 110 ongoing Actions. The remaining Actions - mostly in the telecommunications area - are overseen by secretariats in different Member States. With the number of COST Actions accelerating, and with staffing likely to remain constant, there will be an increasing need for priorities to be set.

This will create an interesting challenge to one of the fundamental concepts of the COST programme - the lack of bureaucracy in introducing new proposals - that has made it the success it is today. There are differing opinions as to how this problem should be handled. One approach would be to approve all justified proposals for new Actions, with reduced funding for all. Alternatively, only the most justified proposals could be given COST status. Whatever the outcome, it is clear that COST is at a crossroads, and the path taken will ultimately determine the further success of

this flourishing programme.

As for new requests for COST membership, the Committee of Senior Officials recently decided that each request for full COST membership will be examined individually, taking into account the programme's manageability as well as political, geographical and technical criteria.

In this context, the Institutes of Research of the countries requesting full membership will be encouraged to participate in individual Actions. This will allow a thorough evaluation of the mutual benefit likely to be derived prior to any decision being taken. □

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## Case study

**Advanced Materials for Industry**

**'Materials for Advanced Power Engineering 1994',  
a major conference held last October in Liège, illustrated the significant  
industrial relevance of COST materials research.**

The first COST activities in advanced materials date back to four Actions launched in 1972. Focusing mainly on gas turbine materials, they were succeeded by Action 501 in 1982, the Third Round of which was approved until 1996 last year. Since 1982 another 15 materials-oriented Actions have also been launched, ranging in scope from wood mechanics to ferro-electric ceramic thin films.

Action 501's overall objective is to develop better materials for Europe's power engineering industry, improving plant efficiency by raising operating temperatures, increasing reliability and improving design methodologies. By pooling industrial research across Europe it has made a major impact on European competitiveness in this vital field.

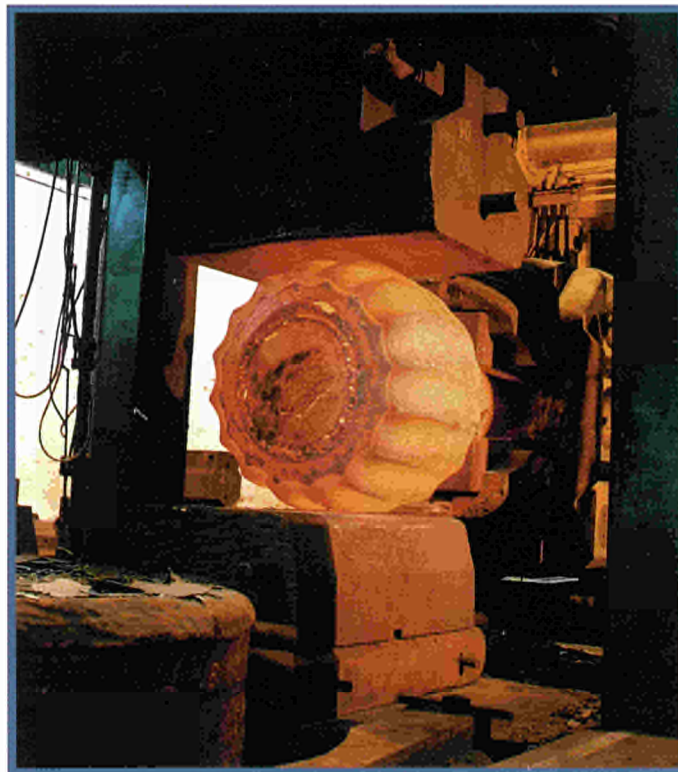
**Focusing on Industrial Needs**

The first Round of Action 501 focused on identifying key material requirements in technologies such as steam and aero-gas turbines, diesel engines, boilers and other heat exchangers used in non-nuclear energy production.

In Round II (1987-1992), Europe's power engineering industries worked together to draw up detailed, specific research goals based on their requirements, and now work closely together to direct the programme and evaluate the results. It was divided into eight Work Packages, each covering a component design, manufacturing or service problem. Two-thirds of the 204 participants were industrial companies. Taken together, Round II involved more than 550 staff years of research and development and cost 42 MECU.

The conference last October presented

the results from these Packages. It was the fifth in a series that stretches back to 1978, and included well over 150 papers and posters from participants from the EEA, Central and Eastern Europe, Japan, North America, the Middle East and India. In addition to the support of the COST Secretariat, it was co-sponsored by GEC-Alsthom Turbine Generators, who



**Cost 501 Rotor during forging**

have been involved in COST since 1972.

"Collaborating in this way has many advantages," notes Rod Vanstone of GEC-Alsthom. "By pooling our research with other turbine makers such as Siemens, ABB, MAN Energie and Parsons we end up with many more scientific results for the same expense. In addition, the project teams are vertically integrated, with power utilities - our customers - fully involved in the research. That means they really understand the new materials' properties, making it easier to bring results to the market."

GEC-Alsthom focused on Work Package 3 (Critical Components for Advanced Steam Cycles), which aimed to develop and evaluate the advanced steels required for more efficient, less polluting power stations. The steelmakers involved in the Action first made a number of samples of 'candidate materials', which the turbine manufacturers tested, circulating their results regularly. Academic laboratories, including the Institute of Advanced Materials of the EC's Joint Research Centre(1), were also involved. Full-scale forgings and castings of the most promising materials were then produced and further tests made.

**Results on the Market**

In a paper published in the 'Journal de Physique IV' one year ago, researchers from Swiss company ABB and the Institute of Advanced Materials wrote of the new materials: "Compared with the conventional CrMoV steel, creep test results show a major improvement. In addition, there is a clear tendency for the COST materials to show a flatter curve of creep life versus strength, indicating that long-term performance will be superior."

As a result, GEC-Alsthom are currently supplying their customers with better rotors based on these new materials. They are continuing their work into Round III, which focuses on materials for high efficiency, low emission systems. "We are funding all of our contribution ourselves, without any national support," Mr Vanstone notes. "That should speak volumes for the 'added value' that COST brings to our R&D."

(1) A 'case study' on the JRC's work in advanced materials appeared in issue 1/94.



► **EIMS REPORT**

**SPRINT  
IN BRIEF**

SPRINT (Strategic Programme for Innovation and Technology transfer) is an EC Programme designed to improve Europe's ability to innovate and transfer technology, both between business sectors and between Europe's different regions. It is an innovative and experimental programme composed of a number of actions and initiatives, and was covered extensively in issue 2/94.

**C o n t a c t**

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# Eastern Europe's Innovation Infrastructure

*SPRINT's European Innovation Monitoring System has recently published a 'Survey of the Innovation Infrastructure in Central and Eastern Europe'.*

One of the best ways of helping the struggling economies of Central and Eastern Europe is through scientific cooperation: helping to stem the brain drain, modernise their industries and encourage new ones.

However, one of the legacies of the Communist system was an institutional structure where product and process innovation were unnecessary, scientific and technological research were totally separated and the free exchange of ideas discouraged. As the new EIMS report notes: 'In seeking to move to a market system and compete with Western companies, Central and East European coun-

tries have inappropriate institutional structures for generating a high rate of innovation, and there are strong cultural barriers to innovation. Also, scientists are politically stronger than technologists and invariably exert more influence on policy makers.'

So there is more to developing these countries' industries than supporting scientific research - their innovation infrastructure must be encouraged. For this reason the EIMS survey sought to study the innovation infrastructure across all of Central and Eastern Europe (1), point to areas where future EU help might be beneficial and provide specific information on at least

some innovation actors in order to encourage contacts with equivalent organisations in EU member states.

The survey thus forms a baseline from which these countries can develop action programmes which fully reflect the needs of their business communities and innovation support agencies.

The first stage of the survey gathered existing sources of information on organisations within each country's innovation infrastructure. This was updated with contacts 'on the ground', leading to a postal survey of a large number of organisations and face to face interviews with a smaller group.

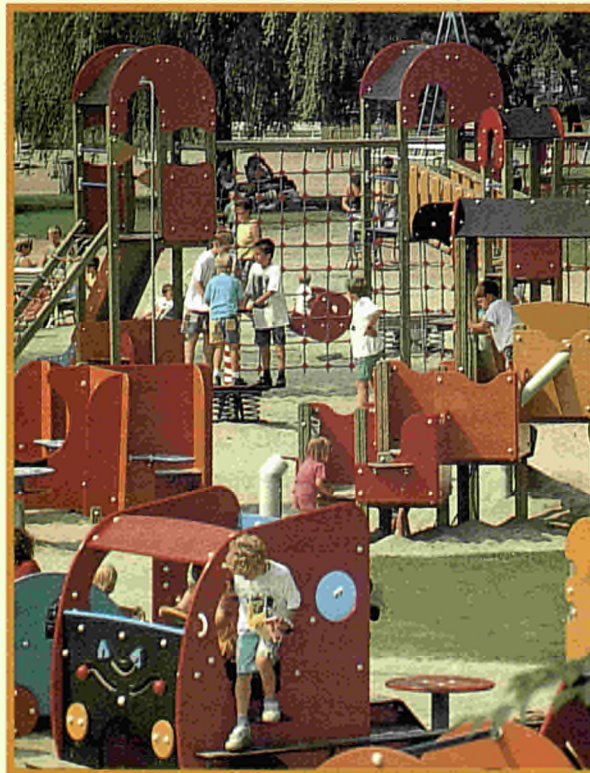
'The quality and clarity of the responses to the postal survey were very high,' the report notes. "This reflects the high level of interest of many organisations in Central and Eastern Europe in making contacts with the EU and their willingness to invest effort to establish such contacts."

Over 170 face to face consultations were carried out from June to August this year in all the countries surveyed bar Albania and Slovenia. The responses have been summarised into twelve 'country profiles', which form a major part (130 pages) of the report.

**Common Themes**

In addition, the report identifies a number of common themes:

■ **Main Issues in Technology Transfer:** a 'funding gap' exists between technology suppliers and users; the lack of knowledge and experience in technology transfer are particularly acute in areas such as managing patent portfolios, li-



*Danish company Kompan's range of innovative, stimulating playground equipment won them an EC Design Prize earlier this year. «Humanity is clearly the guiding concept in this company», the jury agreed.*



censing technology or market evaluations of technology; in most cases, technology transfer is low on the political agenda; for some countries there is a very low demand for technology transfer.

■ **Existing Technology Providers:** Although the survey methods tended to select 'healthy' technology-oriented organisations, these organisations were still losing staff through redundancies or brain drain; there has been a distinct shift away from research towards production, education, training and technology transfer activities; the applied research institutes face an uncertain future, with most struggling now that they are fully exposed to market forces; the institutes of the various academies of science are generally in better condition, and are often being restructured on the basis of performance; universities are struggling for funds, but initiatives are being introduced to boost university research.

■ **Public Bodies Related to Technology Transfer:** the most relevant public body varies with the country, and is usually either the Ministry of Economics or the Ministry of Science and Education; in many cases there are low-level funding initiatives for technology transfer; in most countries there is a significant policy bias towards science rather than technology.

■ **Emerging Organisations:** in many countries, low salaries and redundancy are driving staff from universities and institutes to set up small technology-oriented firms, in many cases within the walls of their parent organisations, usually without official support and sometimes without legitimate existence; technical consultancy firms have been set up in some countries, but often need significant non-technology business to survive; science parks and technology parks are well established in some countries (e.g. Hungary and Estonia), but usually struggle to make an impact. ■

(1) Albania, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia and Russia.

► **CASE STUDY: RTO NETWORKS**

# Glass Manufacturing: A Sound Method

*The partners in one of SPRINT's RTO Networks are developing and transferring new measurement technology to Europe's glass industry.*



**Temperatures in the glass furnace can reach well over 1500°C.**

**A**n RTO Network facilitates cooperation and exchanges between Research and Technology Organisations (any organisation which provides technology-related services) and/or the dissemination of specific technologies.

In Network 319, for example, Europe's four largest glass technology institutes - Hüttentechnische Vereinigung der Deutschen Glasindustrie (Germany), TNO Institute of Applied Physics (the Netherlands), Stazione Sperimentale del Vetro (Italy) and British Glass (UK) - focused on improving the production efficiency of glass furnaces. The resulting technology may be commercialised in the future.

**Spotting Corrosion with Sound**

"Glass manufacturing requires heating the glass in a furnace to around 1,450°C," explains Mr A. Faber of the TNO. "The molten glass cor-

rodes the refractory bricks of the furnace's inner wall, so operators have to rebuild their furnaces every 5-10 years. The problem is that they never know exactly when."

While ensuring that molten glass does not break through the wall is crucial, furnace relining costs millions of ECUs, so it should be done only when the bricks are near the end of their lifetime. Determining their thickness can be accomplished by visual inspection, measuring outer wall temperature and thermography, where an infrared camera finds 'hot spots' in the outer wall.

"Visual inspection is very accurate, but you need to shut down production and drain the tank," Mr Faber continues. "The other methods are used during operation. External temperature measurement, however, is very dependent on the technicians' experience, and thermography is inaccurate. A method for accurately measuring refrac-

tory wall thickness from outside the furnace is needed."

In the partners' new system, two ultrasonic transducers are attached to the furnace outer wall and a portable PC. One fires a pulse of sound energy into the wall, which is reflected at the interface with the molten glass and picked up by the second. The time interval between transmission and reception provides the refractory wall thickness.

All four research institutes were tackling this problem independently, and formed a SPRINT network because "most of the work involves testing and transferring the technology to users. SPRINT was therefore the most suitable programme."

**Extensive Industrial Trials**

Not that it was simply a matter of adapting a fishing sonar. Furnace walls are around 500°C, ●●●

Photo: courtesy TNO, Netherlands.



●●● so a quartz buffer and high temperature coupling media had to be developed to protect the transducers. The speed of sound through different refractory bricks also had to be determined.

The first phase of the project, launched in 1991, was confined to the partners' laboratories. The second phase, which was recently extended to mid-1995, involves extensive industrial trials at glass manufacturers in all four countries. "We need to finish refining the equipment and calculation methods," Mr Faber explains. "Wherever possible we perform tests on furnaces due to be dismantled soon afterwards, allowing us to check our predictions."

Preliminary results suggest consistent accuracy of around 10%. "Figures for other methods are hard to determine," Mr Faber says, "but I would estimate that thermography measurements have an uncertainty of 30-50%."

This improvement could help add years to each refractory wall, increasing manufacturing competitiveness significantly. Presently, the method's applicability is limited mainly by the accessibility of and cracks in the furnace wall. These factors can be overcome by slight modifications in furnace construction and more careful operation.

"The project has demonstrated the system's potential to the companies, who are very interested," Mr Faber concludes. "This proven market demand will make it easier to commercialise our results, in partnership with a private acoustic firm. Compared to the total project cost - both SPRINT and ourselves each contributed around 150,000 ECU - the benefits are outstanding." □

## ► TECHNOLOGY TRANSFER THEORY

# Staff Mobility in Technology Transfer

*The role played by 'researcher mobility' is becoming increasingly recognised as crucial to the successful transfer of technology. National schemes already exist, and SPRINT may be launching a transnational initiative in the near future.*

Recent developments in our understanding of the innovation process and the role and nature of knowledge have led to a new model of the innovation process. This 'interactive' or 'system' model stresses the importance of the interaction between the different stages and actors in the innovation process.

Innovation is driven by the combination of new knowledge with skills and experience. The knowledge is transferred from both internal and external sources of information, and can take one of two forms: codified or tacit. The former is contained in equipment, instruments and materials, or is available as data or written documents. Either way, it is not tied to any one particular person.

### SMEs: Particular Needs

Tacit information - the accumulated knowledge and experience of individuals - is of greater importance to the innovation process. SPRINT organised a successful workshop on tacit knowledge last year, because tacit information is important to all sorts of companies, particularly SMEs.

These companies usually have a weak knowledge base and a limited ability to exploit codified information. They also lack the financial resources to establish proper technology search and transfer mechanisms, tending instead to rely heavily on informal communication channels and information sources.

Studies of university-SME collaborations, for example, have shown that considerable problems arise

because of the conceptual and cultural differences between the two types of organisation. For this reason university-SME collaborations have made only marginal contributions to the overall level of the university-industry relationship and in transferring technology to SMEs.

Educational programmes can go some way towards strengthening a firm's knowledge base, but are not themselves sufficient. Another idea, currently being developed in a number of national pilot projects across Europe, is to support the transfer of a researcher to the company for a limited period. Usually, young researchers are placed in SMEs for a number of months, although some countries exploit the talents of experienced - often retired - researchers or managers.

These schemes satisfy several needs. The researchers bring to the companies not only their expertise in the relevant technologies, but also their list of formal and informal contacts. They can also increase the companies' ability to exploit codified information. In return, the younger researchers acquire experience in the private sector, increasing the likelihood of more successful technology transfer in the future.

### Towards Transnational Mobility

If these schemes could be linked together across Europe, a transnational dimension could be introduced, encouraging researcher mobility throughout the EU.

This could have significant consequences on European industry's competitiveness. The mobility of

research personnel, particularly between the public and private sector, is lower in Europe than in the US, and it has been argued that this is one of the reasons explaining the difficulties European companies face in commercialising their research results.

It should be noted, however, that in Japan this mobility is even lower than in Europe. On the other hand, the mobility within Japanese companies is very high, leading to extremely active informal networks between researchers. This may compensate the negative impact of Japan's tradition of life-long employment, which, in any case, looks increasingly likely to be abandoned in the future.

The whole question of human capital mobility in Europe is becoming more and more important - Activity 4 of the Fourth Framework Programme, for example, is entitled 'Training and Mobility of Researchers', and aims to further develop Europe's scientific resources by developing advanced training in centres of excellence throughout the Member States. A complementary programme focusing on technology transfer may well bring added benefits. □

## Contact

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■ John Kyrtoudis,  
SPRINT TAU



► **INDUSTRIAL TECHNOLOGIES**

# Preparing for the Future

*Held just days before the first Call for Proposals for the new Specific Programmes on Industrial and Material Technologies and Standards, Measurement and Testing, a major conference will focus on the results already obtained in these fields and industry's future research needs.*

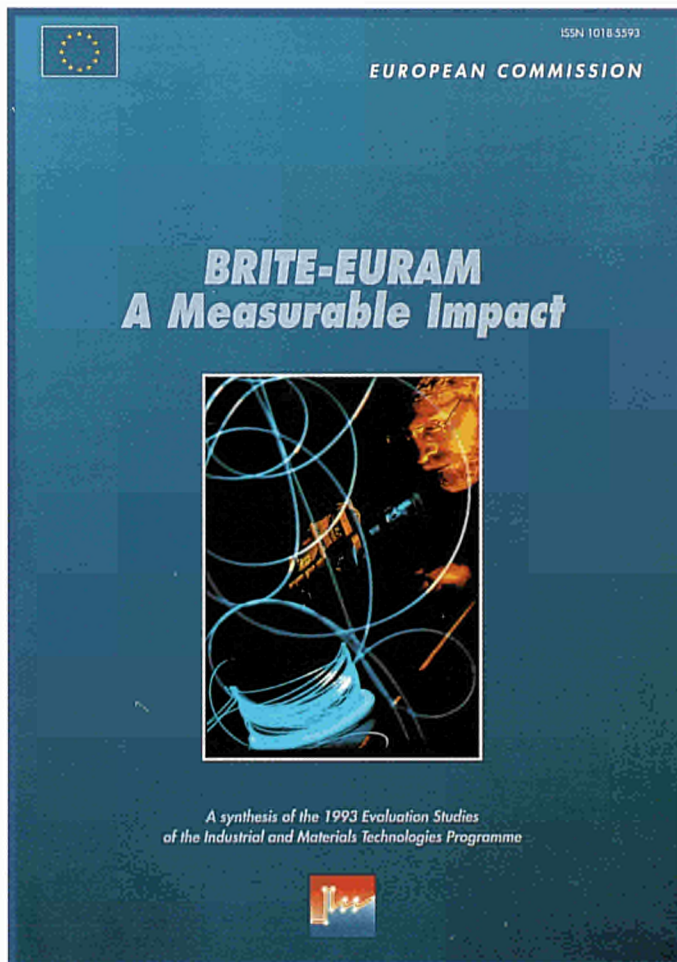
These Specific Programmes were some of the first to be adopted by the European Parliament and Council. In fact, on September 15 the European Commission was able to issue a 'preliminary notice' of the upcoming Call for Proposals, in order to give potential participants as much time to prepare as possible.

The actual Call for Proposals for both Programmes will be published on December 15. Provisional Information Packs for Industrial and Material Technologies became available in English, French and German in mid October, with other language versions on the way. In addition, the same information has been available over the ARCADE system - a telematics network designed to speed access to the Programme (see issue 2/94) - since October 15.

## Success Stories

Information Packs for Standards, Measurement and Testing will be available at the 5th Conference on Industrial Technologies, to be held on December 6-8. It will be opened by Commissioner Ruberti (responsible for Science, Research and Development). The first round table session will cover the role of SMEs in industrial R&D, managing technology for industrial innovation, the industrial needs of pre-normative research and the banking sector's view of investing in innovation.

For most of the next day, attendees will study the exploitation of successful RTD projects, presented in five sessions dealing with Materials Research, the CRAFT initiative, Design and Manufacturing Technologies, Measurement and Testing and Steel Research. A sixth session will cover evaluations of the BRITE-EURAM, Measure-



*Recent studies have stressed the significance of the economic and technological impact of previous BRITE-EURAM Programmes.*

ment & Testing and Steel R&D Programmes, as well as the overall impact of European R&D.

## Perspectives for the Future

The second day will end with an overview of Industrial Technologies R&D in the 4th Framework Programme, with general presentations by the managers of the specific programmes. The future will be examined in much greater detail on the last day, during which six thematic sessions will examine:

- Research for the industry of the

future: research needs for the construction industry and for sustainable technologies in the chemical industry;

- Industrial research for product innovation: materials and design research and the integration of new technologies in designing complex industrial systems;

- Inter-programme coordination, especially around transport policies;

- Prenormative research;

- RTD by and for SMEs: two SMEs will present their needs, expectations and difficulties;

- Networks and initiatives asso-

ciated with the programmes (training, EUREKA, etc).

A final round table will officially end the conference in the afternoon.

A number of events will also be run parallel to the Conference:

- Proposers' Forum: to help potential project participants both examine the Expressions of Interest currently on the Programme's telematic system (ARCADE), and to place their own;

- Exhibition: Projects will be presented via demonstration stands (around 20 projects), in poster form (200) and in an audiovisual production;

- Meetings between project proposers and Scientific Officers, which will continue on into the morning of December 9;

- A multimedia CD-ROM, containing text, pictures and videos on the programmes, projects, results and publications of all DGXII-C programmes (i.e. Industrial and Materials Technologies, Measurement and Testing, CRAFT & Steel Research) has been developed and will be demonstrated at the conference. □

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## ► INFORMATION SERVICES

# Developing Europe's Information Infrastructure

*A wide range of initiatives designed to stimulate and develop Europe's information services industry have been very active over the past 6 months.*

As part of the preparatory activities for 'Information Engineering' within the Fourth Framework Programme, the European Commission (DG XIII-E) issued a Call for Proposals last March. They received more than 400 proposals for exploratory R&D actions in multimedia publishing, involving over 1,600 companies. As a result, 22 projects were selected and launched in October, ranging in scope from electronic newspapers and magazines to asset trading.

In addition, DG XIII-E is currently studying proposals for two studies, which are likely to present their results next year. They assess and forecast the development of technologies relevant to multimedia publishing and information engineering, and investigate the opportunities, problems and priorities in corporate publishing systems.

## GIS Projects Under way

Another programme in this field is

IMPACT. Unlike DG XIII's R&D-oriented work, however, IMPACT is market-driven, and promotes existing technologies in applications designed to stimulate the pan-European market for electronic information services.

Among other activities, IMPACT is actively promoting information services based on Geographic Information Systems (GIS), which combine geographic data with digital maps to support decisions in fields as diverse as environmental surveillance and transport management.

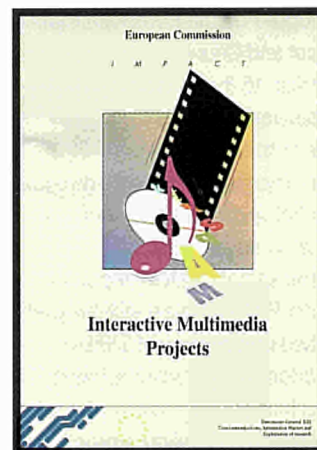
The first Call for Proposals two years ago resulted in 28 definition phase projects, eight of which were recently selected for implementation. They include an interactive directory of conventional maps and digital data for Western Europe, a multimedia GIS for elementary-level environmental education, information on European coastal and offshore waters and a GIS for visitors to cities, providing points of interest and an integrated information system on the city's transport structure.

In addition, IMPACT has supported the creation of the European Umbrella organisation for GIS (EU-ROGI), which held its first general assembly last May to adopt its work plan.

## Current Call: Pilot Projects

IMPACT's latest Call for Proposals, published in September, is for pilot projects providing high quality information for trade and industry across Europe.

The scope of the proposed information services should ultimately cover both EU and EFTA countries, reinforcing the concept of the EEA as the 'home market' for European businesses, partic-



*This recently released information pack describes the IMPACT programme, concepts such as multimedia and interactivity and the 22 IMPACT multimedia projects. Issues relating to production, technology and marketing are also discussed.*

ularly SMEs. The information should be up to date, high quality and reliable.

It should also be easily accessible, making electronic information an integral part of the users' normal environment. This requires, among other features, that the service not be dependent on one delivery channel - the more technologies it is compatible with (satellite, cable, mobile telephony, etc) the better. The projects should be under way by Spring 1995. □

**C** o n t a c t  
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**Fax: +352 4301 32847**

## I'M-EUROPE ON INTERNET



*The 'Home Page' for I'M-Europe on the World Wide Web.*

With IMPACT's I'M-EUROPE World Wide Web (WWW) Server placed on the Internet, 25 million people worldwide now have access to:

- information on the European information market, EC programmes in this domain and the IMPACT Programme, together with the latest Calls for Proposals;
- the full texts of key EC documents in hypertext format;
- on-line partner search for IMPACT-funded projects;
- the 20 databases available on

ECHO, including all CORDIS databases, detailed descriptions of their content and structure, and tutorials in ECHO's CCL database query language.

WWW integrates hypermedia and networked information retrieval technologies to create a global, dynamic information system, so that clicking a 'hypertext link' in any one electronic document may take the user to another, related document on a computer on the other side of the world. It can also support multimedia.



## ► CONFERENCES



For details of this major conference, see Programme Briefing.

### **CLEAN COAL TECHNOLOGY** **28-29 November 1994** **Lisbon (Portugal)**

DG XII will present the final results of the APAS Clean Coal Technology Programme. The conference will examine the programme and the combined use of biomass or other wastes with coal to produce environmentally friendly energy.

**Contact:** Mr. J. Bemtgen, European Commission, Brussels

**Tel:** +32 2 296 2071; **Fax:** +32 2 296 4288

### **TRANSTECH INTERNATIONAL** **1-2 December 1994** **Cardiff (UK)**

Held in the Welsh capital's International Arena, the two day technology transfer event is designed to create new business opportunities by bringing together researchers and industrial developers from around the UK, Europe and beyond. Organised by the Technol-

ogy Marketing Group of the Welsh Development Agency, the event is partly funded by the EC's STRIDE (Science and Technology for Regional Innovation and Development) Programme, which will focus on technological opportunities for SMEs and present case studies.

The programme features a series of specialist workshops and seminars on specific subjects ranging from process engineering to patents, licensing and technology funding. TransTech International will also host a number of complementary events, such as a gathering of medical companies from France, Spain, Denmark and Wales supported by the EC's Medical Interprise Initiative and the annual meeting of the UK Academic Industry Links Organisation. There will be a major exhibition, with around 200 displays.

**Contact:** TransTech International

**Tel:** +44 352 750 723; **Fax:** +44 352 752 633



## ► COMMUNICATIONS

### **I. IMPLEMENTING EUROPEAN TELECOMMUNICATIONS LAW** **21-22 November 1994, Brussels (Belgium)**

Organised by DG XIII, the conference will provide participants with the opportunity to learn how existing European telecommunications legislation is being applied in the Member States and to express views directly to those responsible for the legislation's supervision and enforcement. Speakers will include senior representatives from the European Commission, national regulatory authorities, telecom operators and manufacturers, service providers, consumers and law firms.

The programme will cover existing telecommunications measures, opening the terminal equipment market, liberalising services, opening the networks, competition and cooperation in the services field, procuring equipment and services, and areas for future EU action.

**Contact:** CMP International Conferences,

**Tel:** +33 1 49 52 33 00; **Fax:** +33 1 49 52 33 00 22

### **II. TELEMATICS FOR EDUCATION AND TRAINING** **24-26 November 1994** **Dusseldorf Neuss (Germany)**

An official event of the German European Union Presidency, and organised by the German Ministry of Research and Technology (BMFT), the conference theme will be "Shaping the new information and knowledge society".

The conference will present the results of projects on the use of telematics for open and distance learning supported by the DELTA programme (flexible and distance learning), and include discussions on telematics for education and training under the Fourth Framework Programme and in the broader context of Community initiatives in this area. There will be plenary sessions with keynote speakers, practical demonstration and workshops.

**Contact:** Ms. Gabriella Schmotz, German Telekom

**Tel:** +49 731 1001811; **Fax:** +49 731 32626

### **III. TRANSPORT TELEMATICS AND INTELLIGENT VEHICLE-HIGHWAY SYSTEMS** **30 November - 3 December 1994** **Paris (France)**

The First World Congress on Applications of Transport Telematics and Intelligent Vehicle-Highway Systems is being co-sponsored by ERTICO (Europe), IVHS America (North America) and VERTAS (Pacific Rim). The Congress will present and discuss advanced concepts and development activities, as well as hosting a major international exhibition of new equipment and systems.

The executive session will cover, among other topics, the need to improve transport systems, applying and financing the development of advanced transport telematics (ATT) and intelligent vehicle-highway systems (IVHS), industry's and operator's policy priorities, the legal and social implications, ATT market development, and more.

The technical sessions will focus on applications and technology developments, test and evaluation results, as well as institutional, legal, safety and market issues. The Advanced Transport Telematics programme (DRIVE) of the European Commission is sponsoring a major part of the technical sessions, where the results of its 65 projects will be presented.

**Contact:** Ms. Zoe Ketselidou, European Commission, Brussels

**Tel:** +32 2 296 3431; **Fax:** +32 2 296 2391

### **IV. HEALTH IN THE NEW COMMUNICATIONS AGE** **6-10 December, 1994, Lisbon (Portugal)**

Organised by DG XIII in conjunction with the Health Ministry of Portugal (IGIF), the conference is intended for health professionals, administrators and decision makers, allowing them to anticipate how they can benefit from the new communications technologies and how they can influence the shape of new services.

Organisational and socio-economic issues will also be discussed. European activities such as multimedia patient records and 'telematics' applications will be presented. An exhibition with live demonstrations of potential applications will give users an opportunity to meet industrial manufacturers.

**Contact:** Ms. Maria Laires, Health Telematics Central Office

**Tel:** +32 2 296 3545; **Fax:** +32 2 296 0181



## TRANS-ATLANTIC INNOVATION CONFERENCE

6-7 December 1994  
Lisbon (Portugal)

Co-organised by Portuguese VRC Agência de Inovação and the Luso-American Development Foundation, the event will consist of around 10 invited presentations from the private sector, universities, national administrations and the European Commission. Some speakers will be from the US.

They will survey and discuss promoting innovation and technology transfer, strategic alliances, innovation financing, intellectual property, university-industry relationships and the role of innovation consultants and contract research.

Contact: Mr P. T. de Castro,  
Agência de Inovação  
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Fax: +351 2 610 3361

## EUROPEAN WORKSHOPS ON ECO PRODUCTS

19-20 January 1995  
Dublin (Ireland)

Organised by the European Foundation for the Improvement of Living and Working Conditions, this conference will present the results of several of the Foundation's projects into developing new policies, methodologies and practical tools for a more sustainable future.

The workshops will include industrial and graphic designers, representatives of the European Commission and Parliament, employers' organisations, trade unions and governments.

Contact: Ms. L. Mastenbroek  
Tel: +353 1 282 6888  
Fax: +353 1 282 6456

## PUBLICATIONS



*This 4-page brochure (EUR 15913) summarises the results of 'Assessment and evaluation of financial returns in ECSC - Steel research programmes (1981-1990)', published in June this year.*

### RESEARCH AND TECHNOLOGY MANAGEMENT IN ENTERPRISES: ISSUES FOR COMMUNITY POLICY

The 2-year SAST (Strategic Analyses in Science and Technology) Project No. 8 produced 12 reports. Ten are Case Studies, covering both geographical areas (Portugal, England, the Wallonie-Limburg-Aachen 'Euroregion', etc) and industrial sectors (mechanical engineering, software, chemical engineering, food industries in less favoured regions, etc). Ranging in price from 7 to 16.5 ECU, they provide a detailed analysis of the structure and technology management practice of the region/sector.

Enterprises of various sizes are surveyed and threats and opportunities identified.

In addition, there is a 109 page Overall Strategic Review (EUR 15438 EN, 11.5 ECU), which draws general conclusions, discusses technology management from both sectoral and regional perspectives, and identifies key issues. Its final section on policy recommendations considers the broad implications for existing Community policies, outlines new policy measures and further research requirements, and suggests priorities.

Lastly, the 'Conceptual Framework and Technical Guidelines' (EUR 15426 EN, ECU 23) concerns those aspects of management associated with the procurement of technology, with research, development, adaptation and accommodation of technologies in the enterprise, and with the exploitation of technologies for the production of goods and services.

Contact: Anne de Greef,  
EC (DG XII/A), Brussels  
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Fax: +32 2 296 4299

### INDICATORS OF THE SCIENTIFIC BASE OF EUROPEAN PATENTS

EUR 15330 EN, 11.50 ECU  
The aim of this study was to assess the extent to which scientific advances by scientists receiving support from European Commission research programmes are important for the advance of technology. The analysis was

## NOTE

If specific contact information for obtaining a publication is not supplied, refer to the 'Quick Reference Guide' (ITT issue 1/94). Publications are free unless otherwise stated.

performed on the basis of patents at the European Patent Office and the US Patent and Trademark Office in the fields of the Biomolecular Engineering Programme (BEP), the Biotechnology Action Programme (BAP) and the ESPRIT programmes.

### BIOFUELS

EUR 15647 EN  
'Biofuels: Application of Biologically Derived Products as Fuels or Additives in Combustion Engines' provides a comprehensive review of the current state of the art with regard to the production and use of biofuels and to establish potential needs in RTD and technology transfer.

The technical applications of existing gaseous biofuels are considered and the potential benefits of using biological commodities as energy sources are discussed. The positive and negative environmental impacts stemming from the production and use of biofuels are analysed and an economic analysis of market issues related to energy and fossil fuels is presented.

Contact: European Commission,  
DG XII/E-2,  
200 Rue de la Loi,  
B-1049 Bruxelles.

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