

Innovation & Technology Transfer

5/94

EUREKA: MARKET-ORIENTED R&D

+ VALUE NEWS • SPRINT NEWS • CONCERTED ACTION CASE STUDY
• EUROPEAN IT CONFERENCE • AND MORE



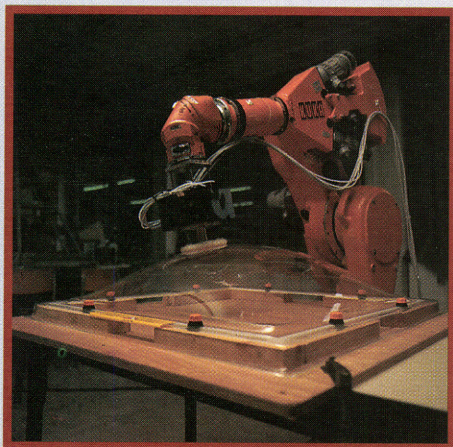
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INNOVATION & TECHNOLOGY TRANSFER

Newsletter published by the
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Telecommunications, Information Market and
Exploitation of Research

DIRECTORATE XIII-D

Dissemination and Exploitation of RTD Results,
Technology Transfer and Innovation

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European Networks

Once again, this issue kicks off with information technology.

As the report of the Bangemann group on Europe and the global information society points out, information and communication technologies are bringing about an industrial revolution as important as those of the past, and with similar opportunities and dangers (see article on facing page).

The report charts the way forward with an Action Plan for the European Union and the Member States. The accent is on market mechanisms and the private sector as the driving force. No extra public money is needed, but the report does state that existing public funding should be refocused. Some re-allocations may be required under the Fourth Framework Programme, for example.

Elsewhere in this issue we look at an example of how a relatively small amount of financial support can help build a really effective Europe-wide research network, where before there were unconnected, uncoordinated research groups. The example is research on magnets, the subject of a 'Concerted European Action' (see pages 20-21). A moment's reflection on the ubiquity of magnets in modern life is enough to show the scope for innovative magnetic materials and manufacturing processing. As the article explains, magnets are indeed a strategic resource, and after almost ten years of research networking, European researchers and companies have improved their position significantly.

Other articles report on the European Parliament's research committee, following the elections for the European Parliament in June, and on the continuing process within the European Commission to simplify the procedures for getting involved in the Specific Programmes of the Fourth Framework Programme.

Lastly, this issue's Dossier focuses on EUREKA, the pan-European collaborative research programme which complements other research programmes, including COST and the Framework Programme, by concentrating on product-oriented, 'near market' research. As such it provides an excellent channel for exploiting the results of EC-supported projects. Launched in 1985, EUREKA now counts 22 European countries and the European Commission as members, and has a total portfolio of over 800 projects - finished and underway - worth an estimated investment of 15 billion ECU by both the public and private sector. ■

► UPDATE: TRANS-EUROPEAN NETWORKS

Europe and the Global Information Society

Whether we like it or not, the "Information Society" is on the way, according to the report Commissioner Bangemann presented to the European Council in Corfu last June.

The report, "Europe and the global information society" (1), was prepared by Commissioner Bangemann and a group of high-level experts as a follow-up to the White Paper on Growth, Competitiveness and Employment (see issue 3/94 of Innovation & Technology Transfer).

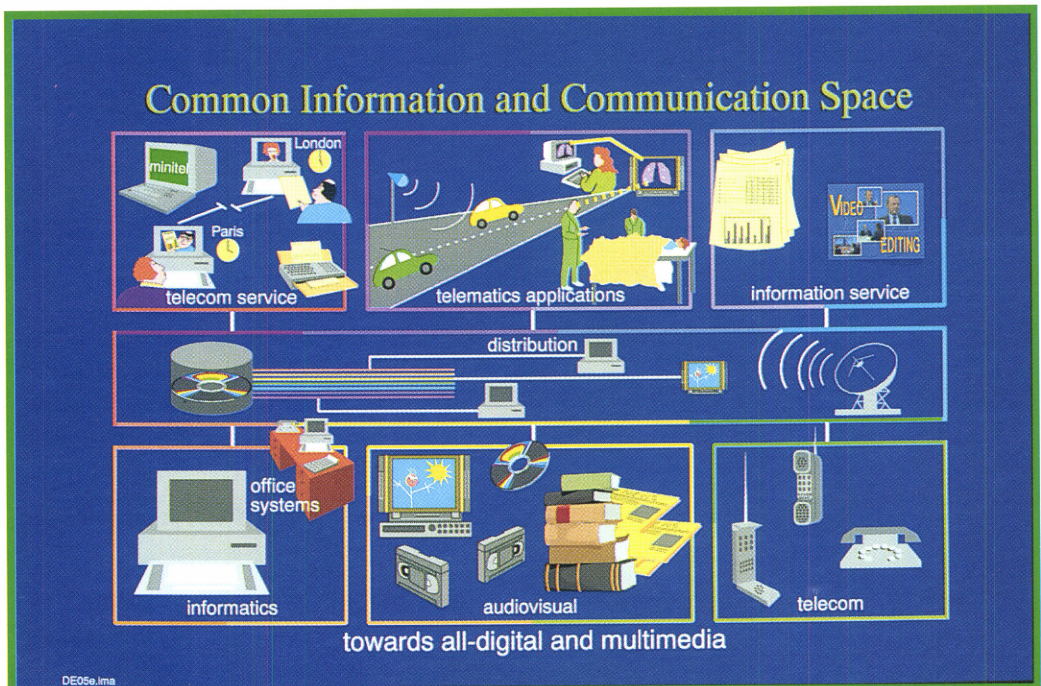
According to the report, the dawning of the information age is likely to cause a social and economic upheaval comparable in scope to that caused by the Industrial Revolution in the 19th century. While it represents a major challenge, it also represents an unprecedented opportunity for economic progress and job-creation in Europe.

Opportunities and Pitfalls

The report identifies an enormous range of benefits springing from the establishment of a trans-European information infrastructure, including new jobs, reduced isolation for peripheral regions, improved health care through tele-diagnosis and easier access to markets for innovative enterprises. For European companies, tele-conferencing will reduce travel costs, database access will improve their grip on their markets, while link-ups with universities and research centres will smooth the transfer of knowledge.

High on the report's list of priorities is the need to ensure fair access to the infrastructure and guarantee the provision of universal service. "Europe must not", the group stresses, "create a two-tier society of have and have-nots."

The European Union must act quickly. The information revolution is already well under way in the US,



Europe's future information infrastructure will pave the way for a wide range of new applications and, indeed, industries.

where 60% of all households are linked by cable network to a range of TV-based services, including text and information transmission. Europe's average figure is only 25%. "Competitive suppliers of networks and services from outside Europe are increasingly active in our markets," the report warns.

Key Words

The three key words in the report's plan of action are liberalisation, deregulation and privatisation. "Monopolistic, anti-competitive environments are the real roadblocks" on the way to an information society. A new regulatory framework allowing full competition is essential if Europe is to play a leading role in the emerging markets. Competition rules ought to view the market from a global rather than a purely European perspective, and should be worded so as

to allow operators to forge alliances and joint ventures.

The report calls for the urgent implementation of "rules of the game." It urges the Union "to establish a common and agreed regulatory framework for the protection of intellectual property rights, privacy and security of information in Europe and, where appropriate, internationally."

The report also calls for rules on access licenses for the networks, on radio-frequency allocation, guidelines for ensuring interconnectability and interoperability and the establishment of rapid procedures for settling disputes.

Trailblazing Projects

As regards outside access to European services and networks, the report wants to see the criterion of reciprocity established, while at

home it recommends that all licensed operators shoulder their fair share of public service obligations.

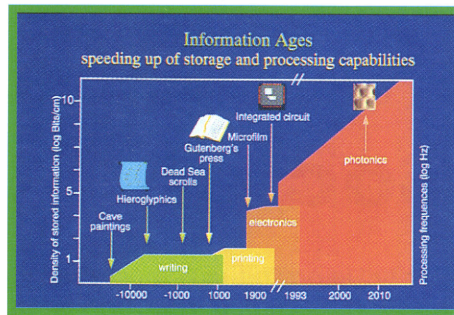
To stimulate demand, the group suggests launching a series of demonstration projects for these new services. The report identifies ten applications for "blazing the trail": tele-working, distance-learning, networking by universities and research centres, telematics networks for SMEs, advanced road-traffic management, air-traffic control, healthcare networks, electronic tendering for public procurement, trans-European public administration networks and city information highways.

Although the report says that considerable investment will be required to jump-start the information society, they are confident that the necessary private capital will be forthcoming, so long as the market is fully open to

●●● competition and functions in an orderly manner.

Action Plan

The European Council noted the findings of the Bangemann group and decided that a permanent co-ordination instrument, made up of ministerial-level representatives from each Member State, should be set up to ensure that the various public and private parties involved co-operate. The European Council invited the Council of Ministers and the European Parliament to adopt measures in the areas covered by existing proposals before the end of the year, and also invited the Commission to establish a pro-



gramme covering the remaining measures needed at the Community level. It will assess progress at its meeting in Essen this December.

In mid-July the European Commission adopted a communication called "Towards an Information Society in Europe: Plan of Action", in

which the Commission sets out a number of measures and a timetable for the establishment of the information society. According to the communication, an outline of the proposed approach to the liberalisation of infrastructures as well as green papers on infrastructures,

media ownership and intellectual property can be expected before the end of the year.

Also coming soon is a conference of the relevant G-7 ministers to discuss the development of an open, competitive and integrated world information infrastructure, an updated Open Network Provision framework and an "Information Society Project Office" in the European Commission. □

On a rising curve: Information storage and processing technologies are improving exponentially.

(1) The full text of the report is available as a special supplement to *CORDIS focus*, available from the RTD Help Desk, Luxembourg (Tel: +352 4301 33161; Fax: +352 4301 32084).

► EUROPEAN PARLIAMENT

Research and the European Parliament

On July 27 the European Parliament's Committee on Research, Technological Development and Energy (formerly the CERT Committee) held its first meeting following the recent European Parliamentary elections.

The Committee plays a key role in translating the European Commission's proposals for European research programmes into actual legislation in a wide range of issues, including energy policy, European technological research and development, biotechnology, the Joint Research Centre and information technology.

The Committee examines each programme proposed by the European Commission, carries out its own investigations and suggests amendments when they present the proposed legislation to the plenary session of the European parliament. Once the plenary session has approved a programme or proposal it is sent to the Council of Ministers, who can either adopt it or reject it, without modification. Hence the Committee's impact on European R&D Programmes is considerable.

Past Priorities

Three priorities dominated the Committee's work during its last term: the 'Maastricht Treaty' revision process, the internal energy market and the Community's RTD activities. For example, the Committee was behind the development of the new co-decision procedure, which makes for much swifter decision-making between the European Commission, Parliament and Council. The Fourth Framework Programme, adopted earlier this year, was the first piece of legislation to pass through in this way - 12 months faster than the Third Framework Programme.

The co-decision procedure also allowed greater influence on programme content, so several trends within the Fourth Framework Programme are broadly in line with those proposed by the Parliament. These include the emphasis on re-

newable and non-nuclear sources of energy, disseminating research results, health and safety at work, cooperation with third countries and research into the effects of major accidents in Central and Eastern Europe and the former Soviet Union. Through Parliament's insistence, the Specific Programmes are no longer solely concerned with improving European competitiveness, but are aimed at improving the quality of life for the inhabitants of Europe.

The Committee has closely followed certain other R&D sectors, such as the coal and steel sector, aeronautics, aerospace, information technologies and biotechnology, and helped to create the STOA (Scientific and Technological Options Assessment) unit within DG IV.

Lastly, the Committee has suggested a merger of the three Treaties which cover research, devel-

opment and energy (i.e. the Treaties for the European Coal and Steel Community, the European Community and the European Atomic Energy Community, or EURATOM). It has presented the case for a separate treaty for energy, proposing a measure of harmonization and an upgrading for each Treaty's Parliamentary procedures in the energy and research sectors. These ideas did not come to fruition within last year's Treaty on European Union, but they will be reviewed at the intergovernmental conference in 1996.

The New Committee

Although the dust created by the recent European parliamentary elections has not yet settled, the 23-member Committee appears likely to break down in political terms similarly to the last one. The

July meeting focused on re-electing Mr Claude Desama (European Socialist Party) as the new chairman and on setting the agenda for future meetings.

Before its mandate ended, the previous Committee made a considerable effort to adopt and pass to the Council of Ministers 12 of the 20 Specific Programmes of the Fourth Framework Programme. The remaining 8 Programmes therefore formed the bulk of the new Committee's agenda at its second meeting on 29 August 1994, and may be ready for the Council meeting of September 29:

- Environment and climate;
- Biotechnology;
- Biomedicine and health;
- Nuclear fission safety;
- Controlled thermonuclear fusion;
- Transport;
- Training and mobility;
- Specific programme to be implemented by the JRC under Euratom.

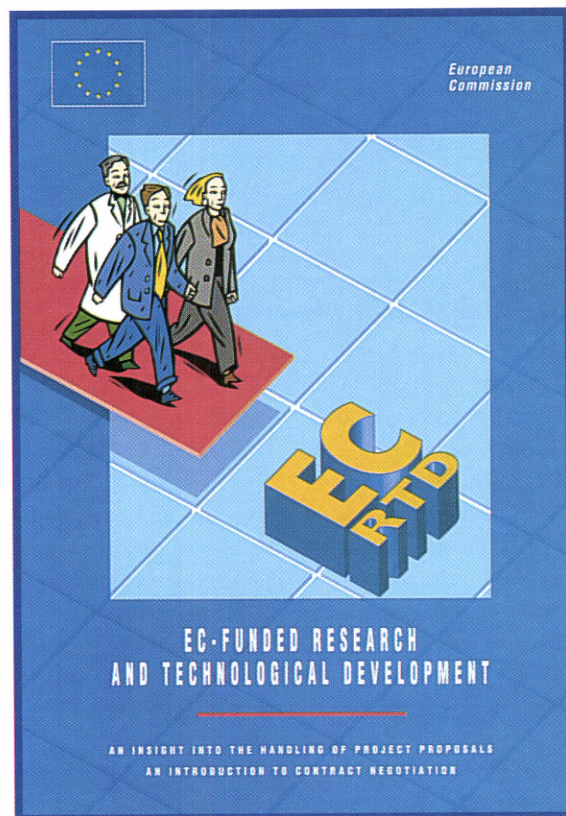
Other agenda items included the rules for the diffusion of research results, trans-European networks for the energy sector and financial support for the promotion of energy technologies in Europe (THERMIE II).

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► **SMEs**

Clearer Communication, Simpler Procedures

Accessing and exploiting the Specific Programmes will be easier for everyone, particularly SMEs, thanks to a drive towards simpler forms, harmonised procedures and transparent decision making.



First of the management manuals: 'EC-Funded Research and Technological Development' (EUR 15462).

The fast growth of the various EC RTD Programmes created a plethora of different procedures, with each Specific Programme having its own system for project proposal, selection and funding. A number of initiatives have already been introduced to make getting information and proposing projects a simpler process. To begin with, the Calls for Proposals for all Specific Programmes are now only issued on four days of the year: the 15th of March, June, September and December.

In addition, 'EC Funded Research and Technological Development' was published in January this year. The first of three 'management manuals', this guide starts with the receipt at the EC of an RTD proposal and gives a step-by-step account of its progress through the various procedures: evaluation, rejection/acceptance, contract negotiation, allocation of funding and the start of the project. The next two manuals will cover how RTD policy is arrived at and detail the sources of information and assis-

tance available to project proposers.

In the near future, the information packs for each Specific Programme under the Fourth Framework Programme (1994-1998) will be produced in a standard format, and Calls for Proposals will be issued with a likely timetable for processing applications, giving applicants an idea of when they can start work if their proposal is approved.

Consulting the Contractors

For the first time, the future users of project proposal application forms are being consulted to improve these forms' user-friendliness. The June 1994 issue of RTD Info and the July 29 issue of CORDIS focus (1) included a new draft proposal form, upon which readers in the scientific and industrial communities can comment.

This new project proposal form is part of a general drive to simplify and harmonise procedures and introduce greater transparency into project application, selection, funding and reporting. The new contract negotiation forms, as well as the RTD Model Contract, are also being simplified, while the possibility of a new, general guide for helping project coordinators is being assessed.

(1) To subscribe to RTD Info, fax your request (specifying quantity and language) to Donatella Fassone: Fax: +32 2 295 8220. CORDIS focus is available from the RTD Help Desk: Tel: +352 4301 33161; Fax: +352 4301 32084.

► VRC PROFILE/CASE STUDY

Focusing on Specific Sectors

IRIDE, the VALUE Relay Centre for Southern Italy, benefits from being located in Tecnopolis Novus Ortus, Italy's first Science Park.



IRIDE, the VRC for Southern Italy, is located within the Tecnopolis Science Park.

IRIDE focuses mainly on SMEs, because Italy's economy is dominated by these companies," observes Mrs Sasso, the VRC's manager. "We perform both upstream work - helping companies get involved in EC RTD Programmes - and downstream work, where we help companies exploit project results."

IRIDE concentrated on upstream work to begin with, as these activities also reinforced the organisation's role as a regional 'EC landmark'. A string of information days explaining the EC's Programmes was held, resulting in a number of requests for help in submitting project proposals.

"SMEs face several problems in developing proposals, including language and standardisation barriers and a lack of understanding of how different types of organisations operate in other countries," says Mrs Sasso. "The largest problem, however, is in formulating those parts of the proposals relating to exploiting project results. These are becoming increasingly important for a successful proposal in many Programmes, and SMEs usually rely exclusively on external consultants. VRCs like

IRIDE are well placed to help."

Downstream work, however, now dominates IRIDE's activities. The VRC began by analysing the technological areas most important to the region, identifying the agri-food, shoe, software and micro-electronics industries. The VRC also studied local companies, drawing up profiles describing each organisation, its production processes and innovation requirements.

"Being situated within a Science Park has significant advantages, as we can call upon the Park's multidisciplinary experts to help in these analyses," Mrs Sasso notes. "The Park is an important mechanism for promoting innovation, transferring technologies and helping 'start-up' companies grow and attract industrial investment, so our location here is very appropriate."

Improving Software Development

IRIDE staff visited around 50 companies in its first year. Twelve of these companies were interested in one or more research results, resulting in intra-firm contact and further negotiations.

For example, IRIDE analysed a number of research results in the area of software quality and productivity. Several were selected as being suitable for local SMEs, forming the IRIDE 'Software Quality Observatory' work package, a brief, user-friendly document outlining the projects and their results.

This document was first disseminated to the local companies. The response was positive, so an introductory workshop was held to explore a number of themes. This was then followed up with a range

of meetings focused on specific results, resulting in several enquiries from Italian firms to the owners of the research results.

"One of the projects in the package was ESPRIT Project 2046 - MERMAID," says Mrs Agrimi, of the VRC staff. "MERMAID involved companies and universities from Finland, Ireland, Italy, the Netherlands and the UK. Together, these partners developed a computer-based system for estimating the costs and risks associated with software development."

One of the MERMAID partners was Data Management Spa, a software development company with offices throughout Italy. Faced with the task of developing commercial products from the project's successful conclusion, the company welcomed IRIDE's help in finding other software engineering organisations, preferably SMEs, for testing their new product.

As a result of IRIDE's information days, a number of local SMEs contacted Data Management. An ad hoc training and technology transfer session was held at the VRC, with the result that four SMEs began experimenting with the new system in early June.

According to Gianni Caracoglia, based at Data Management's offices in Pisa, the initial results are expected this December. "The four SMEs are testing two prototypes, and their feedback will be instrumental in the development of a product ready for the market." ■

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.

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► VRC ACTIVITIES

Technology Transfer Days

The past 6 months have seen a number of Technology Transfer Days (TTDs) run by VRCs around Europe.

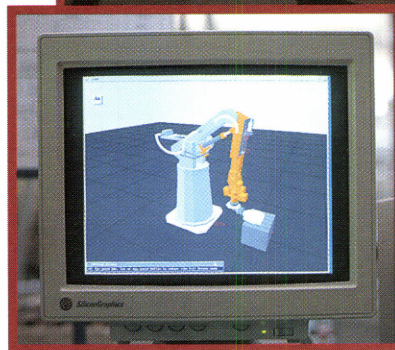
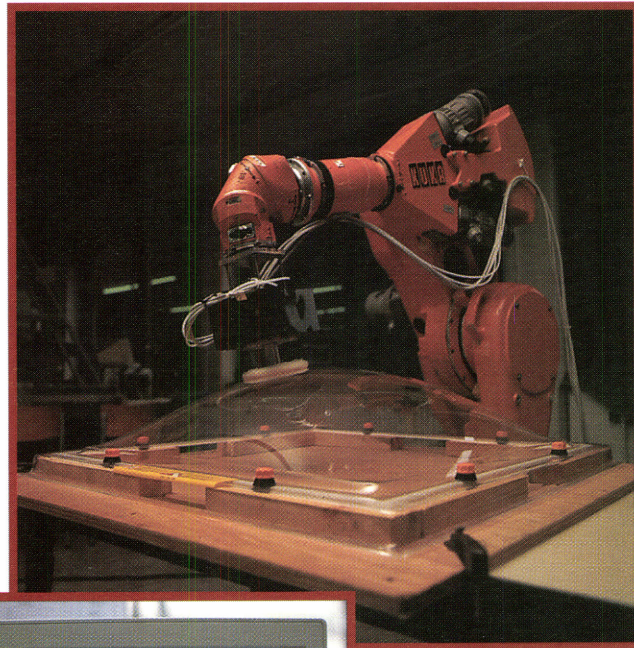
In mid-April, for example, the Hellenic VALUE Relay Centre (Greece) ran a TTD focusing on Agri-Food Biotechnology in Athens. The two day event was attended by over 150 participants, around half of which represented SMEs and agricultural cooperatives. It focused primarily on encouraging technology transfer between Greek scientists and local companies, although around a quarter of the 26 presentations were from projects without Greek partners.

The organisation for the TTD began several months beforehand, when the VRC asked potential delegates what fields they were most interested in. This resulted in a very wide spectrum of research areas, with presentations on technologies ranging from biological control systems to conserving meat products. These technologies were developed within a number of EC programmes, with a third originating from the ECLAIR Programme. The FLAIR and AIR Programmes were also well represented(1).

According to Lela Poulakaki, the VRC project coordinator, the event was a definite success. "For example, there was a speaker from a French company who made an excellent presentation on producing a new surfactant from sugar beet," she recalls. "The new production method was developed and patented under an ECLAIR project. It produces a better surfactant than existing products, and has ten times the commercial value of ethanol, another sugar beet by-product."

As the method can also be applied to other pectin-rich plant wastes, such as citrus fruits, this is of great interest to Greece's large citrus industry. The VRC followed this up by identifying 33 SMEs who may be interested in this technology and putting them

Photo: E. Filers.



Computer controlled polishing on display at Katholieke Universiteit Leuven.

in touch with the company.

According to Mrs Poulakaki, this is just one of many important contacts resulting from the TTD. "We forwarded another 119 requests for further information from the TTD participants to the companies and research institutes behind the presentations. If even a small fraction of these result in technology transfers, the event will be a significant success," she concludes.

Machine Vision in Flanders

A few months later, the Flemish VRC (Belgium) organised a Technology Transfer Workshop on Industrial Vision, Autonomous Robots and Medical Imaging, in conjunction with the Katholieke Universiteit Leuven, where the event was held, the European Comput-

er Vision Network and DG III (Industry) of the EC.

The workshop attracted around 150 participants from across Europe, and began immediately after the European Information Technology Conference (see Programme Briefing, this issue). It included the results of ten EC-sponsored research projects in the field of machine vision, autonomous robots and medical imaging. The aim was to take these results and demonstrate their potential in industries as diverse as manufacturing and medicine, as well as generally broaden understanding between these often widely separated groups.

The first day included six tutorials, designed to inform the participants of technologies lying outside their own field of expertise:

- Image Processing Techniques;
- Medical Image Processing;
- Learning Techniques in Robotics;
- Image System Integration;
- Active Computer Vision;
- Force Controlled Robots.

There were also demonstrations of both research results suitable for industrial exploitation and state-of-the-art industrial products, ranging from radiological workstations to vision-guided control systems for industrial burners.

The second day was dominated by the presentations of project results, including sensor-based dextrous robots (the SECOND project), generating stereo-lithographic models for surgery from computer tomography images (PHIDIAS), behavioural learning (B-LEARN II) and more. There was also a presentation of the VALUE Programme and a seminar on 'Preparing a Technological Business Plan'.

At the general discussion concluding the event, all the participants recommended that the exercise be repeated regularly across Europe. □

(1) See issue 4/94 of *Innovation & Technology Transfer* for a 6-page Dossier article on the EC's Agricultural RTD Programmes.

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► CORDIS UPDATE

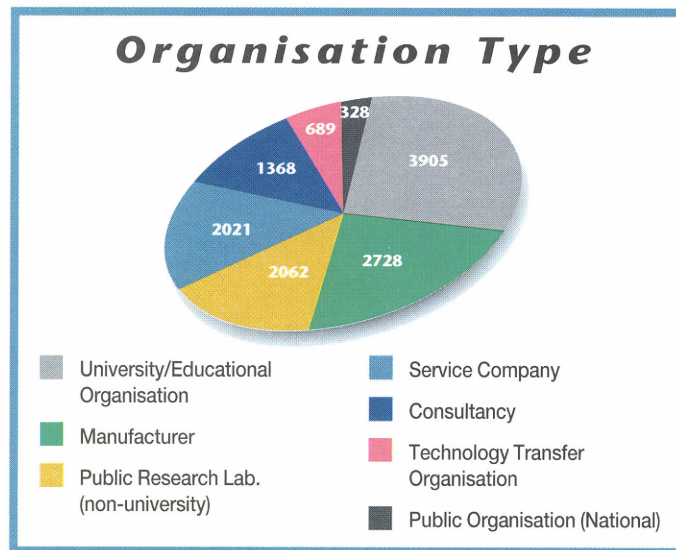
Partner Search

Issue 3 of Innovation & Technology Transfer featured a short article on finding partners for collaboration on RTD project proposals using the RTD-Partners database on CORDIS, and included an entry form for those interested in adding their own details to the database.

As a result, the CORDIS Unit has received many completed forms from readers within and outside Europe, showing the great interest in collaboration and development of partnership networks across the RTD community.

The greatest response has been from Germany and the UK, with a number of entries from Eastern Europe providing potential partners in some countries such as Latvia and Estonia for the first time. Enquiries have also been received from as far as Indonesia and the Philippines.

There are now over 12,000 entries



on the RTD-Partners database providing details of contacts in research organizations, manufacturers, universities and technology transfer organizations (see graph) along with information on the types

of collaboration sought and interest in specific projects and programmes. The majority of the entries are from organizations in the European Union Member States and EFTA countries. □

The CORDIS RTD-Partners database contains around 12,000 entries from around the world, ranging from consultancies to universities.

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► INTERFACES OF VALUE

Technology Assessment in Europe

The third and final workshop on Technology Assessment Practices for EC RTD Project Managers was held on July 11.

The workshop concludes a successful project aimed at defining modules for Technology Assessment Training. The overall aim is to reinforce and diffuse Technology Assessment (TA) throughout the EU, as well as improve its impact on RTD policy.

The workshop included a communication exercise which focused on the problems of altering decision-making processes without TA, and featured a structured debate on how TA can be integrated into RTD project management within different institutional frameworks. It raised a number of inter-

esting questions about how to structure such training actions for the benefit of EC project officers, and identified three levels where the methodology could be adapted and employed:

- raising awareness of TA in project management, focusing on specific themes and aimed at targeted audiences (energy, information and communication technologies, health, and so on);
- improving TA methods and operations at the institutional level, for those officials in both the EC and subsidiary institutions who already have some experience;

■ raising the awareness of the implications of TA organisation and results in decision makers, such as politicians and industrialists.

The feedback from the workshop indicated that the participants from the EC were extremely interested in integrating TA into project management and networking with others within and beyond the EU. The participants also concluded that similar workshops should continue to spread awareness of and competency in TA in the future. Establishing the structure of these future training sessions will be discussed at VALUE's Expert Work-

shops this November:

- European TA Infrastructure Developments, November 28
- European Awareness Workshop Initiatives, November 29 □

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► **SPECIFIC PROJECTS**

Goal Oriented Project Planning

Goal Oriented Project Planning (GOPP) is a project management tool that both ensures that all the partners in a project have the same broad objectives and prevents any major ambiguities and conflicts of interest.

The GOPP management tool is based on the 'logical framework' approach initially developed by the US space/military industrial complex, where it has been used to design and manage complex projects. The method was then further developed and redesigned by the German Agency for Technical Cooperation as a team-based approach, so that the major planning events are now moderated workshops relying on groupwork and visual aids.

GOPP is well suited to managing 'diverse projects', where the participants have a wide range of academic backgrounds, or come from different countries or organisational environments (SMEs, research institutes, public utilities, consultants, etc). SPRINT has used GOPP for managing its Large-Scale Specific Technology Trans-

fer Projects since 1992, as, like many trans-European collaborations, these projects are diverse in all of these ways. For this reason, GOPP may prove useful in a much wider range of tasks.

GOPP has three objectives:

- to improve communication and cooperation, by giving all participants the opportunity to build and maintain a strong and sustainable consensus;
- to enhance project logic and transparency, by defining a realistic hierarchy of objectives and by clarifying the responsibilities of the project management and each partner;
- to improve quality and efficiency, by fixing indicators for monitoring and evaluation.

Initial Analyses

The GOPP procedure begins by analysing the project's:

- Participants: The interests, needs and potential contribution of each partner are reviewed to create a well-balanced, competent partnership. At the end there should be at least one partner committed to each aspect of the intended innovation;
- Problems: A 'problem tree' is produced to ensure that the problems which the project intends to address are properly understood (figure 1a). This involves identifying the major problems, brainstorming them into 'problem clusters', identifying the core problem and how each problem relates to the others.
- Objectives: An 'objectives tree' is then produced to generate a realistic set of objectives (figure 1b). This involves turning problems into desirable, realistically achievable challenges, examining the 'means and ends' ●●●

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 edition 2/94.

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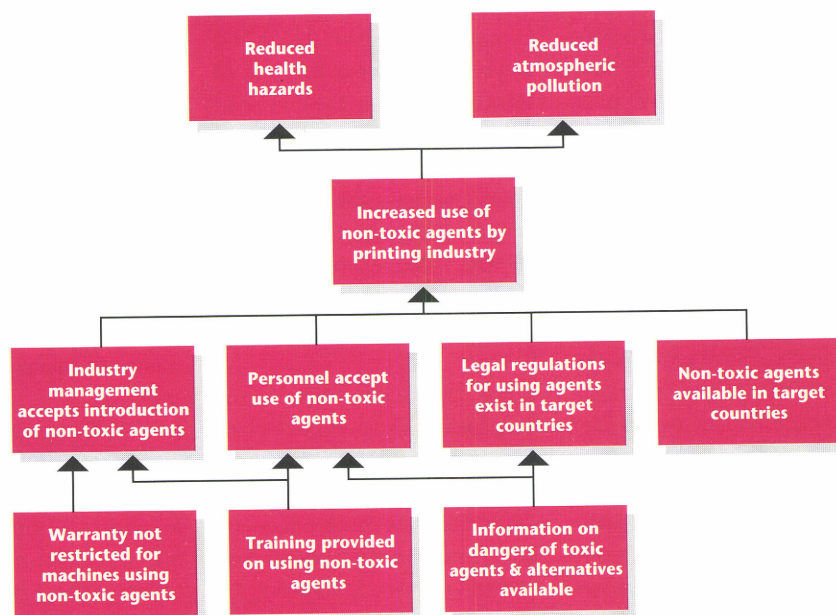
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Objective Tree



Strategies and indicators for Specific Project 231 - 'New Cleaning Agents for Printing' - are derived from an Objective Tree using the GOPP method.

**SPRINT
DESIGN
PRIZE**



Innovative design from Italian company LUCEPLAN, one of the three winners of the European Community Design Prize (see previous issue).

●●● relationships thus created, and adding and deleting objectives as necessary.

Developing a Strategy

A hierarchy of objectives is then produced to define one or more realistic project strategies. After any undesirable or non-achievable objectives are identified, different 'means and ends ladders' are designed. Each ladder represents a possible project strategy. One must be chosen through comparison against criteria including available resources, chance of success, political feasibility and so on.

One of the most important stages of this planning process is the definition and evaluation of the project's 'assumptions', which are defined as the conditions that must exist if the project is to succeed. These must be properly evaluated

to assess the realism of any project strategy and to define the responsibilities of the project management and the partners.

Each assumption is first derived from the objective tree. The likelihood of the assumption occurring is then assessed:

- if the assumption is almost certain, it can be ignored;
- if it is quite likely, then the project strategy is realistic as long as the assumption is monitored;
- if it is not likely, then the project strategy must be redesigned, either to avoid the assumption or render it superfluous.

Objectively verifiable measurements, or indicators, for each objective are then identified so that progress can be monitored and evaluated.

The final result is a Project Planning Matrix, which summarises, on one page:

- Why the project is being carried out;
- What it is expected to achieve;
- How it will achieve these results;
- Who is involved;
- Which external factors are crucial for the project's success;
- How the project's success can be measured;
- Where the data required for this assessment can be found.

GOPP is only one workable system among several for running a project, but its rigorous procedures and emphasis on teamwork and consensus may make it suitable for many trans-European collaborations. ■

C o n t a c t
Peter Lowe,
SPRINT TAU

► PUBLICATIONS AND CONFERENCES

Overview: Current SPRINT Activities

SPRINT's various activities are generating a range of conferences and publications.

The Second European Exchange conference was held last June in Lyon, France. Following on from the first event of its kind held two years ago, the conference is one of the activities run by SPRINT's Working Group on Regional Technology Advisory Centres (RTACs).

RTACs are defined as organisations which have, as their primary function, the role of providing information, advice and assistance on technical matters to enterprises in their regional area. Usually oriented towards SMEs, RTACs, along with science parks and other regionally-based structures, have recently been recognised as vital players in the transfer of technology throughout Europe.

The SPRINT RTAC Working Group was set up in 1990 to find ways of enhancing the role of RTACs. Apart from the European Exchange conferences, the working group produces:

- a regular newsletter(1);
- the European Directory of RTACs, a 'Who's Who' which will soon appear on-line via the new CORDIS RTD-Contact Points database;
- The Tools Guide': a selection of diagnostic systems and best practices used by RTACs in their work with SMEs.

In addition, the Group runs studies on a number of themes such as operating efficiency, targeting for growth and company networking.

As its name suggests, the con-

ference in Lyon focused on exchanging experience and best practices between RTACs across Europe. Around 120 people, including RTAC staff, politicians and other decision makers attended the event, which was composed of ten parallel workshops focusing on three themes:

- Operational Efficiency: from measuring quality and performance to managing human resources;
- RTAC Client Companies: SME growth potential, supply chain networks and client clustering;
- The RTAC Operating Environment: including competition and collaboration, funding strategies and the role of national and regional infrastructures;

C o n t a c t
European Value Management Conference:

- Mr. José R. Tiscar, DG XIII, Luxembourg
Tel: +352 4301 34102
Fax: +352 4301 34544
- British Institute of Value Management
Tel: +44 71 824 8257
Fax: +44 71 730 4293

Large-Scale Technology Transfer Projects Conference:
Mr A. Boylan,
SPRINT TAU

Quality Promotion in Europe:
Gower Publishers
Gower House,
Croft Road
Aldershot, Hampshire,
GU11 3HR, UK

Value Management Conference

On October 6-7 this year, SPRINT will be supporting the 5th European Value Management Conference. Held in Brighton (UK), the conference is being organised by the British Institute of Value Management and will be opened by Michael Heseltine, President of the UK's Board of Trade and Secretary of State for the Department of Trade and Industry, and Dr Giulio Grata, Director of DG XIII-D (Dissemination and Exploitation of RTD Results, Technology Transfer and Innovation), which publishes this magazine.

The SPRINT support is consistent with the Programme's emphasis on the use of value management as a fundamental tool for innovation and technology management. The conference is aimed at company directors and senior managers, suppliers and customers of both the private and public sectors, project sponsors and managers and others.

It aims to present the best practices and latest development in Value management, and how these important techniques, ranging from Value Analysis to Busi-

ness Re-engineering, can deliver radically improved business performance. The working language will be English, with simultaneous translation into French and German.

Following the keynote addresses, the conference will split into two parallel streams composed of 14 modules each, allowing participants to select subjects from both streams in order to meet their needs. Examples of the 28 modules include:

- Value Management Overview;
- Implementing Value Management in British Airports Authority plc - a case study;
- The Value of Time - business process re-engineering and new achievements;
- Value Analysis for the Environment;
- Building Teams that Win;
- Status of Value Engineering application and management in Japanese industry;

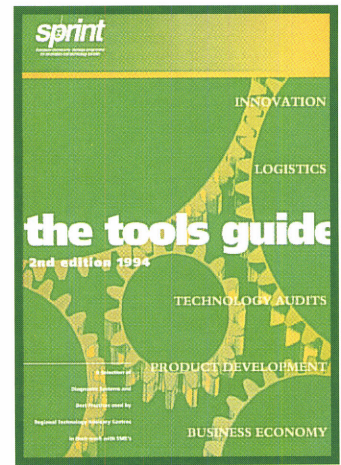
The speakers are all leading professionals in their field from Europe, the USA and Japan, and together will present a multitude of case studies to illustrate both the theory and practice of promoting innovation and improving businesses, projects and products.

Specific Projects and Quality

A conference focusing on SPRINT's Specific Projects will be held on February 21-23 next year in Luxembourg. These large-scale demonstrations of trans-European technology transfer have, over the past four years, facilitated the effective adoption and transfer of a number of new technologies. In the process, they have showed that, despite the Single Market, there are still a number of barriers to technology transfer, and demonstrated the effectiveness of the appropriate management techniques.

The conference - entitled 'The Impact of Large-Scale Technology Transfer Projects on the Innovation Process' - aims to improve the awareness of firms, institutes and national and community programmes of the 'Best Practices' in transferring technology and innovation. Representatives from all of these organisations will swap experiences and learn from each other, as well as discuss the future orientation of EC technology transfer policies under the Fourth Framework Programme.

Lastly, SPRINT has recently pub-



lished 'Quality Promotion in Europe', a review of national and regional schemes and measures in the field of quality throughout Europe.

Produced in association with two consortia of European consultancy firms, the book compares national and selected regional schemes and considers the awareness of the schemes among their target audiences, their impact in practice and their relative successes and failures. The initiatives undertaken by the European Commission are also considered. □

(1) Obtainable from Mr Gaston Hudig, ICN. Fax: +31 70 381 7003

► EIMS UPDATE

Second Tier Markets

"European Second-Tier Markets for NTBFs", the 5th study produced by the European Innovation Monitoring System, is now available.

An NTBF is a New Technology Based Firm - in other words, a fast growing, innovative company whose success, or failure, depends on a recent technological development. One of the biggest obstacles such firms face, apart from developing the technology in the first place, is attracting development financing.

This is because such companies do not usually appear on the 'Official List' of companies trading on the stock market. However there is an alternative: second-tier markets.

A second-tier market is a stock market for fast growing companies, filling the gap between the Official List and the non-regulated trade of the NTBFs' equity shares. They are a key element in the chain of financing mechanisms for NTBFs, which are in turn essential to the competitiveness and development of the European economy.

In the United States, second-tier markets play a much larger role in financing innovative companies than in Europe, giving a competitive edge to American NTBFs.

Over the years there have been a number of studies and much controversy on second-tier markets. The new EIMS study breaks new ground by relating activity in these markets to the structure of capital markets in general, as well as the specifics of the organisation and operation of the markets and the attitudes and motivations of the issuers, intermediaries and investors.

By comparing European markets with those of the US and Japan, it draws lessons that will inform

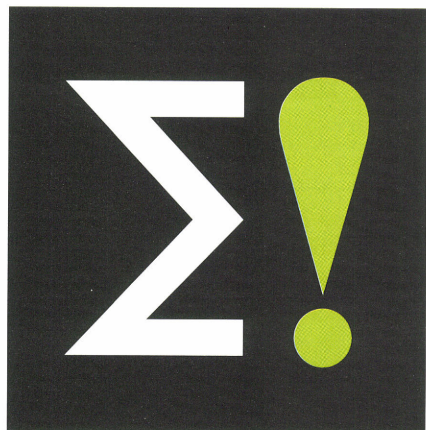
thinking on this subject in Europe, and argues convincingly that conditions for the development of stock markets for growth companies in Europe are now better than they have ever been. □

C o n t a c t

- Mr. Daniel Janssens, EC, DG XIII, Luxembourg
- Mr. Daniel Routier, SPRINT TAU

EUREKA:

Promoting Ma



EUREKA

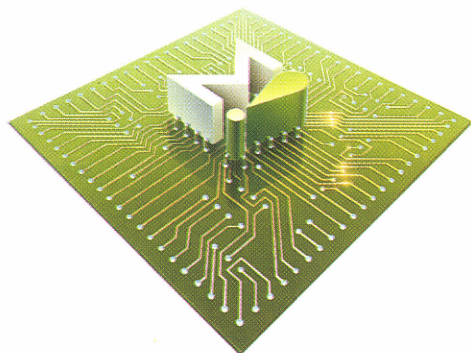
The 12th EUREKA Ministerial Conference, held in Lillehammer (Norway) led to a new agreement between EUREKA and the EC.

When 17 Western European countries and the European Commission launched the EUREKA Initiative in 1985, they aimed to complement, not duplicate, the basic research programmes of the European Community and other pan-European organisations.

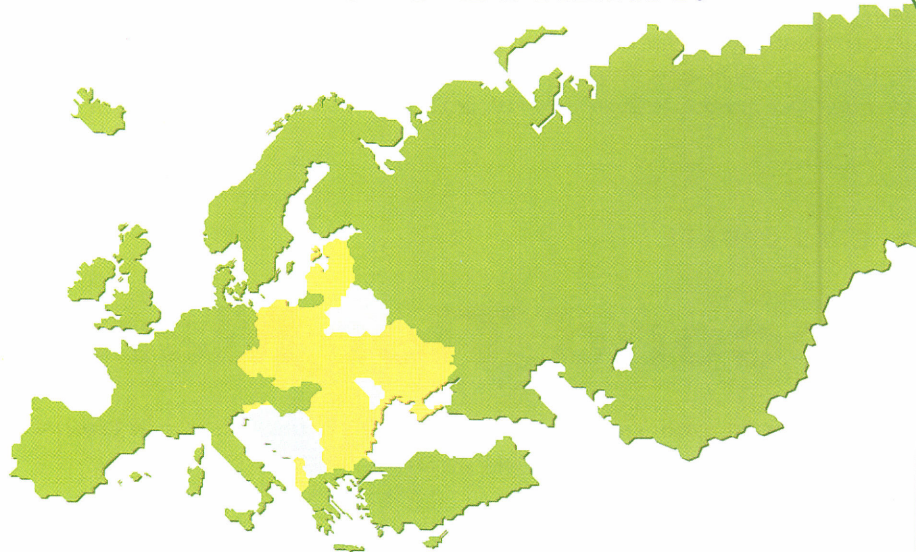
EUREKA is therefore not an EC Programme: the European Commission is actually treated just like a 'Member Country', with its own research labora-

tories (the Joint Research Centre). However, the EC's influence in pan-European basic R&D, regulation and standardisation, as well as its concern for European industrial competitiveness, has forged a special relationship between the two organisations.

Recently, for example, the ties between the EC's RTD activities and EUREKA have been strengthened, with both the EC's Fourth Framework Programme and the individual Specific



Where is EUREKA?



EUREKA has grown rapidly since 1985, with all the countries of Western Europe becoming Members (green regions) in the first few years, forming a research community stretching from Iceland to Turkey.

Operating procedures were changed following the fall of the Berlin Wall to make the participation of companies and research institutes from Central and Eastern Europe as easy as possible. A network

of National Information Points (NIPs) was established throughout the region by 1992 (yellow regions).

As a result, Hungary joined the EUREKA family at the Ministerial Conference in Finland in 1992. In November 1993 the Russian Federation joined, and last June, at the Lillehammer Ministerial Conference, Slovenia became EUREKA's 23rd Member Country (still marked yellow on map).

Market-Oriented R&D

...ne, emphasised the close relationship

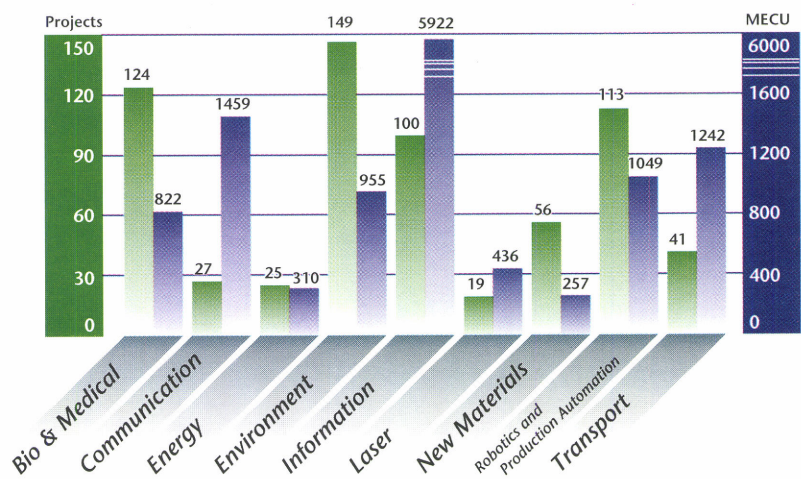
Programmes frequently referring to the desirability of EC-EUREKA cooperation, and with a string of co-organised conferences and partnership events being held across Europe. There is no doubt that EUREKA offers an excellent framework within which participants of the Specific Programmes can commercialise their research results. But what, exactly, is EUREKA?

The 'Bottom-Up' Principle

In a sentence, EUREKA is a Europe-wide, non-bureaucratic network promoting 'market-driven' collaborative R&D projects in advanced technology. There are four key phrases defining the EUREKA Initiative:

- **transnational:** Each EUREKA project must have partners from at least two different EUREKA Member Countries;
- **market-driven:** EUREKA projects develop high-technology products and services for the market-place;
- **bottom-up:** The project participants are the best judges of how their project should develop, so it is their responsibility to define, finance and manage it. This ensures that all EUREKA projects are motivated by sound commercial interests and are run by the people closest to it. Thus EUREKA does not dictate the project's terms. It is instead an 'enabling network', helping firms and research institutes in EUREKA Member Countries to pool their resources in high-technology, product-driven cooperative R&D ventures;
- **unbureaucratic:** The bottom-up approach also means that participants are not buried under an avalanche of paperwork. The initial application form, for example, is known as the '18 point sheet' after the number of questions it asks, and only takes a few hours to fill in.

The EUREKA Portfolio



There are more projects underway in Environmental Technology than in any other sector, but the largest financial investment has been made in Information Technology.

EUREKA has no focused programme or priority sectors, so projects can be in any technological area. For statistical purposes (see graph) all projects are allocated to one of nine broad areas: medical/biotechnology, communications, energy, environment, information technology, lasers, new materials, robotics and production automation, and transport.

EUREKA Advantages

Why form a EUREKA project? There are a number of advantages:

- **Partner Search:** EUREKA can help organisations find the right partners and set up the partnership arrangements in order to get the project off the ground;
- **Public Financing:** Each participant applies for public financing through their own country's normal channels. However, EUREKA status counts: some countries give EUREKA projects 'preferred status', while others have special 'EUREKA funds';
- **Supportive Measures:** Many compa-

nies find the lack of relevant industrial standards a serious obstacle to commercialising their new technology. Others find barriers in public procurement policies, or other technical obstacles to trade. EUREKA can help bring these problems directly to the relevant authorities, at both governmental and European levels;

- **Private Financing:** EUREKA can also help participants contact sources of private finance, such as venture capitalists;
- **Recognition of Excellence:** Obtaining EUREKA status identifies the collaboration as a high-technology project of outstanding quality and potential.

However, to obtain EUREKA status, a potential project must:

- include at least two partners from different EUREKA Member Countries;
- use and develop cutting-edge technologies;
- result in a marketable product, process or service
- be aimed at the civilian (non-military) sector;



EUREKA Structure

Structurally, EUREKA is very decentralised, with project participants only needing to contact the National Project Coordinator (NPC) in their country. This network of local EUREKA offices works to get projects launched, monitors their progress and offers advice and support when requested.

Member Countries hold the Chair in turn for one year, with a small Secretariat supporting the Chair and maintaining the EUREKA project database. EUREKA's 'political body' is known as the Ministerial Conference, and is composed of ministers from the Member Countries and a Member of the European Commission. It meets every year at the end of each Chairmanship (usually in June), when it formally announces new projects, discusses new initiatives and hands over the Chair to the next country.

Lastly, EUREKA has around 13 'umbrellas' focusing their attention on specific technological fields, including diagnostic biotechnology applications, laser system development, marine environment technologies, flexible assembly systems and preserving Europe's cultural heritage and built environment.

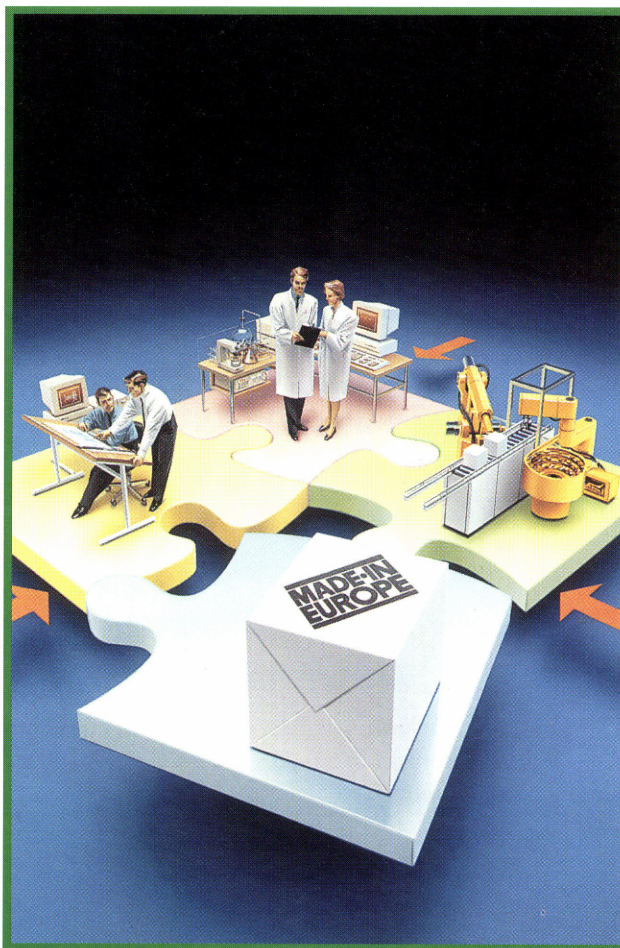
These umbrellas form 'mini-networks' within the wider EUREKA Initiative, and may not involve all EUREKA Member Countries, although the majority (9) include the European Commission as an official participant. The umbrellas work on a number of fronts within their specific area, promoting the use and development of standards, organising conferences and brokerage events, liaising with the European Commission and helping potential participants find partners.

A Growing Portfolio

The latest Ministerial Conference was held on June 16 in the Norwegian city of Lillehammer, site of the 1994 Winter Olympic Games, and was opened by King Harald V of Norway.

The Ministerial Conference announced that a total of 144 new projects had gained the EUREKA label over

the previous 12 months. This new crop of projects, worth an estimated investment of 900 MECU, is the second highest score in EUREKA's history, showing that, despite a difficult economic climate, European companies and research institutes find that the EUREKA formula fits their needs.



EUREKA actively helps companies and laboratories find partners across Europe.

This year's record, however, lies in the 90 finished projects. This is roughly equal to the total number of finished projects over EUREKA's previous history. Nothing could more clearly illustrate how the substantial investment built up through the EUREKA Initiative is paying dividends to European industry and society.

As a result, the EUREKA portfolio now contains 653 active projects, representing an estimated investment of 11,720 MECU, and 184 finished projects worth around 3,240 MECU. Most of this year's new projects fall into the areas of Environmental Technology, Information Technology and Robotics and Production Automation.

The 1994 Ministerial Conference was also the first one attended by represen-

tatives from Russia (which officially joined in November 1993) and Slovenia, which joined in Lillehammer. Along with Hungary, which joined in 1992, they bring the total number of Member Countries from Central and Eastern Europe to three.

Focusing on the Environment

One of the main emphases of the Norwegian Chair throughout the 1993-1994 period was on developing technologies that will either minimise or reverse environmental damage. This was the driving force behind the "Lillehammer Statement on the Environmental Dimension of Technological Development", adopted by the Ministers at the Conference.

As a result of the Statement, all EUREKA project applicants will be asked to describe and evaluate the expected environmental aspects of their project at both its beginning and end. This will improve the assessment of every new project's environmental impact at an early stage in its industrial development.

The message is being reinforced with the Lillehammer Award, which was granted this year for the first time to the participants of EU 160 - FERMSEP (see page 15). At every Ministerial Conference, the Award will recognise a recently

completed EUREKA project for its technological achievements, economic results and practical environmental benefits, and is expected to become a valuable marketing tool for the participating companies.

The Lillehammer Award is just the latest in a series of EUREKA initiatives focusing on the environmental aspects of advanced technology. The importance of environmental concerns is in fact recognised in EUREKA's basic charter, the Hannover Declaration, which refers to the importance of technical R&D in creating solutions to trans-border problems, including environmental issues. Since then, the number and total value of EUREKA projects related to the environment has grown steadily - there have been



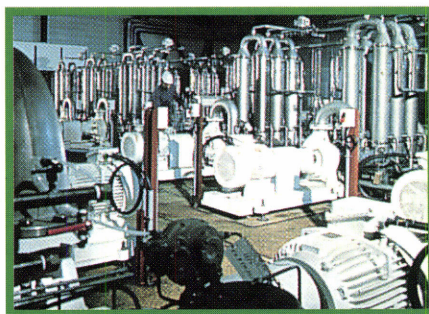
Case studies

FERMSEP: Award Winning Technology

FERMSEP (EU 160) won the first Lillehammer Award by developing new mineral membranes to significantly reduce pollution from the pharmaceutical and food industries.

FERMSEP was led by French SME Tech Sep, in partnership with Italy's Antibioticos and public laboratories from both countries. Their target was to develop better mineral membranes, which are currently used by the pharmaceutical and food industries to separate molecules, such as proteins, from broth solution. Chemicals produced by this technique range from the important antibiotic cephalosporin-C to the flavour enhancer glutamic acid.

The new technologies developed in FERMSEP include new membrane supports of porous carbon ceramics and metallic oxide, new procedures for manufacturing the membrane skin, new materials for the filtration mem-



Glutamic acid extraction with FERMSEP's mineral membranes.

branes, and better membrane fouling control and cleaning methods.

The result is to render the dangerous organic solvents and filtration additives normally used almost totally redundant. In addition, they can be used in closed systems, improving efficiency, cutting the risk of accidental emissions and making certain processes safe enough to implement.

"Our final objective is to remove all dangerous organic solvents and filtration additives from the pharmaceutical industry, particularly in the fermentation plants," explains Dr. Cueille, Head of Research and Development at Tech Sep. Although it has not yet been possible to completely remove all hazards, FERMSEP products are already improving the environment in and around many fermentation plants.

The FERMSEP technologies have generated a wide range of new products for the worldwide mineral membrane market, evaluated at 115 million ECU for the system and over 7 million ECU per year for replacement products. Tech Sep has already sold well over 1,000 square metres of membranes to this market since the project began. The Lillehammer Award will doubtless help them build on their success.

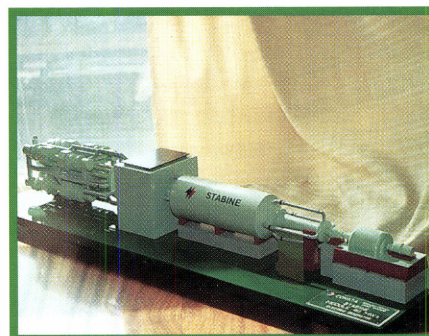
STABINE: Combined Power from East and West

The innovative design of the small to medium sized STABINE power plant will provide cheaper, cleaner electricity using Russian gas turbines.

In gas-fired power stations, fuel is mixed with compressed air in a combustion chamber, producing energy which is captured by gas turbines. Around two-thirds of this energy is 'fed back' to the air compressor, leaving the rest for electricity production.

"By the mid 1980s I had developed a new design, but needed the help of an industrial manufacturer to produce the actual equipment," recalls Mr. Benaroya, the French engineer leading the STABINE project. "I formed the STABINE project with the Belgian company Cockerill Mechanical Industries in 1986 to produce and test working prototypes."

The new design uses a specially designed diesel engine to provide the compressed air, improving efficiency, and hence lowering prices, by 15%. By the



A model of a 40MW STABINE power station.

late 1980s the partners were ready to build a demonstration plant. With the French and Belgian markets dominated by nuclear power, however, they needed to look further afield.

When Hungary joined EUREKA in 1992 it released enough public funding for Olajterv, one of the country's largest engineering firms, to join the project. This led to a study of the economic, environ-

mental and technological feasibility of a 30MW demonstration plant, and the introduction of a new process - patented by Olajterv - that cuts NOx pollution economically.

A similar story unfolded in Canada, where another feasibility study could lead to opening up the entire North American market. But possibly the most striking feature of this project is the source of the turbines - Russia.

"Trud, one of our Russian partners, is the main producer of turbine engines for the Russian military and civil aviation markets," Mr Benaroya explains. "Their factory is first-class, and they will probably be the sole supplier for Stabine power stations around the world - a classic case of turning swords into ploughshares. It also opened up new markets - we now hope to build a series of 10MW stations to power the pumping system throughout their oil and gas fields."

●●● more EUREKA projects under the Environmental Technology banner than any other for many years.

Brokerage Events for SMEs

The Norwegian Chair also focused on opening EUREKA to SMEs. EUREKA has always had an impressive SME participation rate, and this has been improved further over the past year: more than 50% of the industrial participants in the 144 new projects announced in Lillehammer are SMEs, up from a previous figure of around 30%.

This raises the SME participation rate to 25% of the entire EUREKA portfolio. This is the result of a wide range of activities, particularly Brokerage Events. These are specialised conferences specifically designed to encourage participants to identify new business opportunities and meet potential R&D partners from across Europe. Although they were initiated by EUREKA only a couple of years ago, Brokerage Events have quickly been recognised as an effective way of bringing together organisations to explore and launch projects.

The success of the brokerage event formula stems from its strong emphasis on partnering. The events include sessions on market trends and technological developments, as well as workshops on specific technological issues, allowing groups of 10-20 participants to exchange knowledge in a practical working atmosphere.

In addition, the organisers of many brokerage events send every participant profiles of the other participants beforehand. Each participant identifies those organisations they are interested in meeting privately, resulting in hundreds of short, focused meetings in one two-day period. The result is significant project generation.

Each brokerage event focuses on one topic, with a large number of major technological areas being covered in the past two years. Four such events were arranged by EUREKA umbrellas and offices during the Norwegian chairmanship:

■ The "Fisheries Technology" brokerage event took place in Reykjavik (Iceland) on September 13-14, 1993, and was organised in collaboration with the European Commission. It provided a forum where European companies and research institutes could meet and define cooperative R&D projects in the

fisheries sector, which is of major importance to many European countries. Themes included selective fishing methods, quality control, environmental impact and the use of information technology and robotics.

■ "Transport Technology '94" was held in February 1994 in Zeist (the Netherlands), again in cooperation with the European Commission. Manufacturers, researchers and operators in the transport sector attended specialised workshops and discussed their plans and expectations for transport technology, demands and services through the next decade. Special attention was paid to integrating transport services and intermodal transport, important tools in creating an efficient, environment-friendly transport network across Europe.

■ The STEEP brokerage event was co-organised by the EUREKA umbrella of the same name ("Sustainable Technologies for Efficient Energy Production"), the European Commission and the World Industry Council for the Environment. Held in Budapest (Hungary) on April 21-22, it brought together some 170 participants to encourage the development and diffusion of more efficient energy production technologies based on local resources such as coal, biomass, waste and geothermal energy. The brokerage event paid special attention to opportunities in Central and Eastern Europe.

■ Further inroads into Eastern Europe were made at a two-day brokerage event held in late May in Warsaw (Poland). Like other brokerage events, it was designed to help partners build international R&D projects. However, while most brokerage events focus on a specific technology, the Warsaw event concentrated on Poland itself, seeking to establish new ventures with active Polish involvement.

Vision EUREKA: An Olympian Achievement

By far the largest event of the Norwegian Chairmanship, however, took place in Lillehammer alongside the Ministerial Conference. 'Vision EUREKA' attracted more than 2,000 scientists, industrialists and decision makers from Europe's scientific and industrial community, making it the largest EUREKA event ever staged.

Vision EUREKA was divided into 17

different technology conferences, allowing participants from both the public and private sector to exchange ideas, knowledge and proposals concerning a wide range of R&D issues. Taken together, the technology conferences covered all major EUREKA technological areas, with particular emphasis being given to environmental responsibility and the construction industry.

Vision EUREKA was the first major event to use the impressive infrastructure left behind by the recent Winter Olympic Games. Held from June 13-17, it was a truly European event, with participants from all of Western Europe, most of Central and Eastern Europe and 22 non-European countries - 55 countries in all. More than half of the participants were from outside Norway, and almost 50% of the them were from industry, emphasising EUREKA's success at attracting and promoting international, market-oriented R&D. Other participants included a large number of universities, research institutes, service companies and governmental organisations.

In the spirit of EUREKA's "bottom-up" philosophy, the organisation of the individual conferences was left to companies and institutes specialised in the various technological fields, with the Norwegian EUREKA Chairmanship Office providing overall coordination. Consequently, the conferences varied considerably in content, format and attendance. Most included keynote speeches, project presentations, specialist workshops and poster sessions, while seven also featured partnering or brokerage events, organised to stimulate in-depth discussions between potential collaborators. Ten conferences featured presentations by representatives of the European Commission. Altogether, over 400 presentations were made. ■

C o n t a c t

■ For the contact details of your National Project Coordinator (NPC), contact: EUREKA Secretariat, Brussels

Tel: +32 2 229 2240

Fax: +32 2 218 7906

■ Details on EUREKA and all EUREKA projects are provided on-line by the European Commission Host Organisation (ECHO).

Case study

COSINE: Integrating Europe's Research Community

Computer networks are particularly useful for scientific research, as they allow scientists located all over the world to work together on the same project without leaving their laboratories. Their potential for stimulating European collaborative R&D is therefore high.

Before EU 8 - COSINE (Cooperation for Open Systems Interconnection Networking in Europe), there was no Europe-wide network - just a patchwork of different networks in different countries, catering to a diverse range of highly specialised user groups. They also often used different communication protocols, so that each network was only accessible to users of a certain brand of computer.

COSINE's answer was to use the 'Open Systems Interconnections' (OSI) standards to form a network linking all these European groups, creating a 'network of networks' that would open up Europe-wide communications to everyone in the research community, whether in a university or a company laboratory.

By February 1993, COSINE had established EuropaNET, the hardware backbone of the network. EuropaNET supports OSI and other protocols, so that users of the various standards can be easily connected for the first time, and allows the transmission of data at rates up to 2 Mbits/s, with the potential to reach 8 Mbits/s in the future.

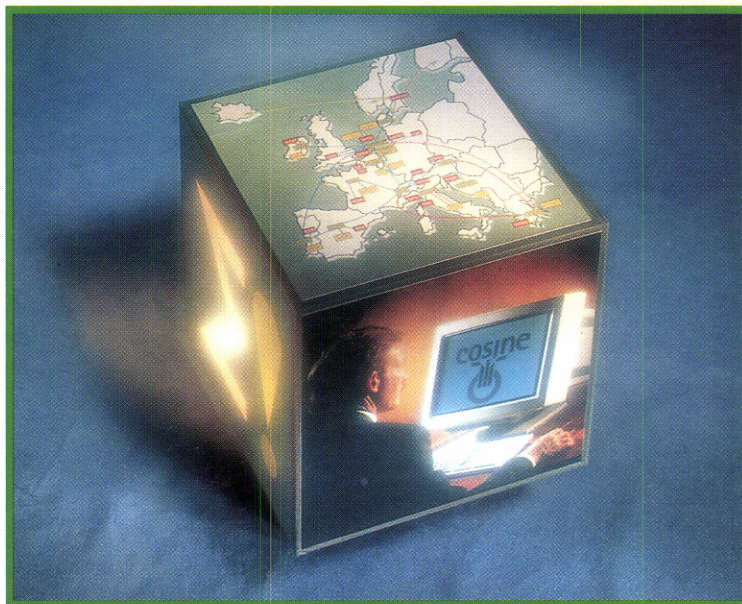
Software Tools

Building EuropaNET involved leasing the appropriate telephone lines and installing, wherever necessary, the right switching technology. However, without the right software services, this new infrastructure risked becoming as useful

as a highway without entrance ramps.

COSINE examined the various tasks people would want the network to perform, defined the necessary software and offered the work to public tender. The resulting software includes:

- a transparent **electronic mail service**, allowing users to send electronic messages between the different national networks;
- '**PARADISE**', an electronic phone book, providing e-mail addresses, telephone numbers, postal addresses and other public information. In addition,



the OSI technology will enable the development of multimedia databases, allowing, for example, a researcher in one country to look up and identify foreign companies through their logo, or listen to a short audio explanation of the company's products.

PARADISE will make it significantly easier for researchers around Europe to find the right partners, equipment suppliers and potential customers, stimulating cross-border collaboration. By the end of 1992 there were well over 2,500 organisations and a million entries, so it is becoming a significant resource for the European R&D community.

- **CONCISE**, a central information ser-

vice for researchers all over Europe, brings the country-based services provided by the individual national networks to users across Europe. It is like a library catalogue, telling users where they can find the information they need in the vast 'European library' of on-line databases.

COSINE Continuity: EUROCAIRN

Although COSINE officially concluded last December, it is continued in EU 1061 - EUROCAIRN. Launched on January 27 this year, it is administered by

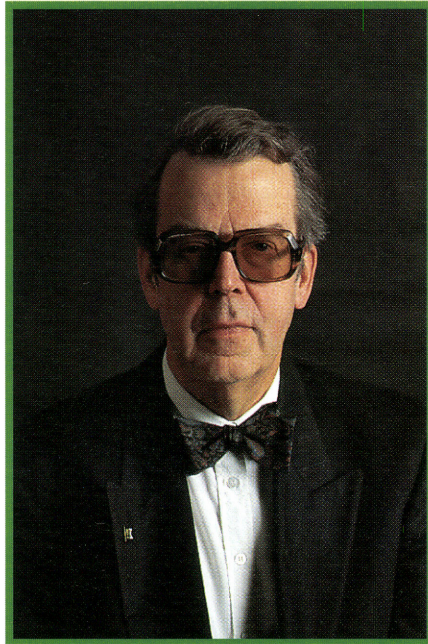
Jean-Pierre Euzen, responsible for the EC's Research and Technological Development for Networks (RTDN) Programme, and will select an external Project Office later this year.

EUROCAIRN was defined and launched following the conclusions and recommendations of the European Consultative Forum on Research Networking. It is a feasibility project, studying and planning the ways forward to a network capable of 34 Mbit/s and beyond which is open to broader user commu-

nities, not just researchers. The actual implementation of this network may take place under a subsequent phase of EUROCAIRN, or within another project. Apart from the EC, companies and public institutes from 17 countries are involved in the project, including Hungary, Slovenia and Turkey, illustrating the project's determination to develop a truly pan-European infrastructure.

C o n t a c t
Jean-Pierre Euzen,
DG XIII-C-3, Brussels
Tel: +32 2 296 3447
Fax: +32 2 296 2392

Interview

EUREKA: A Complementary Approach

Reinhard Loosch, Head of the EUREKA Secretariat in Brussels.

According to Reinhard Loosch, Head of the EUREKA Secretariat in Brussels, EUREKA provides a natural mechanism for exploiting the results of EC-supported projects.

■ **I&TT: Both EUREKA and the EC aim to develop European industrial competitiveness. Is there any duplication of effort?**

■ **Reinhard Loosch:** No, because of the innate complementarity of their approaches. The EC's Framework Programmes support research, development and demonstration, or RDD, in priority areas. These areas are selected 'from the top', after consulting the industry and research sectors, in order to develop generic technologies and disseminate knowledge.

In EUREKA projects, on the other hand, the initiative is taken by companies and laboratories, with individual EUREKA Members backing those projects which meet their criteria for intervention. This 'bottom-up' approach, giving the priority to industrial initiative and keeping the public funding decentralised, has proved to be particularly well-suited to market-oriented R&D, where the goal is a hi-tech product or service on the market, rather than generic knowledge.

Therefore the potential is for cooperation, rather than duplication. Participants who have developed a generic technology in an EC-supported project should look very closely at the EUREKA formula when deciding how to exploit it. Making this transition as easy as possible is the challenge today, which is why you'll find EC-EUREKA cooperation identified as high priorities in the EURE-

KA Medium-Term Plan for 1992-1996 and the EC's Fourth Framework Programme.

■ **In what way does the EC participate in EUREKA projects?**

■ The EC has been involved in a total of nine umbrellas and 17 individual projects, particularly in the areas of Environment, Information and Communication Technologies.

The high participation rate in the umbrellas reflects the EC's interest in supporting strategic technological areas of European industry and formulating appropriate technical standards and regulations. Many of the 17 individual projects involve the Joint Research Centre, but two projects - COSINE and its follow-up, EUROCAIRN - were actually led by offices within the EC [see page 17]. Other projects, for example large 'strategic' projects like the 3.8 billion ECU Joint European Submicron Silicon Initiative, also receive considerable EC funding.

■ **In what other ways do the EC and EUREKA cooperate?**

■ The most visible form is in the co-

organisation of conferences and brokerage events. The aims of both types of event is to inform industrialists, scientists, financial circles and other decision-makers from across Europe on the state of science and technology in a specific area, with brokerage events also presenting market analyses and helping potential partners meet to define collaborative R&D projects.

Organising these events together has enormous practical benefits, because it allows them to create projects under both the EC and EUREKA. They also give industrialists a chance to show researchers and EC programme managers what areas of technology they feel require more basic research, and show researchers what applications of their knowledge, if properly developed, could be marketed.

Three out of the four brokerage events held under the Norwegian Chair were run along these lines, demonstrating that this facet of cooperation is in fact the norm, not the exception. On the EUREKA side, they are usually organised, or at least co-sponsored, by the NPC of the host country. From the EC side, it is usually the relevant programme manager.

In addition, the EC and EUREKA have improved the mutual flow of information about both organisations' RDD activities. This will help the early identification of any proposed EC or EUREKA projects which could benefit from EC-EUREKA synergy. For example, a proposed EC Programme may stimulate more EUREKA projects downstream if it is recognised early enough, and EUREKA projects may have implications for EC regulations or research activities.

Case study

JRC/EUREKA: Environmental Analysis on the Road

The JRC's Environment Institute is the leading participant in EU 674 - Advanced Mobile Analytical Laboratory (AMAL). The multi-vehicle laboratory will undertake its first major field trial this October on a heavily polluted site near Leipzig.

Analysing environmental pollution is often best done on site, rather than at a central laboratory, for a number of reasons. Emergency authorities dealing with a chemical accident will need results as soon as possible, while moving highly toxic samples is undesirable. And some samples, such as soil extracted from underground, may need to be analysed immediately.

AMAL answers these needs. Launched under EUREKA's EUROENVIRON umbrella in 1991 by the Environment Institute and companies and research institutes from Denmark, Finland, Italy, Russia and the UK, the result is five modules, each mounted on its own truck:

■ **UM 1 - The Mobile Chemical Laboratory:** Contains standard laboratory equipment (chemical hoods, freezer, oven etc) and units for Supercritical Fluid Extraction (SFE), Potentiometric Stripping Analysis (PSA) and Flow Injection Analysis.

■ **UM 2 - Instrumental Analysis:** Dominated by a plasma spectrometer using a mass spectrometer as a detector, it also contains two gas chromatography units and a unit for analysing the presence of hydrogen, carbon, nitrogen and sulphur.

■ **HMK -** Primarily concerned with organic compounds, including vapours and gases, it contains a combined gas chromatography/mass spectrometer and an X-ray fluorescence unit. It can also screen solid samples for the presence of metals.

■ **Water Analysis:** Three different instrument systems provide a complete analysis of waterborne pollutants, ranging from phosphates to phenols.

■ **Penetrometer Vehicle:** A 20 tonne, four wheel drive truck dedicated to the penetrometer probe. A hydraulic thrust system drives the probe up to 80 metres underground, through which pumps extract water and gas samples for analysis in the other vehicles, resulting in a profile of soil and water composition and contamination up to 80 metres deep.



Led by the JRC's Environment Institute, the AMAL project (EU 674) takes environmental analysis into the field.

Lastly, AMAL's communication systems uses mobile telephones, fax-modems and the Inmarsat C satellite system, a link which has been successfully demonstrated over a distance of 6,000 kilometres.

Total Site Analysis

"One of the main challenges has been to adapt analytical techniques to field conditions, which means making sure that they can stand shocks, vibrations and temperature swings," comments Dr Avogadro of the Environment Institute. "In addition, we had to establish a set of standards for in-field measurements that may now be adopted across Europe."

The site near Leipzig will provide a number of challenges. From 1870 to 1930 low quality coal was mined and processed on-site into oil, which was further processed into chemical products, and coke, which was simply dumped. The 15 km² site, now covered in forest, contains a stream, large heaps of coal ash and coke and an artificial lake used as a liquid waste dump.

"We will be there for two weeks, examining the water in the stream and the lake, and lake sediments and surface soils in a number of locations," Dr Avogadro explains. "Down the hill from the lake, for example, is a barren area, while vegetation in the fields near the ash deposits seems to be struggling. We hope to find out how a whole range of pollutants, from toxic vapours to heavy metals, migrate from ash heaps to the fields and the water table, from the lake bed to the ground surface, and throughout the system generally."

AMAL should be fully operational by next year. The final stage of the project will then be to find commercial customers, such as local authorities or industrial sites.

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► BRITE/EURAM

Forming a Europe-wide Research Community

When the participants of the Concerted European Action on Magnets (CEAM) project have their yearly general meeting this September, they will be marking almost 10 years of successful, focused European research networking.

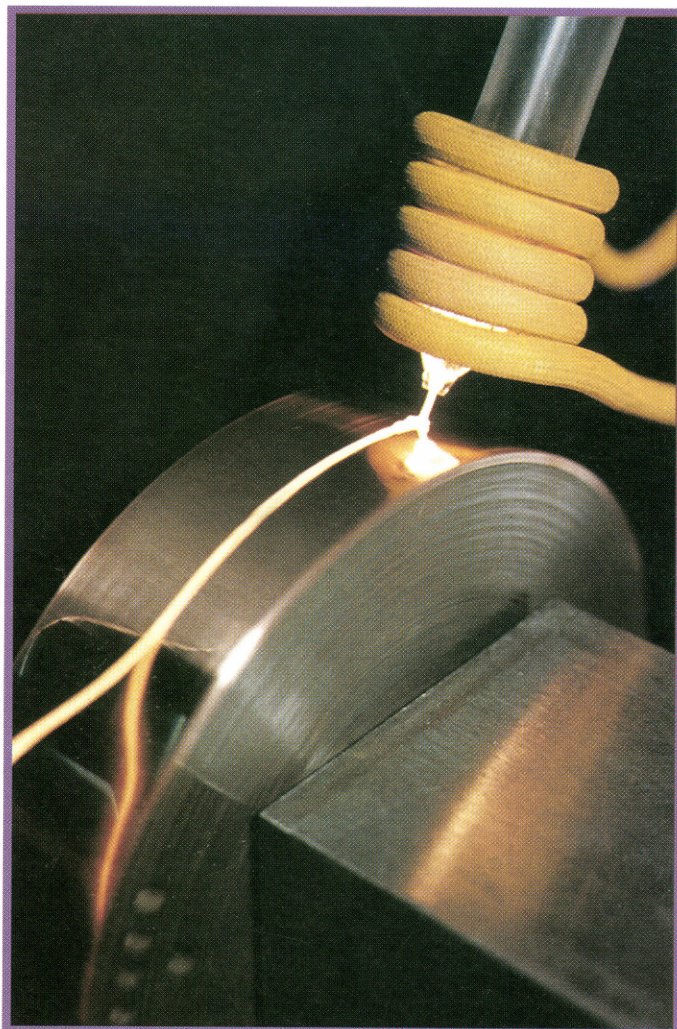
There are countless applications for permanent magnets, ranging from tiny devices inside hi-fi equipment to the massive blocks needed to levitate tomorrow's high speed trains. The global market for magnets, today worth 2 billion ECU, is expanding at around 15% each year. At present, Japan dominates this market (54% market share), with the US and Europe accounting for around one fifth each.

"Magnets are more than an important component, they are a strategic resource," explains Professor John Michael David Coey, Head of the Physics Department at Trinity College, Dublin. "When, in 1983, Japanese and American companies independently discovered Nd₂Fe₁₄B - the first iron-based high-performance 'rare-earth' magnet - it was clear that European competitiveness was falling behind."

This was not for lack of research expertise, as there were many European groups active in rare-earth magnetism. However they were separated by geographical and political barriers, so that while various European countries had special strengths in particular fields, the whole spectrum of interlocking activities had never been properly developed within one coordinated framework.

Concerted Action

The Concerted European Action on Magnets (CEAM) was launched in 1985 to bring these different groups together in a flexible, voluntary framework. Originally launched under the EC's 'Stimulation' programme for three years, it



Melt spinning, an industrial process used to produce rare-earth iron magnets.

has continued under the EURAM and BRITE-EURAM Programmes. The initiative started with around 50 laboratories, and has grown to include more than 150 scientists from 92 organisations in 13 countries (the EU twelve, except Luxembourg, plus Austria and Finland).

Being a Concerted Action, the bulk of the 2.75 MECU spent over these nine years was on network-

ing. The heart of CEAM is a series of meetings, ranging from small gatherings of experts focusing on a special topic to the yearly general meeting, held this year on September 16-17 in Birmingham. There is also a bi-monthly newsletter, a scientist exchange programme and a bibliography and database for the researchers.

The research falls into three broad areas:

- **device applications exploiting rare-earth magnets:** coordinated by the Technical University of Berlin, this group is closely associated with industry. Electrical engineers and computer-aided design specialists focus on electromagnetic and magnetostatic applications for the new materials;
- **new processing technologies:** composed largely of metallurgists and materials scientists, including a significant industrial component, this group is coordinated by Birmingham University and focuses on magnetic alloy microstructures and problems of magnet processing and stability;
- **new materials for high-performance magnets and investigation of their properties:** coordinated by Professor Coey in Dublin, this large group is composed mainly of physicists and chemists synthesising and investigating rare-earth magnets. In addition, the CNRS in Grenoble, France, coordinates activities relating to 'coercivity', essential to producing permanent magnets from magnetic alloys.

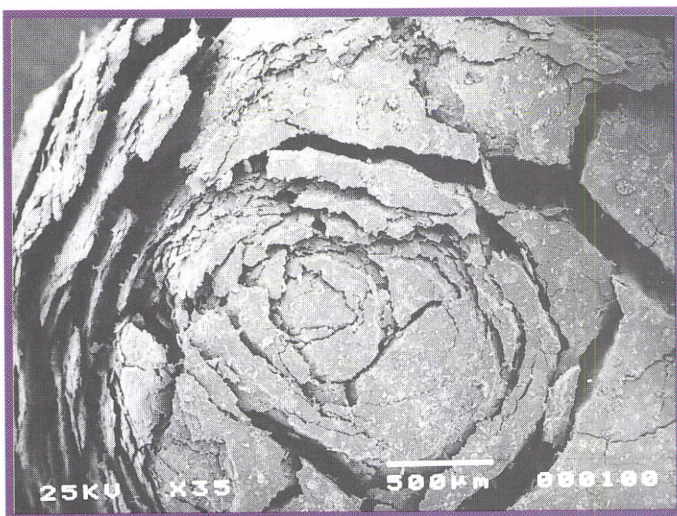
Patented Results

According to Professor Coey, there is no doubt that CEAM has been a significant success. "Nd-Fe-B magnets are now manufactured by five companies in Europe, and significant improvements have been made to their thermal stability and corrosion resistance," he points out. "Taken together, the partners have filed over a dozen patents in the past nine years, with more on the way. Much of this would never have happened without CEAM."

Professor Coey's own group, for

Photo: J. Vincent, Sheffield University

Photo: J. Vincent, Sheffield University



A scanning electron micrograph of hydrogen decretted Nd-Fe-B.

example, filed several patents following their 1990 discovery of what some believe will be the next generation of rare-earth bonded magnets: $\text{Sm}_2\text{Fe}_{17}\text{N}_3$, commonly known as 'Nitromag'.

The $\text{Nd}_2\text{Fe}_{14}\text{B}$ magnets developed in the early to mid 1980s by Japanese and American companies are excellent performers, but only at temperatures below 150°C . Many motors run hotter than this, and therefore cannot use these high performance magnets.

Nitromag, however, has better temperature stability with magnetic properties comparable or better than $\text{Nd}_2\text{Fe}_{14}\text{B}$, opening up a whole new range of applications. It is produced by heating $\text{Sm}_2\text{Fe}_{17}$ - a mediocre magnetic compound - and exposing it to nitrogen gas under carefully controlled conditions. The $\text{Sm}_2\text{Fe}_{17}$ lattice absorbs the nitrogen, expanding by around 6%. It is this lattice expansion that increases the usable temperature range.

"Nitromag's discovery is a good example of how a Concerted Action like CEAM can make a difference," Professor Coey explains. "It was our research group's exposure to industry's priorities that led us in the right research direction, and when we had developed the material, of course, the CEAM network transmitted the results throughout the European industry. We were also very fortunate to be given a great deal of assistance from the VALUE Programme in filing the patents."

It should be stressed, however,

that the Japanese companies have competing patents, and are right alongside the CEAM partners at the cutting edge. A similar story springs from the research into new hydrogen-based processing technologies in Birmingham and Grenoble. Today, both European and Japanese companies are adopting the Hydrogen Decrepitation (HD) process.

One of the more expensive steps in making a magnet is producing the magnetic material in powder form, which is then either mixed

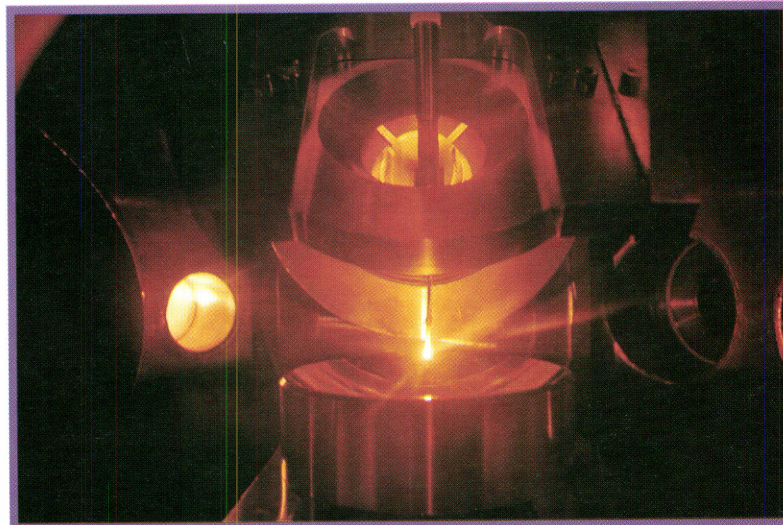


Photo: F. de Boer, University of Amsterdam

Pulling crystals of new magnetic alloys from the melt.

with a bonding resin or sintered to create the magnet. HD promises to be much cheaper than traditional crushing and milling methods, and works simply by exposing the ingot to hydrogen at room temperature. The crystalline microstructure of the $\text{Nd}_2\text{Fe}_{14}\text{B}$ absorbs the hydrogen and falls apart.

A related yet more sophisticated process, known as HDDR (Hydrog-

enation, Disproportionation, Desorption and Recombination), produces a powder with a smaller grain size than that of the original ingot. The process is more complex, requiring various stages of heat and pressure, but the rewards are significant, as the reduced grain size translates into better magnets.

A Flexible Framework

In these and other cases, it is now Japanese and European researchers who are leading the world, a significant improvement to the situation of ten years ago. The key to CEAM's success is the way it combines a maximum of flexibility with a minimum of paperwork. Participation is motivated by the desire to exchange high-quality scientific information, rather than the promise of research funding.

Within CEAM, "a cross-section of academic and industrial scientists and engineers, interested in different aspects of magnetism, form clusters of related specialists," notes Professor Coey. "These clusters are linked together, creating an ensemble greater than the sum of its parts. This

The final proof of CEAM's success is that it has reversed the tendency for European researchers to collaborate primarily with their counterparts in North America, rather than with those just across the border. Scores of graduate students and researchers have visited other CEAM laboratories for an average of six weeks each, while over one third of the more than 1000 papers published by the partners were joint efforts involving at least two CEAM members. The barriers to regional scientific collaboration in this specialised field have been convincingly overcome, and a European hard-magnet community has come to life.

CEAM officially ends this October, but Professor Coey believes that many of the partners will wish to develop their network further and apply for support under the Fourth Framework Programme. "CEAM has achieved many of its objectives, but there are always new avenues of research," he concludes. "Therefore the next Concerted Action will probably extend into new areas as it carries on into its second decade." ■

structure promotes understanding between experts in fields ranging from basic magnetism and microstructure through to patents and international commercial competition. Everyone has learnt something about the links between science, technology, production and innovation. And all of this was achieved without any full-time administrator or organiser."

C o n t a c t

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► INFORMATION TECHNOLOGY

Europe's Information Infrastructures

EITC '94, the European IT Conference, was held last June in Brussels, and focused on how the coming global information infrastructures will transform the way Europeans work and live.

The conference began on Monday, June 6, with a short plenary session opened by George Metakides, Director of DG III-F (Industry: RTD Actions; Information Technology) of the European Commission. As he observed, the conference was well timed, with Com-

missioner Bangemann's report on Europe and the Information Society (see Policy News, this issue) recently completed, and the new Specific RTD Programme for Information Technologies soon to be launched.

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role of information technology in supporting cooperative work.

■ **Technologies for IT components and subsystems:** A number of panel sessions considered business opportunities for microsystems, flat panel displays and the requirements of the European

of trans-European activities.

■ **Multimedia technologies:** This session examined major multimedia trends and their future socioeconomic impact, the new market opportunities being created and the resulting challenges facing the publishing industry.

participants exchanged experiences, discussed management science, technology management and technology for business processes and examined company competitiveness, competitive advantage and the role of technology.



The walk-through section of the ESPRIT Exhibition focusing on 'Mobility' included many research results in the field of Teleworking.

missioner Bangemann's report on Europe and the Information Society (see Policy News, this issue) recently completed, and the new Specific RTD Programme for Information Technologies soon to be launched.

The conference participants then split up to attend one or more of the 8 parallel sessions for the rest of the first day:

■ **Long-term research in the Fourth Framework Programme:** Three round-table discussions examined research leading to improvements in human-computer interactions, trends and perspectives in operating systems and the

semiconductor industries.

■ **Software technologies:** This session examined the coming opportunities and challenges in this field, discussed new needs which software could satisfy and identified the key factors for software intensive applications in the next decade.

■ **High-performance computing and networking (HPCN):** Panelists from both the goods and services sectors reviewed the current and future opportunities offered to Europe's enterprises by HPCN and discussed the opportunities offered by high-performance simulation in the design and operation

■ **Integration in manufacturing:** Themes covered in this session included the challenge of introducing innovation into manufacturing, new manufacturing paradigms and the way advanced information technology can contribute to cleaner production techniques.

■ **Open Microprocessor Systems Initiative:** The session examined the results, industrial benefits and future directions of the Open Microprocessor Systems Initiative and discussed applications and architectures.

■ **Technologies for business processes:** Under the heading of "Transforming the Enterprise" the

Transforming the Enterprise

The second day began with an opening address by Commissioner Bangemann on the new information markets, and focused on the ways information technologies and infrastructures can improve efficiency and generate new markets and employment.

The conference concluded on Wednesday June 8 with the IT Forum. Drawing on the previous days' sessions, the Forum addressed how Europe's enterprises can implement and exploit the transition to a society and industry based on information infrastructures, in the context of the White Paper on Growth, Competitiveness and Employment.

In addition, the EITC '94 Exhibition was held to focus attention on the impact of information technology on three aspects of daily life: the workplace, mobility and leisure. Composed of a series of interconnected 'walk-through' environments, the exhibition highlighted the contribution made by Community-sponsored R&D in this area. ■

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EUROPEAN INNOVATION CONVENTION 11-12 October, Stuttgart (Germany)

Sponsored by the EC's VALUE and INTERPRISE Programmes, the Convention aims to present innovative environmental technologies developed within the EC's RTD Programmes to technology-oriented SMEs, as well as promote technology transfer between these companies.

It is suitable for companies seeking to solve their environmental problems, production companies looking for new products to suit environmentally-oriented demands and research organisations interested in applying for EC or regional research funding. There will be four workshops, covering environmental technologies in the metal production, plastics and textile/paper industries and industrial emissions screening. A range of technology transfer services will also be organised.

Contact: Gesellschaft für Internationale Wirtschaftliche Zusammenarbeit

Fax: +49 711 227 87 22.

COMBINED ENERGY AND WATER MANAGEMENT IN INDUSTRY 24-25 October, Thessaloniki (Greece)

Organised with the collaboration of the JOULE Programme, this EUROTHERM Seminar focuses on the efficient industrial use of water and energy. Topics include optimised system modelling and design, energy efficient desalination and waste water purification, energy and water auditing and more.

Contact: Prof. A. J. Karabelas, Aristotle University of Thessaloniki
Tel: +30 31 996 201; **Fax:** +30 31 996 209.

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 co-operation in the services field, procuring equipment and services and areas for future EU action.

Contact: CMP International Conferences
Tel: +33 1 49 52 33 00/22.

TRANSTECH INTERNATIONAL 1-2 December, 1994, Cardiff (UK)

Held in the Welsh capital's International Arena, the technology transfer event is designed to create new business opportunities by bringing together researchers and industrial developers. Organised by the Technology 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 pat-

R&D ON INDUSTRIAL AND MATERIALS TECHNOLOGIES 6-8 December 1994, Brussels (Belgium)

The 5th in a series of annual conferences covering the EC's research programmes in this field, the conference focuses on the results obtained under the 3rd Framework Programme and industry's needs from future research.

The Opening Session will be chaired by Commissioner A. Ruberti (responsible for DG XII - Science, Research and Development), and will include the Presidents of the EU's Research Council and the European Parliament's Committee on Research, Technological Development and Energy. The round table session that afternoon will focus on "The Needs for European Research on Industrial Technologies, including Standards, Measurements and Testing", and will be chaired by Mr P. Fasella, the Director-General of DG XII.

Most of the presentations the next day will focus on successful, exploitable RTD projects in Materials Research, the innovative CRAFT initiative for 'low-tech' SMEs, Design and Manufacturing Technologies, Measurements and Testing, and Steel Research. The day will end with an overview of the 4th Framework Programme as concerns Industrial Technologies and the opening of the Proposers' Forum.

The morning of the final day will be devoted to six thematic sessions, each examining the new Industrial Research Programmes in detail:

- Research for the industry of the future;
- Inter-programme coordination, especially around transport policies;
- Prenormative research;
- Industrial research for product innovation;
- RTD by and for SMEs;
- Networks and initiatives associated with the programmes (training, EUREKA, etc).

A final round table will officially end the conference in the afternoon, although the Proposers' Forum and meetings between project proposers and Scientific Officers will continue on into the evening and the following morning.

Contact: BRITE-EURAM, DG XII, Brussels
Fax: +32 2 295 8046

ents, 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 also be a major exhibition, with around 200 displays.

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

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

■ Research Publications, 1993 EUR 15673, 13.5 ECU

The latest in a yearly series of books providing the titles (translated into English, if necessary) and other bibliographic details of all 'EUR' series reports published during 1993 which result from the EU's RTD Programmes, as well as from other studies financed wholly or in part from the EU budget.

The 500+ listed reports are classified as Industry & Technology (94 titles), Energy (116), Physical and Exact Sciences (6), Biological Sciences (17), Agricultural and Marine Resources and Products (62), Measurements and Standards (26), Protecting Man and His Environment (124), Social and Economic Concerns (25) and RTD Horizontal Actions (36). There are also indexes based on titles, EUR numbers and authors.

■ European Community Design Prize 1994 15 ECU

A 140+ page, full-colour book covering the 42 nominees and winners of the 1994 European Community Design Prize, which is supported by the SPRINT Programme. See the previous issue of *Innovation & Technology Transfer* for more details on the prize, which aims to promote the importance of innovative design to SMEs.

Contact: European Design Partnership, Dublin,
Tel: +353 1 661 0944
Fax: +353 1 676 8240



■ Scientific and Technological Cooperation with Eastern Europe EUR 15716

A 36-page, full-colour brochure describing the history, activities and preliminary results of the EU's initiatives in this field: ACE, CHECIR, CIST, COST, INTAS, PECO-COPERNICUS, PHARE, TACIS and TEMPUS. General descriptions, tables of statistics and contact persons for each of these programmes are provided. The French version is available now, with other languages following soon.

Contact: Mr M. Claessens,
DG XII, Brussels
Fax: +32 2 295 8220.

■ EUR-OP News Supplement:
Fourth Framework Programme
DG XII and DG XIII co-financed this supplement to the Summer 1994 edition of EUR-OP News, the A3-format publication on EU issues available in several languages. Apart from a general introduc-

tion, it provides a financial breakdown of the Fourth Framework Programme, details of information sources and guides, a brief summary of other RTD-related EU Programmes (from nuclear fusion to helping Soviet scientists) and an interview with Mr Ruberti, the Commissioner for Research.

Contact: Mr M. Claessens,
DG XII, Brussels
Fax: +32 2 295 8220.

■ Assessment of Critical Technologies in Europe EUR 15698, 7 ECU

"Assessment of Critical Technologies in Europe in Selected Fields Covered by the EC Research Programmes", to give the full title, summarises a Patent Citation Analysis of the EU's technological position, both overall and in 13 critical technologies ranging from advanced materials to software. The main findings are that: the EU continues to lose overall technological position to Japan; the Japanese are particularly strong in critical technologies, especially those related to electronics, where the EU is generally weak; the EU still shows considerable strength in critical technologies related to materials, chemicals, drugs and medicine.

■ Proceedings: "A Single Market in Medicines"
ISBN 3-89245-030-7
"Health Changes and Needs in Europe in 2001" was held in March 1993 in Berlin by the Kangaroo Group ("The Movement for

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.

Free Movement'). The conference examined current and future issues for achieving a free flow for services and goods in the European health care sector, including drug development regulation, the European Medicines Agency, genetic technologies, 'soft', or alternative, medicines and European demography until 2010 and beyond. The Proceedings are bilingual (English-German).
Contact: Medical Trends GmbH,
Tel: +49 212 20 5093
Fax: +49 212 20 8352

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