

Innovation & Technology Transfer

2 / 99

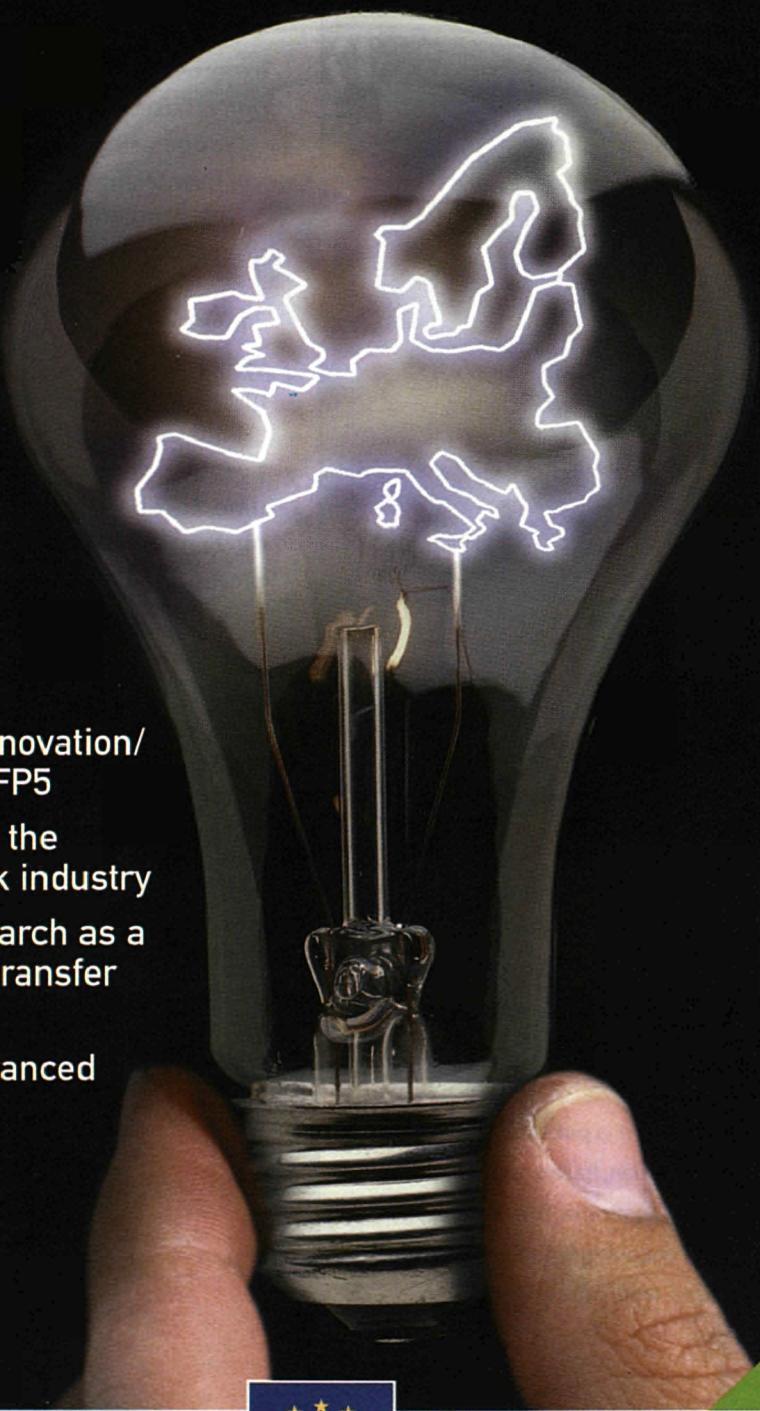
Training for Innovation

Building a Europe of Knowledge

Plus

- The role of the new Innovation/SMEs programme in FP5
- Robotised welding for the European rolling stock industry
- Cultural heritage research as a source of technology transfer opportunities
- JRC launches two advanced software products

... and more



Pull-Out Guide:
FP5 On-Line





Solar Roof, page 18

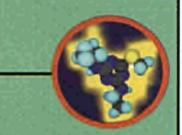
Innovation/SMEs programme 3-5

- The Fifth Research Framework Programme — the role of the new Innovation/SMEs programme
- Innovation project — robotised welding for the European rolling stock industry



Dossier: Education and training: 6-11

- Vocational training, fellowships and training networks for researchers
- Industrial involvement in the transnational training of European researchers
- Case study — a research training network in the field of advanced polymers for chemical analysis
- Case study — training materials for a European course in neuroradiology
- Case study — transfer of good practice in entrepreneurship training



Policy News 12

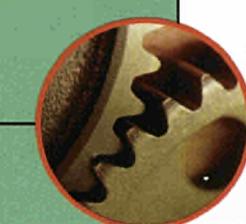
- Creating a European risk capital market

Supplement:

On-Line Support for Participation in FP5

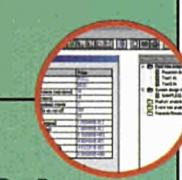
IRC Newsletter 13-20

- The network of Innovation Relay Centres under FP5
- Cultural heritage research
- Improving the technology transfer service with technology profiles
- Improving the technology transfer service with semi-automatic distribution of offers and requests
- Technology transfer success story — solar heating for agricultural drying
- IRC staff training — first induction workshop
- Calendar of events



Programme Briefing 21-22

- JRC launches two advanced software products through distribution deals



Conferences & Publications 23-24



The 'Innovation and Participation of SMEs' programme is part of the European Commission's Fifth Research Framework Programme, under the responsibility of Edith Cresson, Member of the Commission responsible for Research, Innovation, Education, Training and Youth.

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A Europe of knowledge

Europe's prosperity will be largely determined by the priority it awards to education and training. This is an essential investment, not only because it will allow young people to gain access to quality jobs and permit their personal fulfilment, but also because now - more than ever before - it is the key to our industry's competitiveness.

We are currently facing a paradox. While unemployment remains a major problem in all European countries, we are also seeing that the development of many high-tech sectors is being held back by a shortage of skills. What is more, these are the very sectors which are - and will long remain - the strongest engines for economic growth worldwide. We must therefore clearly devote more effort than in the past to the education and training of young people, as well as to the lifelong updating of their skills.

Our training policies also determine the level of scientific expertise on which our capacity for technological innovation is based.

Europe's single employment market and the very nature of new technologies are changing the whole dimension of the problems we are facing. This is bringing both new challenges and new development opportunities - and a greater need than ever for a European approach. It is to meet this need that the Leonardo programme for vocational training and the programme for the training and mobility of researchers were designed.

I am determined to draw on the success of these initiatives in order to help create, over the next few years, a genuine Europe of knowledge. A Europe in which the free movement of skills, of men and women equipped with their professional qualifications, will allow research and companies throughout Europe to gain access to the human resources they need.

Edith Cresson

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Fifth Research Framework Programme Launched



The budget for the European Union's Fifth Research Framework Programme, for the period 1999-2002 — a total of €14.96 billion — was agreed by the Council of Ministers just before Christmas. The programme was officially launched at a conference in Essen at the end of February.

Edith Cresson, Member of the European Commission for Research and Innovation, promises that FP5 will be animated by 'a different spirit', with greater integration of different research areas, and a clearer orientation towards the needs of Europe's citizens.

This new spirit is reflected in significant changes to the structure of the framework programme, embodying a more focused set of objectives. Research is organised into four 'Thematic Programmes', each encompassing a limited set of problem-oriented 'key actions'. Three 'horizontal' programmes cover co-operation with third countries, innovation and SMEs, and improving Europe's research capacity.

The December Council meeting agreed a detailed allocation of the total budget — an increase of 4.6% compared with the Fourth Framework Programme — between the various activities in each specific programme.

Innovation and SMEs

Innovation — the successful application of new technologies and methods — is critical to industrial competitiveness, sustainable economic and social development, and the creation of jobs. SMEs are both key sources of new technology and — in much greater numbers — key beneficiaries of its application, converting it into competitive products and services.

The 'Innovation and Participation of SMEs' horizontal programme will play a more important role than its predecessor under FP5, in order to facilitate the exploitation of research and further increase the involvement of SMEs.

Innovation is a global objective throughout FP5, and in the projects of its thematic programmes, in each of which measures to encourage SME participation in research will be carried out. In addition, each will interface with the Innovation and SMEs programme, managed by Directorate-General XIII, which will:

- act as a clearing house for innovation data and trends, and for transnational exchanges of best practice, and contribute to policy initiatives, notably through implementation of the First Action Plan for Innovation in Europe⁽¹⁾
- be a 'test bed' for FP5, launching pilot actions in the areas of innovation and SME participation

- offer information services and assistance to innovative SMEs, and support the thematic programmes in their approach to innovation and SMEs.

First Calls

FP5's research priorities have been established on the basis of a common set of criteria, which will also be used in the assessment of proposals — though their relative weighting may vary between programmes:

European added value — necessary 'critical mass' of human and financial resources; contribution to Community policy; addressing European-level problems or issues

Impact in terms of Community social objectives — employment; health and quality of life; environmental protection

Focus on topics of key importance to European economic development — future growth markets; sectors essential for competitiveness; areas likely to yield significant technological progress.

The Innovation/SMEs Programme In Brief

Part of the EU's Fifth Research Framework Programme, the 'Innovation and participation of SMEs' programme promotes innovation and encourages the participation of small and medium-sized enterprises (SMEs) in the framework programme. The Programme Director is Mr G.C. Grata.

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(1) See the Special Edition of February 1998.

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FP5: Detailed Budget Breakdown



1. Thematic programmes

Quality of Life, Management of Living Resources €2,413m

Key actions:

- food, nutrition and health € 290m
- control of infectious diseases € 300m
- the 'cell factory' €400m
- environment and health €160m
- sustainable agriculture, fisheries and forestry €520m
- the ageing population and disabilities €190m

Research of a generic nature €483m

Support for research infrastructure €70m

User-Friendly Information Society €3,600m

Key actions:

- systems and services for the citizen €646m
- new methods of work and electronic commerce €547m
- multimedia content and tools €564m
- essential technologies and infrastructures €1,363m

Research of a generic nature €319m

Support for research infrastructure €161m

Competitive and Sustainable Growth €2,705m

Key actions:

- innovative products, processes and organisation €731m
 - sustainable mobility and intermodality €371m
 - land transport and marine technologies €320m
 - new perspectives for aeronautics €700m
- Research of a generic nature €546m**
- Support for research infrastructure €37m**

Energy, Environment and Sustainable Development

This theme is divided into two parts, as follows:
Environment and Sustainable Development €1,083m

Key actions:

- sustainable management and quality of water €254m
- global change, climate and biodiversity €301m
- sustainable marine ecosystems €170m
- the city of tomorrow and cultural heritage €170m

Research of a generic nature €119m

Support for research infrastructure €69m

Energy €1,042m

Key actions:

- cleaner energy systems, including renewables €479m
 - economic and efficient energy €547m
- Research of a generic nature €16m**

2. Horizontal programmes

Confirming the International Role of Community Research €475m

Promotion of Innovation, Encouragement of SMEs €363m

Improving Human Research Potential €1,280m

Joint Research Centre €739m

3. Euratom Treaty €1,260m

Key actions:

- controlled thermonuclear fusion €788m
 - nuclear fission €142m
- Research of a generic nature €39m**
- Support for research infrastructure €10m**
- Direct actions €281m**

INNOVATION PROJECT



Faster Trains, Faster

High-speed rail links are essential for the free flow of people and goods within the Single European Market. The creation of an advanced trans-European rail network will be hastened by a new robotic manufacturing system, which promises to reduce the cost of both trains and tracks.

The plains of France and Germany present few obstacles to 300 km/h rail travel. With only gentle bends and gradients to negotiate, trains can be built of steel. Special tracks are required, but these can be laid relatively cheaply.

To wind through steep mountain passes at high speed, on the other hand, trains such as Italy's 250 km/h tilt-bodied Pendolino require lightweight, all-alu-

minum carriages. Not only do they allow smaller and more energy-efficient engines to be used. They are also able to run on existing tracks, avoiding the prohibitive costs of constructing new bridges and tunnels.

High Precision

"The market for high-speed trains is expanding rapidly," says Bruno Bisiach of Italian industrial

robot manufacturer Bisiach & Carrù. "Coach-builders' order books are full, and European Union support for the creation of the Trans-European Transport Network will stimulate demand for several years to come."

Extruded aluminium offers significant overall cost advantages, but is technically challenging. Strength, reliability and aerodynamic efficiency all demand high precision, but a

twist of one tenth of a degree in the 29 metre side panels can produce misalignment of nearly five centimetres. At present, panels are welded together, and door and window openings cut out, using traditional equipment, and any deformation must be corrected manually, which is slow and expensive.

In the Transrail Innovation project⁽¹⁾, Bisiach & Carrù and German engineering research centre APS are adapting for rolling stock production a technology which they jointly developed for the automotive sector⁽²⁾. The integration of APS's innovative laser-based sensors into Bisiach & Carrù's Tauro gantry robot makes automated assembly of wagon shells possible for the first time. The system has been tested in the construction of three different versions of the *Pendolino* at Fiat Ferroviaria's plant, at Savigliano, near Turin.

Changing Trains

"Europe's national railways employ a variety of track gauges and tunnel heights, so coaches must be built to a range of different specifications," Bisiach explains. "The ability to switch rapidly between models makes a very large impact on operating costs." Fiat Ferroviaria has used the Transrail work-cell to build coaches for a narrow-gauge Italian *Pendolino* and for a wide-gauge Finnish version, as well as for the standard European model, demonstrating that it greatly reduces down-time between set-ups.

For small-series production, the conventional method of 'teaching' a robot by guiding it through the sequence of positions for each weld and each cut was plainly uneconomic — each side panel may require as many

as 25,000 spot-welds alone. Instead, the robot head follows a path defined in the carriage's computer-generated design, continuously monitoring and adjusting this path in response to feedback from specially developed sensors on the head itself.

"The reflective surface of aluminium creates difficulties for ordinary laser sensors," says APS's Professor Paul Drews, "as do dust and welding sparks. Welding used to take place in a separate workshop from cutting and milling, but a key advantage of the new work cell is that both operations are performed by the same equipment, in the same space. APS devoted a lot of effort to producing a sensor package capable of functioning in a dirty environment."

The lack — in most robotic and computerised numerical control (CNC) systems — of any means to store and process sensor data created the principal challenge to the integration of the sensor technology and the robot. APS developed an intermediate controller and storage (ICS) unit, which converts data from the sensing system into control commands to the robot head.

"The ICS compares the actual shape of the workpiece with the nominal shape predicted by the design, and corrects the trajectory of the robot head by calculating the optimal path," Drews explains. "The heat generated by welding itself causes slight deformation of the aluminium sheets. Real-time sensor control is the only way of compensating for these imperfections, in order to produce a perfectly welded seam. It also makes reconfiguration of the work cell easy, when carriages with different dimensions or design features are to be produced."



Coast to Coast

Build quality translates directly into reliability and aerodynamic performance. The strict quality standards imposed by European railway regulators formed a key element of Fiat Ferroviaria's initial specification for the new system, and the Italian train-builder is thoroughly satisfied with the results.

It currently takes as long as a year to build an 11-unit train. By automating the process, the Transrail work cell can cut construction time by 10% and substantially reduce manufacturing costs. The competitiveness of the rolling-stock industry throughout Europe will be boosted significantly when the technology becomes widely available, following completion of the project this spring.

In 2020, many of the trains whisking Europeans between Bordeaux and the Black Sea will be made of aluminium. ●

The Tauro gantry robot has been equipped with innovative laser-based sensors, allowing fully automated assembly of railway wagons. Here, a prototype mills a window opening in a small test workpiece.

(1) IN10430I

(2) In the Flexbotic research project, BREU0491, in the Brite-Euram Industrial and Materials Technologies programme.

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Building a Europe of Knowledge



Europe's future prosperity depends upon today's investment in high-quality education and training. Since competition for jobs, skills and knowledge now takes places in a single European market, building a 'Europe of Knowledge' demands a transnational effort.

The trend towards knowledge-based industry and employment is accelerating. Education and training, not just in preparation for a career but throughout working life, will be critical for technological innovation and competitiveness — for the creation of jobs, as well as to equip people to fill them.

The European Union does much to promote effective education or training of school pupils, students, apprentices and young volunteers across Europe — pressing for cross-border recognition of qualifications, for example, and stimulating the take-up of advanced teaching methods and technologies. Here, however, we focus on its support for education and training in the fields of research, technological development and innovation.

Skills in Demand

Europe's leadership in the growth markets of the future demands a strong scientific base, built by highly-qualified professional researchers, linked together through efficient transnational networks.

More immediately, many technology-based industries face acute skills shortages. Europe as a whole now spends more on information and communication technologies than on steel, cars, and aeroplanes combined. Yet its own ICT sector cannot find enough suitably qualified staff — and will need at least 1.5 million new professionals in the next five years alone.

Finally, as highlighted at the First European Forum for Innovative Companies in Vienna last November⁽¹⁾, greater entrepreneurial

competence and drive are needed if Europe is to capitalise on its scientific achievements. Academic research institutions should strengthen their links with industry, and encourage their staff to work in a more commercially-oriented way — both in partnership with existing companies, and by starting up their own new enterprises.

Greater Resources

Community actions in the fields of education, training and youth for the period 2000-2006 will focus on five broad types of measure, designed to facilitate the **transnational mobility** within Europe of pupils, students, trainees and teachers; to build European **transnational networks** facilitating the exchange of experience and good practice; to promote understanding of Europe's different **languages and cultures**; to promote **innovation** through pilot projects in the design and delivery of teaching and training; and to improve **comparative information** in this area across Europe.

Leonardo da Vinci — the programme for **initial vocational training** — will by the end of 1999 have supported transnational placements and exchanges for 170,000 young people. The programme's second phase, with an increased budget, begins in 2000.

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(1) See the Special edition of December 1998, and 'Role Models for an Innovative Europe', edition 1/99.

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CASE STUDY

Image Conscious

New teaching methods are vital, to keep pace with technological change. In the field of neuroradiology, the digital nature of the new technologies is being exploited to create a 'virtual university'.

Medical imaging techniques have advanced with extraordinary speed in the past decade — and with them, our understanding of the brain's functioning, as well as the clinical and surgical procedures which make possible for the first time effective treatment of the many diseases which affect it.

Neuroradiology, previously regarded merely as a branch of radiology, has begun to emerge as a discipline in its own right. But no comprehensive standard European training programme has yet been developed.

"The rate at which imaging technologies are continuing to improve in itself presents a huge problem," explains Professor Danielle Baleriaux of the Free University of Brussels (ULB). "Traditional printed teaching materials are outdated by the time they appear — they never include the latest techniques. And because our work is based around images, books are extremely expensive to produce."

ULB is co-ordinating a three-year Leonardo da Vinci project⁽¹⁾ which brings together the complementary expertise of the neuroradiology departments of three leading university teaching hospitals, in order to address this problem. "The project is enabling us to develop and evaluate a coherent set of high-quality teaching tools which will, we hope, provide the basis for a future Masters course available to students anywhere in Europe," says Baleriaux.

Peer Review

Because neuroradiological images are created and stored in digital form, it has been possible to design teaching materials which can be much more cheaply distributed, and which are much easier to update as new information becomes available. A series of CD-ROMs has won praise from experts worldwide, and is already selling well. The partners are now building a medical imaging database, containing additional in-depth reference material for lecturers and students, which will soon be published via the World-Wide Web.

But Baleriaux points out that to be of value as a resource either for a Masters course or for the in-service training of professional staff, such materials must be of the highest quality. "We are developing a structure for the careful peer review of material submitted both by the existing partners and by others, before it is put up on the web site," she explains.

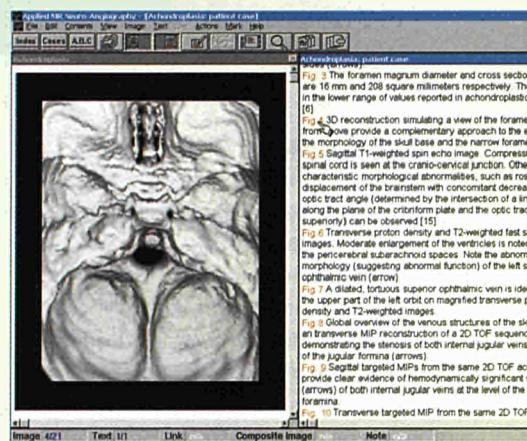
As a means of testing the new tools, they are already being used to support teaching in the three participating universities, and the partners are also assessing video-conferencing as a means of linking lecturers and students at different sites. "Remote access to training and education requires an interactive element, which video-conferencing can provide," says Baleriaux.

The project is devoting considerable effort to publicising its work in medical circles, through conferences and journals, and has



A series of widely praised CD-ROMs provide 'digital textbooks' on

neuroradiology which are easy to update and relatively inexpensive to produce.



A clean, simple user interface makes access to a wealth of high-quality material extremely easy.

generated considerable interest from teaching hospitals in Europe, Canada, the United States and Asia. Baleriaux says that new partners are anxiously awaiting the opportunity to join a full Masters programme.

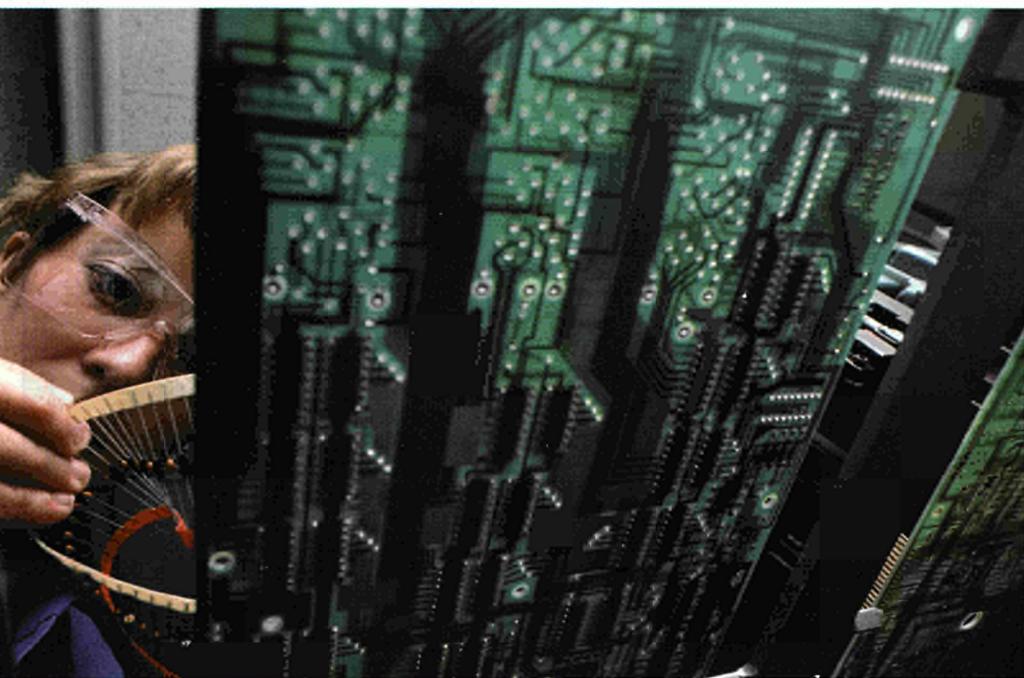
(1) B/96/1/01006/P/I.1.b/FPC, Advanced course in neuroradiology.

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A European Research Area

A Europe in which scientific knowledge, skills and personnel can move freely and efficiently? Training can play a key part.



At a Glance

The EU supports a wide range of education and training activities.

- The programmes managed by DG XXII (education, training and youth), include **Leonardo da Vinci** (vocational training), **Tempus** (higher education), **Socrates** (co-operation in education), and two **Youth** programmes. A new programme will be launched in 2000.
- The Human Potential programme of FP5, managed by DG XII (research), supports **research training networks** and **Marie Curie fellowships** — the latter also offered by each of the specific research programmes.
- The Commission's Joint Research Centre operates its own **training grant** scheme, which provides fellowships for young researchers to train within its Institutes.
- The Innovation programme funds a small number of pilot projects, designed to promote and spread good practice in **entrepreneurship training** for researchers.

The priorities addressed by the EU's education and training programmes are complemented by those of the Human Potential programme of the Fifth Research Framework Programme, which aims to contribute to the creation of a single 'European Research Area'. Through **research training networks**, and through the Marie Curie fellowship scheme, which provides **training grants for individual researchers**, the programme supports high-quality, transnational scientific training,

Bottom-Up Approach

"Our overriding aim is to ensure that the training of young researchers is carried out in a scientific environment of the highest possible calibre," says Cyril Dirscherl of the unit which manages the research training network scheme. "Projects are selected primarily on the basis of scientific quality, allowing partners themselves to define research topics in any scientific field, including basic research."

Helen Hughes-McKay, of the United Kingdom's Department of Trade and Industry, agrees. "The networks facilitate collaboration between Europe's leading scientists, and that is useful," she says. "But their real value lies in the opportunities they offer young researchers, at the start of their careers, to

gain top-quality experience at European level. These days, it is as important to make efficient use of human resources as it is of physical ones. We want the young post-graduate and post-doctoral fellows to establish professional contacts which will form the basis for lifelong collaboration, benefiting both their own careers and the research capacity of Europe as a whole."

Collaboration is needed not only across national but also across disciplinary boundaries. In response to the wishes of the scientific community, there will be a greater emphasis on multi-disciplinarity in the selection of network projects under FP5. "What scientists tell us is that new technologies will increasingly emerge from the areas between traditional disciplines — tomorrow's senior researchers need to explore these areas from the start of their careers," says Dirscherl.

JRC Fellows

The European Commission's Joint Research Centre (JRC), whose new mission⁽²⁾ places it at the interface between the Commission and the research community, runs its own training grant scheme. Fellows, normally proposed by the universities or companies in which they are based, are chosen to work on specific projects within the JRC's research programme.

The Institute for Advanced Materials (IAM) at Petten, in the Netherlands, generally hosts between 15 and 20 fellows at any time. "We have been running the scheme for over a decade," says the IAM's Michael Cundy. "We can offer excellent training and access to research facilities which are in many cases unique. In return, fellows make a valuable contribution to our research effort, sometimes bringing in expertise which we lack."

Just as important, he says, the fellowship scheme provides the JRC with contacts — especially with universities — which enable it to keep abreast of scientific and technological developments in centres of excellence around Europe.

(2) See Notebook, edition 1/99.

Putting Training to the Test

An inter-disciplinary research training network is developing the knowledge and skills needed to exploit a revolutionary tool for chemical analysis, based on the use of polymers which mimic natural antibodies.



MIPs, which mimic natural antibodies, can be used to test for very small concentrations of drugs or their metabolites in blood or urine.

Molecularly imprinted polymers, or MIPs, have the potential to improve dramatically the speed and accuracy of analytical testing for a wide range of substances. Though still at an early stage of development, the technique has already demonstrated better selectivity and sensitivity than current tests.

It promises valuable time savings in the analysis of new drug candidates, and opens up the possibility of measuring environmental pollutants in the field, and of analysing blood or urine at the patient's bedside — applications which today rely on time-consuming laboratory tests.

A Common Language

The research training network project⁽¹⁾ involves eight partners from seven countries — three institutes engaged in advanced polymer materials chemistry, a pharmaceutical company, and institutes specialising in environmental, clinical, dietary and forensic analytical chemistry.

"The breadth of the potential fields of application made a European effort essential," says Dr Börje Sellergren of the Johannes Gutenberg University in Mainz, Germany. "We wanted to involve the best groups working in each field. The necessary spread of expertise cannot be found in one country."

Binding fundamental and applied research groups together to create a cohesive team is a huge challenge, Sellergren admits. "At the start, many were not even aware of one another's work, and the lack of a shared professional language was a major obstacle," he says. "But the opportunities for synergy between the two disciplines were clear to everyone."

Personal as well as professional bonds between the network's 20 individual members were strengthened at an early stage with a three-day outdoor team-building course in Belgium.

New Opportunities

European Commission funding supports the training of five graduates and six post-doctoral students. Each is based in one of the participating academic institutions, but will undertake an extended work placement with at least one of the other partners during the three-year project. "We want each partner to gain direct insight into the capabilities and working methods of the consortium's other members — though there will probably be more exchanges within each of the scientific disciplines than between them," says Sellergren. "There will also be industrial placements."

The Swedish pharmaceutical company Astra is playing an active part, and hosted the introductory training course. But other companies are also becoming involved. "We expect at least ten to attend our first network meeting," Sellergren says. "With some we are already discussing possible involvement in the consortium's work. Contacts with industry open up new career opportunities for the project's trainees."

Commercial interest in their work may also create opportunities for the development of the consortium itself. "We have agreed that any patentable inventions emerging from our work will be developed jointly," Sellergren says. "We are very optimistic about the prospects for the future."



Building an inter-disciplinary team — Bernd Lahr leads members of the network across a Belgian stream.

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⁽¹⁾ Project FMRX-CT98-0173 of the Training and Mobility of Researchers programme, MICA (Molecular Imprinting techniques for efficient methods in Chemical Analysis).

Skills for Innovation and Entrepreneurship

Participation in EU training initiatives gives companies access to the best new talent emerging from Europe's universities.

“Contacts made during the research training network fellowships produce long-term benefits for Europe’s research capacity as well as for individual careers.”

Industry makes an important contribution to both the Leonardo da Vinci and the Human Potential programmes — providing young scientists with experience and skills which open up the possibility of careers in industrial as well as in academic research. Of course, it also benefits from this involvement, as Guy Goyeau of Schlumberger explains.

"We co-ordinated an 18-month Leonardo project in which 27 students from six EU Member States received vocational training in our research centres," he says. "Schlumberger operates world-wide, in a number of very advanced fields, and must compete fiercely for graduates with the right qualifications. When a product development team in Paris has a vacant post, it tends to recruit from the nearest technical university — although there may be better candidates in Italy or Portugal. The Leonardo project gave us the chance to restructure our search for new talent on a European basis, building a network of partnerships with universities from which we had never recruited before."

The six-month traineeships represent a significant investment, but Goyeau declares the project a huge success. Schlumberger recently launched a follow-up which will extend the

network to include a total of 28 universities and 20 companies, and will continue the scheme after the end of the pilot period.

"We have already hired four of the first group of trainees," he explains. "But even those who choose other firms remain potential professional partners for us — whether as future employees, or as customers or suppliers. And the bigger the network, the better the chance that we can find a position for a good trainee. Everyone benefits."

Best Practice

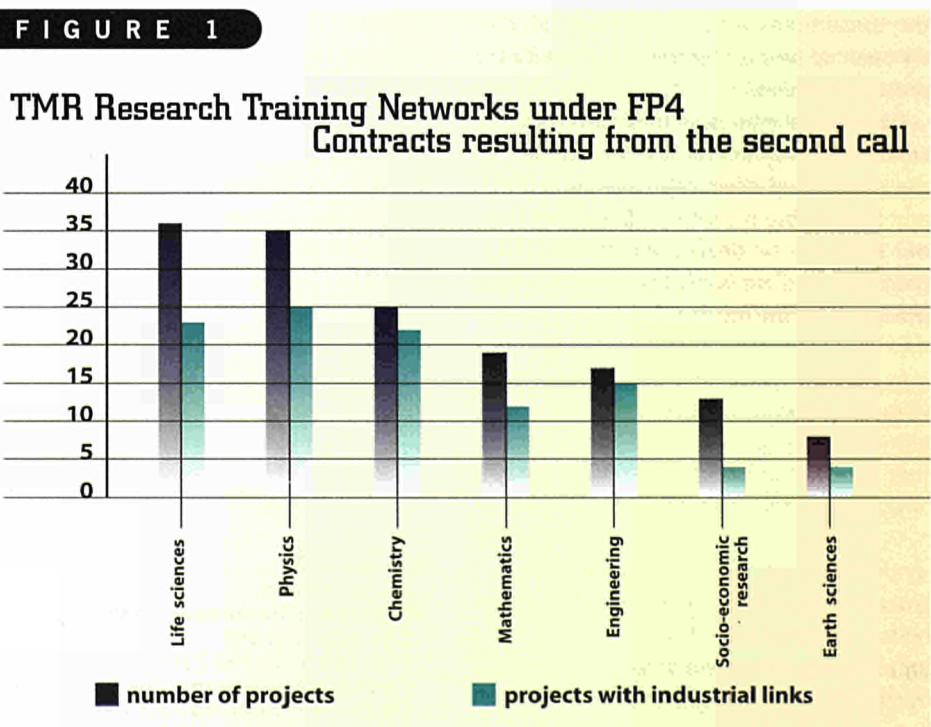
The value to industry of stronger academic links — as a source of new ideas and of new recruits — is also recognised in the Human Potential programme. "Industrial participation in the research training networks is always welcomed," explains Dirscherl. "But we encourage it only when a company adds an extra dimension to the training — in particular, by delivering complementary skills in areas such as project management and intellectual property rights."

Under FP5, Marie Curie fellowships — which in the past have only been granted to individual researchers — will be available to host organisations, including research-based companies. The 'Industry Host Fellowship' scheme enables a company to apply for funding for one or more two- or three-year fellowships. "These posts will provide new research training opportunities, especially for those without previous industrial or commercial experience," says the programme's Dr Patrik Floréen. "They will also encourage co-operation, and the transfer of knowledge and technology between industry and academia."

The new Innovation and SMEs programme in FP5 is likely to include a pilot scheme to support the European networking of regional initiatives for the creation of innovative firms. "A key element of the scheme will be the promotion of best practice in entrepreneurship training," says Jean-Claude Venchiariutti of DG XIII. "Our goal is to embed a new entrepreneurial spirit right at the heart of academic and vocational training throughout Europe."

The programme expects to act as a 'ginger group', stimulating and co-ordinating other Community actions relevant to the promotion of entrepreneurship.

FIGURE 1



Nearly 70% of the research training networks launched as a result of the second call under FP4 involved at least one company.

In Training for Entrepreneurship



Promoting an entrepreneurial culture is a key objective of the new Innovation and SMEs programme. An existing Innovation project is doing just that, by spreading best practice in entrepreneurship training.

In Bernard Shaw's play Pygmalion, Professor Higgins wins a bet by turning a poor Cockney flower girl into a society lady in just three months. The equally ambitious aim of the partners in the Pygmalion Innovation project, led by the École de Management de Lyon (E M Lyon), is to transform scientific researchers into entrepreneurs, equipping them to set up and run their own high-tech companies.

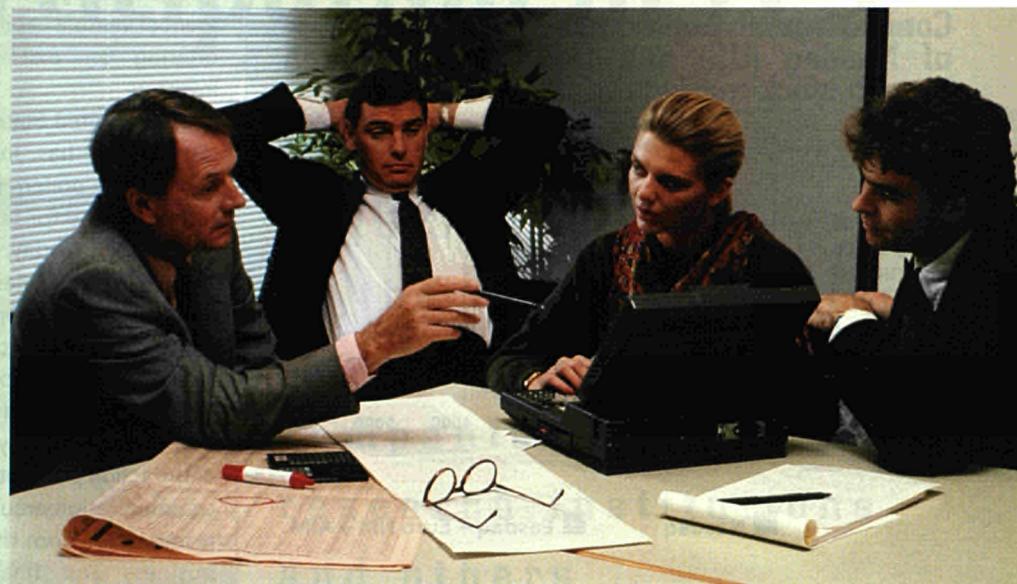
Track Record

E M Lyon's own entrepreneurship training programme enjoys a deserved reputation — since 1984, 25% of its graduates have gone on to form their own new companies, nearly 200 of which survive today, employing over 2,000 people.

An initial one-week generic business skills training course provides the foundation for a more intensive 5-month programme, during which trainees receive expert coaching to support them as they develop concrete plans for their own enterprises.

In the current project⁽¹⁾, the Lyon team are working with Italian technology transfer and business incubation specialists Tecnopolis to formalise this methodology, and to transfer it to the universities of Ulster, in Northern Ireland, and Patras, in Greece.

"Over the next two years, we hope to broaden and improve the existing methodology in order to create a comprehensive package of proven training tools which will enable interested teaching institutions anywhere in Europe to establish their own entrepreneurship programmes," says Michel Coster of E M Lyon. "In order to test the transferability of the process, we will be working closely with our colleagues in Ulster and Patras, helping them to set up and run their first introductory courses — for at least ten would-be entrepreneurs in each case."



Role Models

Coster does not anticipate any major obstacles to the transnational transfer of the methodology, though the partners expect it will take them longer to establish a programme in Greece than in Ulster.

"The central challenge — the lack of business skills among researchers, and their reluctance to bring in outsiders with the appropriate managerial experience — is common across national boundaries," he says. "The ten-step Pygmalion methodology focuses on team-building, and on project design and management. These are, similarly, skills essential to the success of a new company, irrespective of the business environment in which it operates."

The importance of role models is one aspect of such training which E M Lyon's 15-year experience has shown to be of critical importance. "We involve large numbers of real-life business people in all stages of our own programme," Coster says. "But the direct

Entrepreneurship training - researchers into business people.

testimony of successful entrepreneurs is especially valuable — and not only because they can offer advice based on first-hand experience. Someone who has left a career in research to build their own company, and has made a success of it, can be a real inspiration for those about to take the same step."

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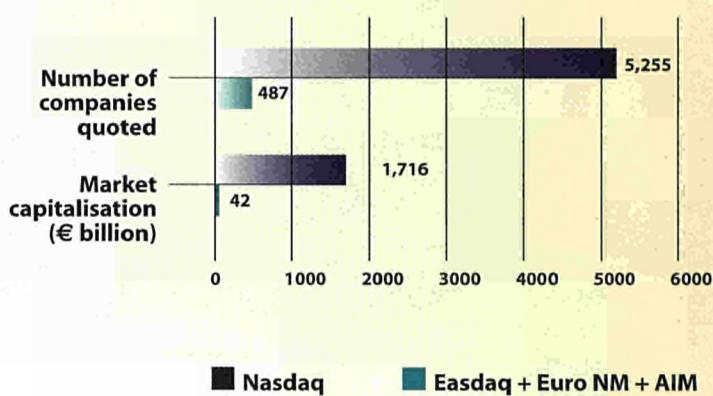


President Santer stressed the importance of a dynamic European risk capital market – for innovation, economic growth and employment.

Risk and Reward

Fast growing small and medium-sized enterprises (SMEs) are one of the main engines for growth and employment creation in Europe. But to perform this vital role, SMEs need access to external equity financing. As the euro is launched, how can a real European capital market be created?

Comparison, in September 1998, of Nasdaq (US) and the European high growth stock markets



In the United States, the 5,500 companies quoted on the Nasdaq market employ around 9 million people. The European stock markets dedicated to the financing of high growth SMEs are still tiny by comparison.

Access to appropriate sources of development capital has been identified by numerous academic studies as a key factor in SME growth. It was highlighted in the First Action Plan for Innovation in Europe⁽¹⁾ and, more recently, in the conclusions of the First European Forum for Innovative Companies⁽²⁾. Last April, the European Commission launched a wide-ranging initiative to promote risk-capital markets with the communication *Risk capital: a key for job creation in the European Union*⁽³⁾.

Different types of external equity financing — from formal and informal venture capital to stock market listing — are needed at different stages of company growth, but efficient and liquid risk capital stock markets play a crucial role. They not only provide a source of finance for companies themselves, but

(1) See Special Edition of December 1996. The Action Plan can also be downloaded from <http://www.cordis.lu/innovation/src/action.htm>

(2) See Special Edition of December 1998, and 'Role Models for an Innovative Europe', edition 1/99.

(3) SEC 552; the document can be downloaded from http://www.europa.eu.int/comm/off/com/riskkal/risk_en.pdf

also encourage the development of venture capital funds by offering an exit route for investors.

In the United States the Nasdaq market has, in 25 years, become the preferred means of raising capital for fast growing enterprises. Today, its 5,500 quoted companies employ around 9 million people. By comparison, the new European stock markets dedicated to the financing of SMEs are still dwarfs.

In November last year, as part of the action plan outlined in the communication, around 200 representatives from the world of business and finance came together for a one day conference, to formulate proposals for the creation of a true European market on the eve of the euro.

Pan-European

Opening the conference, Commission President Jacques Santer stressed how vital it is — for Europe's future economic success, job creation and innovation — to identify and focus on the priorities for the promotion of a widespread, integrated, freely available, pan-European risk capital market.

Among the key issues identified during the one-day event, delegates agreed that:

- The euro will assist the realisation of a truly pan-European financial market, reducing aver-

sion to risk in both equity and debt markets.

- **Cultural factors** constitute a key barrier — despite recent improvement in the availability of both private and public equity, Europe still lacks an entrepreneurial, risk-taking culture.

- Lack of **information and expertise** are also obstacles — high growth SMEs need to become more transparent, while investors should make greater use of qualified technical advice in assessing investment opportunities.

- The **harmonisation** of regulation and taxation systems is badly needed if pan-European markets are to attract international investors.

The conference put forward a number of proposals for actions to be undertaken by European institutions or national authorities:

- to ensure the fiscal **transparency** of venture capital funds
- to remove remaining tax barriers which prevent companies from offering **stock options** to their managers and employees
- to modify **bankruptcy rules** so that an entrepreneur who has failed once can start a company again
- to create **tax incentives** for investment in equities

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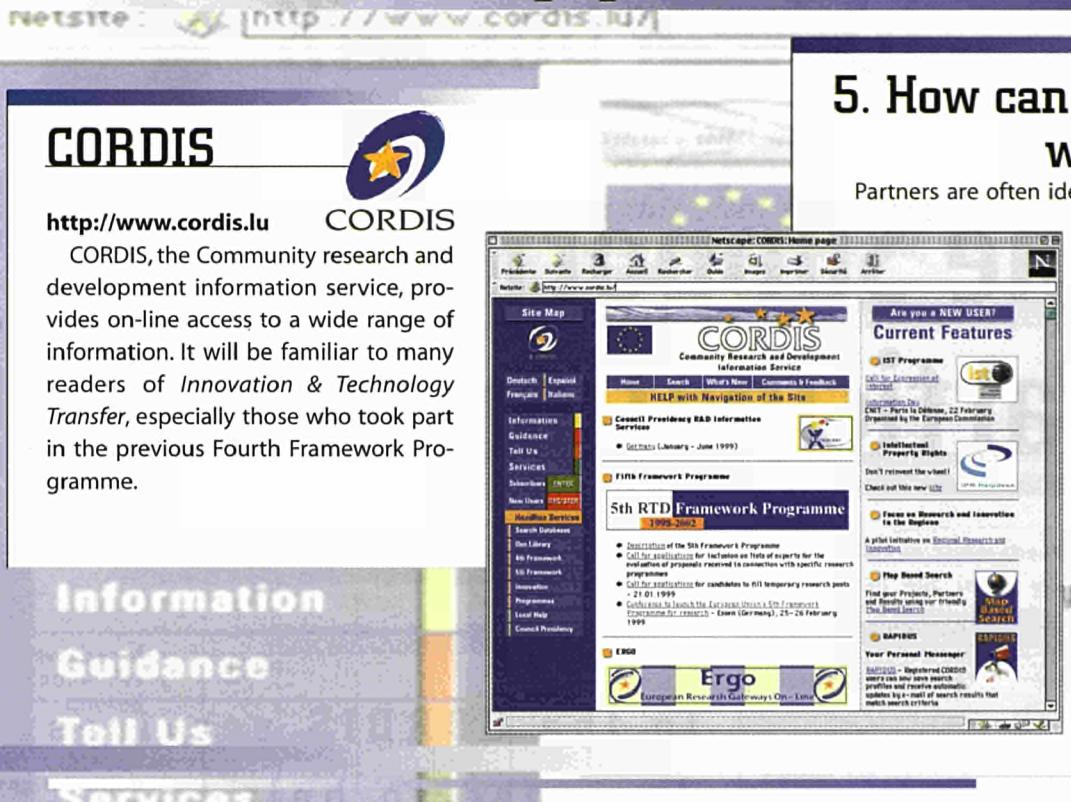
On-Line Support for Participation in FP5

The screenshot shows the CORDIS homepage with several key sections:

- Site Map:** A detailed navigation tree for the FP5 framework.
- News:** Headlines related to the FP5 framework.
- Search Databases:** Links to various databases and resources.
- Doc Library:** Access to documents and publications.
- 4th Framework:** Information about the previous framework programme.
- Helpdesk:** Links to support services like IPR-Helpdesk and Europa-Net.

A guide to the CORDIS services designed to help companies, research institutions and others to access information about the Fifth Research Framework Programme (FP5), and to prepare for participation in it.

On-Line Support for Participati



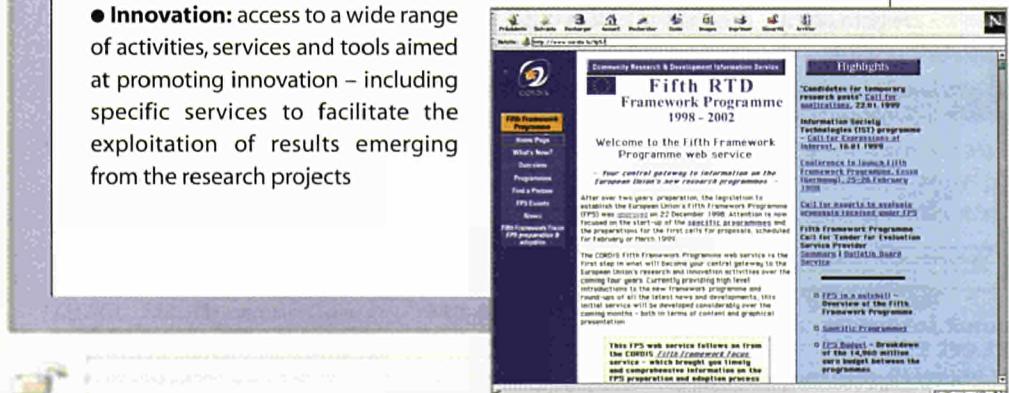
1. What is the Fifth Research Framework Programme (FP5)?

<http://www.cordis.lu/fp5>

To coincide with the start of FP5, and reflecting its integrated structure and approach, CORDIS has launched a new 'single-entry point' service, designed to meet the information needs of those who wish to learn more about its specific research programmes, to participate in them, or to benefit from their results.

General information on the start-up and implementation of FPs will be supplemented by a range of focused services and tools, including:

- **Programmes:** comprehensive 'Home Pages' for each of the specific programmes (see 2), including presentations of their content, participation opportunities, tailored tools to help potential participants, details of the projects supported and their results, and much more
 - **Participation** assistance: access to the information, services and tools needed to prepare and submit proposals for research projects
 - **SMEs:** access to information about the specific services and programmes designed to help small and medium-sized companies participate in FP5
 - **Innovation:** access to a wide range of activities, services and tools aimed at promoting innovation – including specific services to facilitate the exploitation of results emerging from the research projects



5. How can I find suitable partners with whom to form a p

Partners are often identified through existing research or industry. A screenshot of the CORDIS home page shows a search bar with the text 'FP5 expression of interest' (EOI) entered. Below the search bar, there is a link that says 'from the CORDIS home page, click on 'E'.

The specific programme pages (see 2) gramme-specific EOI, as well as to search t cific EOIs.

Alternatively, a more general partner service could be provided by several CORDIS partner services. Map-based services could be used to indicate the geographical location of the partner institutions.

4. What work has been done under previous review?

Information about current or coming projects can be found by clicking on the 'CORDIS Projects' link from the CORDIS home page click on the 'Standard Search' or 'Results Search' links.

Map-based search tools are also
useful if the subject or partner is critical.

3. How can I find out about

Information about the current and forthcoming calls may be available both from a general FP5 'calls page' and from individual call documents.

Alternatively, to get a complete list of current calls for tenders from the CORDIS home page click on 'open calls'

Finally, you can use CORDIS's Rapidus service to request information on areas of interest, which will be sent to you automatically via e-mail (see box, page 4).

2. Which FP5 research priorities are relevant to my area

from the FP5 home page click on 'Programmes'

CORDIS will establish detailed web services for each of the four thematic programmes, and three grammes, are available. These provide user-friendly information concerning the content and implementation of each programme – research areas, calls for proposals, resource material, potential participants, official documents, contact details, etc. Information will be added as it becomes available.

on in FP5

project consortium?

All networks, but CORDIS offers a dedicated service to help organisations locate appropriate partners.

Enter your FP5 Expression of Interest' will also offer a facility to register a programme database of existing programme-specific partners.

which can be undertaken using the general tools are also available, when the

What has been done in my field of programmes?

selected projects in related areas, and their results, helps you to suggest ideas and potential partners.

on 'Search Databases', and then on 'Projects and Search'

available, when the geographical location of a pro-

calls for proposals?

by each specific programme will have its own pages (see 2).

and research proposals:

information about new calls in your e-mail as it becomes available (see

of work?

on of the specific
eral overview of
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to assist poten-
ils, and so on.

6. How can I obtain the forms needed to submit my proposal?

All the necessary proposal documentation will be made available for downloading and local printing, either from the general FP5 page (see 1), or from the pages of a specific programme (see 2) – along with specially-developed tools to help you prepare a proposal.



7. Are my intellectual property rights adequately protected?

IPR issues may need to be addressed in a project partnership agreement, or may arise if the project produces commercially valuable results. Information is available from:

<http://www.cordis.lu/ipr-helpdesk/home.html>

Through this service and a telephone helpline, the IPR Helpdesk provides basic advice on IPR strategies, and comprehensive sign-posting to other specialised sources of information.



8. How can I find one-to-one professional help?

Under FP5, a Europe-wide network of National Contact Points will provide local, personal access to information about the specific programmes, and support to organisations – especially SMEs – which wish to participate. Details will be made available from the FP5 home page (see 1).

Support with the commercial licensing or distribution of research results – whether or not you have yourself participated in the Framework Programme – can be obtained from the network of Innovation Relay Centres, which has nearly 200 offices across Europe. Contact details, and other information about the network, is available at:

<http://www.cordis.lu/irc/home.html>

Note: The information above was correct at the end of January 1999, but CORDIS is a dynamic service, which is steadily improved and expanded to meet users' needs, and to reflect the developing structures of the research programmes themselves.

Automatic Delivery via E-mail



The screenshot shows the 'Query Advanced Search' form on the CORDIS website. It includes fields for 'Enter one or more search terms', 'News since', 'Search in title for', 'Choose a display format', 'Choose a Sort Order', and 'Subject Index Codes' (with options like AEROSPACE TECHNOLOGY, BIOTECHNOLOGY, CONSTRUCTION TECHNOLOGY). Below these are sections for 'For Tenders / Events' and 'News Categories' (GENERAL POLICY, LEISURE, MISC, MILITARY).

The Rapidus service enables you to receive information about calls for proposals, and a great deal else, automatically – without having to search the CORDIS databases repeatedly.

Once the criteria for a search of any CORDIS database have been defined – for example, 'all current tenders related to biotechnology' – they can be added to a personal profile by clicking on the 'Rapidus: Save

'Search' button, registered with your e-mail address. Thereafter, any new information which matches the criteria will be delivered automatically.

Any number of search profiles may be saved, and can be modified or deleted whenever you choose.

Guidance

Publications

The following Commission publications – all of them free – will be of particular interest to those wishing to take part in FP5.



1. RTD Info quarterly, EN/FR/DE

Provides a regular update on programme activities, calls and events, as well as interesting information about emerging research results.

2. The Fifth Framework Programme EUR 18764; CG-NA-18-764-EN-C

A brief overview of the Framework Programme, useful for initial orientation – what it is, what it consists of, opportunities for involvement.

3. A series of 16-page full-colour brochures, covering each of FP5's seven specific programmes

- Quality of Life and Management of Living Resources – CG-19-98-641-EN-C
- User-Friendly Information Society – CG-19-98-649-EN-C
- Competitive and Sustainable Growth – CG-19-98-657-EN-C



5. Euroabstracts six issues per year, EN

Provides a round-up of new publications on European research and innovation.

6. CORDIS Focus fortnightly, EN/FR/DE/IT/ES

Presents the latest news on EU research and research-related programmes and policies.

4. Innovation & Technology Transfer six issues per year, EN/FR/DE/IT/ES

Covers everything the EU does in research, with the emphasis on innovation and technology transfer.

Contact

- 1-3: These items can be ordered from DG XII's Communication Unit
Fx. +32 2 29 58220
E-m. info-dg12@dg12.cec.be
- 4-6: These items can be ordered from DG XIII/D-4
Fx. +352 4301 32084
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Innovation Relay Centre

N e w s l e t t e r

IRCs UNDER FP5

Research – Only Half the Story

The Innovation Relay Centre network has matured as the regional presence of the European Commission's research programmes. But its role in the local promotion of research results and the transfer of technologies will develop still further under FP5.

The Research Council agreed the 'Innovation and Participation of SMEs' programme in December⁽¹⁾. Among other objectives, it aims "to rationalise and co-ordinate the networks providing information and assistance concerning the Community's research and innovation activities ... making full use of the existing networks of IRCS and CRAFT contact points."

According to Javier Hernández-Ros, who is responsible for the project, the IRC network is now likely to focus on technology transfer and the exploitation of research results. The job of attracting SMEs to participate in Community-funded research will be handled by a network of National Contact Points (NCPs) – which will be created, managed and funded by the Member States. The two networks (of IRCS and NCPs) will work in close co-operation, signposting clients to the most appropriate service provider in each region.

"The IRCS have developed the skills, tools and contacts needed to operate really effectively as innovation agents," he says. "I think the network will be the principal channel by which FP5's Thematic Programmes and their research contractors promote their results in the regions."



A Professional Service

FP5 is simply more innovation-oriented, he believes. "We have all realised that successful innovation requires more than technology. Research has to be complemented by services which address the need for funding, the need to protect intellectual property rights, and the need to explore commercial opportunities at the European level. My expectation is that the Thematic Programmes will increasingly choose to use the IRC network to deliver these services. The IRCS are there in the regions, and know the companies and the investors which can bring research results to market. They are a particularly effective channel for promoting cross-border technology partnerships."

"Close collaboration with the current specific programmes is already occurring – I recently had the opportunity to see this in action at the Aachen conference on Cultural Heritage⁽²⁾. We are organising a series of seminars on technology transfer and exploitation in co-operation with the Brite-Euram programme, and have worked closely with the Biotech programme to prepare for the forthcoming Biotechnology Investment Forum (see Attention, Biotech Investors)."

"The potential is enormous, but joint initiatives of this kind depend on the development of professional co-operation between a particular IRC and a particular research programme. The challenge for the IRCS is to improve still further the quality of the service they offer."

(1) See this edition, page 3.

(2) See this edition, page 14.



The IRC Network in Brief

The Innovation and SMEs Programme's network of 53 Innovation Relay Centres (IRCs) spans the EU, Iceland, Norway, Switzerland⁽¹⁾ and Israel (see map), with 'twinning' arrangements extending it to some Central and Eastern European countries (shaded in red).

Each IRC is its region's window on European innovation, helping companies and research organisations transfer technologies to and from the rest of Europe. Further information about the IRC network is available on the IRC homepage (<http://www.cordis.lu/irc/home.html>).

(1) Associate Member

Thirty Countries

The current IRC project runs until the end of March 2000. A single call, covering the entire period of FP5, is planned for mid-1999 – with IRC contractors to be selected in the autumn to ensure a smooth hand-over from the present network.

Mr Hernández-Ros expects

the network to embrace not just the 15 Member States, Iceland, Israel, Norway and Liechtenstein, but eventually Cyprus and the ten associated candidate countries of Central and Eastern European as well. "It will be a 30-country network," he says. "And all its members will be full IRCs. We will no longer differentiate between IRCs and FEMIRCs." •

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CULTURAL HERITAGE



Our Cities, Our Heritage

The protection of historic buildings and artefacts both benefits from, and contributes to, the development of new technologies in a wide range of industrial applications. A recent event promoted new inter-disciplinary partnerships in a field with great potential for technology transfer.

The second European conference on 'Research for the Protection of Cultural Heritage: Opportunities for European Enterprises' took place in Aachen last November.

It not only offered industrial

and academic participants from around Europe an early opportunity to familiarise themselves with the research priorities of the key action 'City of Tomorrow and Cultural Heritage' – part of the Energy, Environment and Sus-

tainable Development thematic programme of the Fifth Research Framework Programme. The linked partner mediation event also provided many of them with practical assistance to develop new collaborative research pro-

jects oriented towards these priorities, and to explore distribution, licensing or co-development agreements for existing technologies.

New Synergies

The local organiser of the conference was the Innovation Relay Centre North Rhine-Westphalia, hosted by ZENIT. Welcoming delegates, the IRC's Director Peter Wolfmeyer called it a unique opportunity to initiate new synergies between researchers and companies. "Promoting the exploitation of hard-won research results, which is the main task of the IRC network as a whole, is particularly close to our hearts," he said.

"That is why we publicised this event across the whole of Europe – and especially among small and medium-sized enterprises, for which we believe there are tremendous opportunities in the field of cultural heritage. We are delighted to have brought together some 220 researchers

Attention, Biotech Investors

The BioTech Investment Forum⁽¹⁾ will take place in Lyon, France on 26-27 March, in conjunction with the 2nd Conference on Biotechnology and Finance, organised by the European Commission and the European Association of Securities Dealers.

The Forum, to be held at BioVision Lyon, is an initiative of a consortium of Innovation Relay Centres with unrivalled access to innovative companies from around Europe. It will offer private and institutional investors

and venture capital funds an extremely efficient means of assessing over 30 high-quality investment opportunities.

Applicant biotechnology companies have been carefully selected for their high growth potential, and have been intensively supported by the consortium in preparing their business plans, as well as the presentations they will make at the Forum. Following similar previous events, around 20% of the participating companies have signed contracts with investors.



(1) See also 'Technology-Specific Investment', edition 6/98.

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and company representatives, two thirds of whom have travelled to Aachen from outside Germany, from a total of 17 other European countries. This creates the perfect conditions for initiating new contacts, consortia and co-operation agreements."

The broad research goals and problem-solving approach to be adopted under FP5 were presented by Dr Christian Patermann, Director of the European Commission's DG XII/D, environment research. The remainder of the two-day conference was structured into three principal sessions, covering 'indoor' heritage artefacts, and the surfaces and structures of historic buildings.

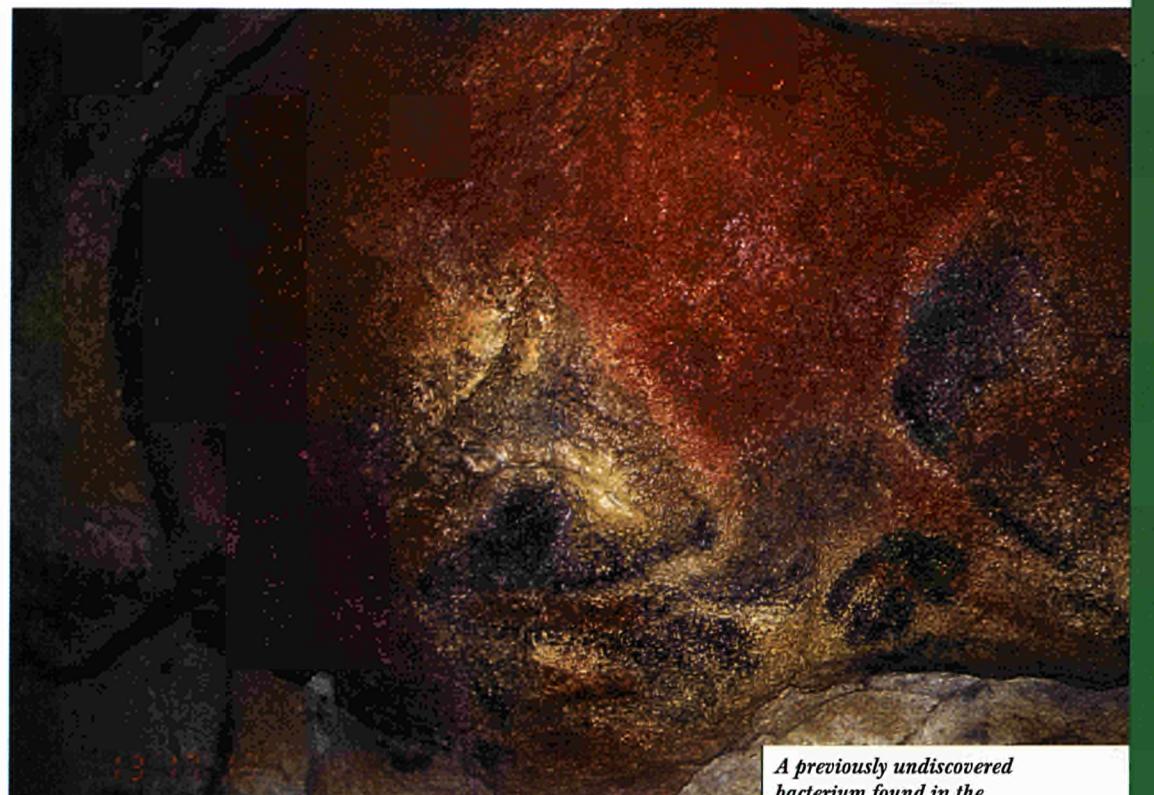
A third day was given over to partner mediation, and saw over 100 representatives of research institutes and commercial firms taking part in more than 300 pre-arranged one-to-one meetings.

Two-Way Traffic

"We were really pleased to see so many new research ideas being brought forward," says Julia Acevedo of the Commission's City of Tomorrow and Cultural Heritage key action, "many of them highly suitable for development as project proposals."

Mr Patermann especially welcomes the participation of significant numbers of municipalities and other end-users. "FP5's new problem-solving approach makes it more important than ever that the beneficiaries and the providers of innovative technologies should work closely together from the outset, in order to orient projects towards the solution of real-world problems," he says.

Acevedo stresses that such broad partnerships will be necessary across a very wide range of research activities. "In future, the focus will no longer be exclusively on the development of new technologies themselves. In many areas, technical solutions have already been found, and what is needed now is to establish best practice



guidelines for their application to a variety of end-user needs."

Under FP4, new materials, advanced software techniques and other technologies originally developed in industries as diverse as aerospace, medicine and construction were harnessed to create a range of improved methods for the protection of cultural heritage.

But conservation and restoration research itself can also lead to the development of technologies with much wider potential. A striking example was presented during the conference. A research project which set out to examine the effects of tourism on the growth of micro-organisms on prehistoric cave paintings discovered a previously unknown bacterium with real potential as a new antibiotic, which is now under active investigation by a pharmaceutical research laboratory.

Creative Tension

The conference also made clear that FP5's pairing of two different research topics – cultural heritage and the city of tomorrow – within a single key action,

is no accident. In fact, one of the most important new fields which future research will address is the integration of cultural heritage within the urban context.

The very special conservation needs of historic monuments and museums – most of which are, after all, located in cities – interact with the priorities of tourism, urban development and city traffic management in ways which are complex but can be mutually beneficial. Until now researchers have had no opportunity to investigate the management issues raised. Over the coming years, the Commission expects a number of interesting projects to address these issues, and the cost-benefit analysis of the available management options. ●

A previously undiscovered bacterium found in the pigment of prehistoric cave paintings during an EU-funded research project may lead to a breakthrough in the search for new antibiotics.

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Quality of Response

As technology transfer intermediaries, the success of the Innovation Relay Centres depends less on the volume of responses from potential collaborators to the technology offers and requests of their client companies, than on their quality.



Tecnopan has developed an innovative range of bread and cakes with a two-year shelf-life at room temperature. It is one of the many local companies which IRC Cenemes has helped to identify potential partners in other Member States.

IRC Cenemes, based at the University of Alicante in south-eastern Spain, has developed a simple procedure which saves everyone time by filtering out all but the really serious responses. Ultimately, the IRC believes, this increases the chances of achieving concrete licensing, distribution or joint development agreements between local companies and technology suppliers or users elsewhere in Europe.

Time is Money

"Distributing technology offers and requests to the IRC network⁽¹⁾ has always worked well," says Esteban Pelayo of Cenemes. "Often, the problem was that we received too many replies. In most cases, these were simply requests for additional information. We found that we were having to go back to the client over and over again to answer detailed queries. That did not seem to be an efficient use of our

time, or of the clients."

Instead, Cenemes decided to try and answer all these questions at the outset by completing a loosely structured six or seven page report in addition to the standard technology offer form. This would enable the IRC to respond immediately to requests for further information, without bothering the client company. An enquiry would be passed on only when it became clear that there was genuine interest in the possibility of a commercial agreement.

"To prepare the report requires a meeting of two or three hours between IRC staff and the company," Pelayo admits. "But it only has to be done once. We have been using the system for over a year now, and we are certain that it saves time in the end. There are side-benefits, too. Only local companies which are committed to technology transfer are willing to take the time to prepare the necessary detailed information. And sending them only those responses with real commercial potential helps to maintain their enthusiasm for a process which can be difficult and frustrating, even when it goes well."

Louder than Words

The free-text form, which is prepared in excellent business English, often includes a relatively technical description of the technology concerned, and in particular of its innovative aspects. Full contact details for the company or research institution are also given, and in certain cases details of the qualifications

and experience of key personnel. "Within reason, we can include whatever information our client wishes to make freely available to those who respond to the original offer or request," says Pelayo. "We find that it is useful to include photographs as well as diagrams."

He recently posted a technology offer on behalf of a local company which had developed a method for producing bread with a shelf-life of two years. Within weeks he received requests for details from bakeries all over Europe. "Sending out copies of the report, normally via e-mail, took hardly any time at all and satisfied over two thirds of enquirers. It was only those which came back to me a second time that I referred on to the client." Negotiations are under way with a number of potential licensees, and Pelayo is hopeful that at least one agreement will eventually be signed.

(1) Using the IRC network's on-line databases, also known as the BBS system - see 'Network Intelligence', edition 6/98.

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Automating Technology Transfer



Using a specially developed software tool to target the distribution of technology offers and requests, one IRC has freed up staff time and improved the rate of response from its clients. Now it is offering the software, free of charge, to other members of the network.

Under the Fifth Research Framework Programme, Innovation Relay Centres will focus – even more than in the past – on supporting the transfer of technologies between companies and research centres in their own regions, and co-developers, distributors and end-users elsewhere in Europe⁽¹⁾.

Their success will depend, crucially, on the speed and accuracy with which they pass on the technology offers and requests received from the IRC network. The number and variety of these opportunities is growing all the time. Matching each to the specific local clients which may be interested in it takes experience, skill, and a great deal of time.

IRC Andalusia, in southern Spain, has developed a system which partially automates the process. "Augusto now forms the basis of the IRC's entire day-to-day operations," says the IRC's technical director, Rafael Camacho Fumanal. "We have been using it ourselves for 18 months, and it has definitely improved the quality of our service."

Classified Information

With around 2,000 active clients, distributing the 1,000 offers and requests posted each year to the network's on-line database⁽²⁾ was a huge drain on the IRC's resources. "Companies and research centres need to find out about relevant opportunities fast," Camacho explains. "On the other hand, they do not



Augusto supports and partially automates the time-consuming task of matching technology opportunities to those companies and research centres which have the potential to exploit them.

want to be swamped with irrelevant offers. Selective distribution is essential, but the volume of data makes it impossible to do this efficiently 'by hand.'

The copyrighted Augusto system is based on two carefully maintained databases – one holding details of the IRC's clients, the other containing technology opportunities, which are added daily after translation into Spanish. Each client record, and each technology offer or request, is coded according to technological area and market application, using structured classification schemes.

"Augusto allows free text and keyword searches," says Camacho, "but it is by matching codes that it prepares a distribution list for each new technology opportunity." Once the list has been reviewed by the operator, a third

module automatically despatches the information to the selected clients, by fax or e-mail.

The speed and accuracy of the process has produced real results. In the year to September 1998, requests for further information were received for one in six of the 1,393 opportunities sent out.

Breaking the Code

All IRCs classify the offers and requests which they post to the network, but the simple categories offered by the on-line system are not sufficiently accurate, according to Camacho. Augusto employs the Venture Economics Industry Codes (VEIC) to define a company's activities and a technology's market application, and the Common European Research Information Format (CERIF)⁽³⁾ to identify research

fields. Both are promoted as standards by the European Commission.

IRC Andalusia is now offering an improved version of the Augusto system – already being adopted by other Spanish IRCs – to any network member. "If enough take up our offer," says Camacho, "we hope that eventually the network as a whole will adopt VEIC and CERIF, making automated matching of technology opportunities and clients possible at European level." ●

(1) See this edition, page 1 in separate edition

(2) Also known as the BBS system – see 'Network Intelligence', edition 6/98.

(3) See 'One-Stop Shopping for Research Information', edition 5/97.

Contact

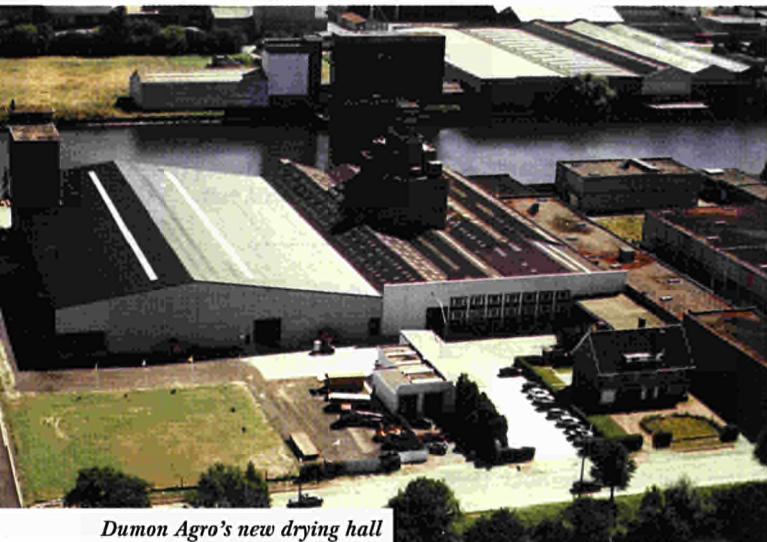
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Solar Roof Cuts Costs of Agricultural Drying

Good links with business development agencies in its region, as well as with other members of the Innovation Relay Centre network, enabled IRC Flanders to broker the transfer of an innovative energy-saving technology which has considerable potential in the agricultural sector.

When Dumon Agro (DA), a Flemish agricultural seed producer, started to plan the construction of a new drying hall, it was keen to incorporate solar power in the design as a way of reducing its operating costs. The company was certain that the necessary technology existed, but had no idea how to track it down.



Dumon Agro's new drying hall (on left) uses an innovative design to harness solar energy, which is expected to reduce fossil fuel consumption by over one third.

to reduce emissions of CO₂ and other greenhouse gases.

Lying in the Sun

Drying agricultural products such as grass seeds requires large quantities of low temperature heat. In warm climates – in southern Europe and north Africa, for example – Farmers simply lay their produce out to dry, and let the sun and wind do the rest. In northern Europe this is not a viable option. But advanced building designs and equipment can harness solar energy to supply at least some of the necessary heat.

DA's first step in attempting to acquire the technology it needed was to approach its nearest regional development agency, GOM West Vlaanderen did not have an immediate answer, but forwarded the request to the IRC Flanders, Vlaams Innovatie Adviescentrum (VIA). "When we received the query about solar technology we were able to answer it immediately, because we happened to know about a demonstration project in the Netherlands which sounded as though it was exactly what Dumon Agro was looking for," says Karel Derveaux of VIA.

The technology works on the same principle as the insulation provided by a bird's feathers, by heating air trapped between two layers. Supported by funding from the Dutch government organisation, NOVEM⁽¹⁾, flower bulb producer De Noordt had created a cavity beneath the roof of one of their drying halls, turning the

whole roof into a large solar collector. Outside air is drawn through the cavity, where it absorbs heat from the roof before it is passed through a duct to join an artificially heated air flow.

In the 1996/97 drying season, 38% of the heat required in the hall was produced by solar power – a total of 152 gigajoules of energy, representing a saving of around 5,445 cubic metres of natural gas. De Noordt estimated that the payback on its investment would be around 12 years. But the capital cost of similar roof air-heaters would be lower, now that the design had been tested and refined.

Cross-Border Partnership

Through NOVEM and the IRC Netherlands, Derveaux established that the technology would indeed meet DA's needs, before passing on the necessary contact details to the company. Having been introduced, staff from Dumon Agro visited the Dutch demonstration farm – and were extremely encouraged by what they found. They also met with Ecofys, the engineering company which had designed and built the experimental system, and had conducted a follow-up study.

With assistance from GOM, DA applied successfully for project funding from the Flemish Administration for Natural Resources and Energy (ANRE), which helps companies to undertake energy demonstration projects, in line with European Union policies to

With the help of the IRC network, DA made contact with a flower bulb producer and an engineering company in the Netherlands, which had recently collaborated to build a demonstration farm unit, where over one third of the heat is supplied by solar energy. DA's new drying hall, which attracted financial support from the Flanders government as part of a regional programme to promote the use of renewable energy, will save the company money as well as contributing to European efforts

promote the take-up of renewable energy technologies.

With specialised design advice and support from Ecofys, the company undertook the bulk of the design and engineering work itself, and staff made frequent visits to the demonstration farm in the Netherlands. DA also enlisted the help of VUB, the Free University of Brussels, and VITO⁽¹⁾, a large Flemish research organisation.

Reducing Costs and CO₂

The new hall, which increases DA's total drying capacity to

7,650 m³, was formally opened by the Flemish Minister for Economics, Eric van Rompuy, in July last year.

Its roof consists of black plates which naturally absorb the sun's heat. About 50 centimetres below the roof is a cavity in which air is quickly warmed to around 20°C above the ambient temperature, before being transferred into the drying silos. Any additional heating which may be required – for example, at night – is generated by propane gas. Over the next year, the solar roof's performance will be monitored by VITO to find out exactly how much energy it saves.

As well as providing an excellent example of technology transfer between European Member States, the Flemish project promises to boost the competitiveness of the region's agricultural drying industry. At last, northern Europe's farmers will be able to benefit from the free energy source which their Mediterranean colleagues have been putting to good use for centuries. ●

(1) NOVEM and VITO are both members of the OPET network managed by the Innovation and SMEs programme in collaboration with the Joule-Thermie programme.

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STAFF TRAINING

A Network of Professionals



Delivery of a high-quality technology transfer service requires a high level of professional skills among Innovation Relay Centre staff. A newly launched series of training workshops will help to maintain the highest standards of support for Europe's technology-oriented small and medium-sized enterprises.

"**A**cross Europe, the IRC network now involves nearly 200 organisations," says Charlotte Avarelo of the European Commission's IRC unit. "Inevitably, there is some turnover of personnel in this very large team, so a programme of on-going training is clearly needed."

A series of centralised induction workshops for newer IRC staff members seemed the most efficient way of transferring to them key knowledge and skills acquired over the past five years or more by some of their senior colleagues. It would also provide a valuable opportunity for the forging of those personal links on which the dynamism of any widely dispersed network depends.

"The response to our initial announcement of the first workshop was overwhelming," says Mrs Avarelo. "We had decided to limit the workshop to 40 people, but more than twice that number wanted to attend." To meet this demand, a second workshop will be held in spring 1999 – and from now on there will be two every year, each hosted by a different IRC.

Lively Discussion

The first workshop, hosted by the IRC Latium-Abruzzo-Sardinia, took place in Rome at the end of November.

Over a day and a half, the 40 delegates heard a range of relatively short presentations cover-

ing core IRC tasks and key tools and structures used by the network – the promotion of transnational technology transfer agreements, the use of the network's on-line databases for the distribution of technology offers and requests, and the functioning of the Thematic Groups. Further sessions addressed management and administrative issues.

In each case, the presentations had a practical focus, and were illustrated with concrete examples from the speakers' own professional work. The workshop was chaired by Mrs Maria Saveria Cinquegrani, the manager of the IRC Latium-Abruzzo-Sardinia, who made sure that delegates were able to interact with the presenters.



"I was very keen to get discussion going during the presentations," she says. "Personal contacts are essential in building a transnational team, and we wanted to generate a real buzz of excitement among the participants, most of whom were quite young. The dinner, which everyone attended on the evening of the first day, allowed further social contacts to be made. But more breaks between sessions would also create good opportunities for discussions to be followed up on an informal basis."

Face to Face

Mrs Cinquegrani now feels that a two-day event – allowing more time for detailed exploration of aspects which particularly interest the participants – might have been preferable. But in other respects, the workshop worked extremely well, and its structure is likely to form the basis for the organisation of future events.

The participants themselves clearly appreciated both the workshop's training content and

the networking opportunities it offered. "A great way to make contacts with colleagues in other IRCs, which will certainly make collaboration on technology transfer projects easier in future," said one. "The commitment becomes stronger when you know the face behind the name," said another. ●

Calendar of Events

For comprehensive and up-to-date information, see <http://www.cordis.lu/irc/src/events.htm>

13-15/4/99 Technology Transfer Day: Jec Show

Paris (FR) At this year's Jec show, SMEs will again have the opportunity to match technology supply and demand. Last year, offers and requests were distributed to over 2,000 companies in 18 countries by catalogue, CD-ROM and the internet, leading to 135 working meetings.

IRC Paris - Ile de France

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14-15/4/99 Brokerage Event: ECOPartners 99

Utrecht (NL) Taking place within Ecotech Europe, ECOPartners will focus on air purification; alleviation of sound pollution; composting; environmental monitoring; waste water purification; decontaminating rolling stock; recycling and recuperation; soil protection and decontamination; consultancy; and treatment and processing of wastes.

IRC Netherlands

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26-27/4/99 Technology Transfer Days: Shipbuilding

Nantes (FR) Focusing on technologies for safety, modularity, rapidity and environment demands, the event will bring together 100-150 participants from French and other European companies, technical centres and universities for a series of technical conferences and confidential one-to-one meetings, arranged in advance.

IRC Lower Normandy, Brittany, Pays de Loire

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18-20/5/99 Conference: CONNECT 99 – Electronic communities

Trondheim (N) Industrial leaders, politicians, academics, and public authorities will discuss information and communication technologies as tools for regional development. Presentations, discussions, and workshops will focus on electronic commerce, network-based learning and changing organizations.

IRC Norway

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24-26/5/99 Brokerage Event: Emerging Technologies in Non-Destructive Testing

Athens (GR) Aimed at technology providers in the fields of equipment (sensors, transducers, data acquisition systems and software, calibration standards, etc.), services and research, and at end-users in the chemicals, process and food, aerospace and naval, transportation, utility and power sectors.

IRC Greece (HELP Forward)

N. Melanitis
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Fx. +301 32 51 877
E-m. nikos@orfeas.praxis.forth.gr

24-25/6/99 Brokerage Event: Information and Communication Technologies

Saarbrücken (DE) Euro Regio Partners 99, supported by the Enterprise programme, offers companies from all over Europe the opportunity of participating.

IRC Luxembourg-Trier-Saarland

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From Laboratory to Factory



Advanced research by the European Commission's Joint Research Centre is not only valuable in its own right. As the distribution of two new software packages shows, it also gives rise to technologies with potential for widespread industrial application.

Nuclear fusion itself is not a technology that anyone expects manufacturing industry to take up in the near future. But two software packages originally developed as tools for nuclear research by the JRC's Institute for Systems, Informatics and Safety (ISIS) have now been adapted for use in a wide range of manufacturing sectors.

Supported by the Innovation programme, both new products have been launched by ISIS during the past year, through licence agreements with specialist distributors. Generis is a powerful and platform-independent system for controlling industrial robots, while Astra is an advanced set of tools for analysing the reliability of complex systems. In each case, the transfer to industry of JRC technology promises to contribute to European competitiveness.

Robust and Powerful

Industrial robots are used for an ever-growing number of processes, from welding to painting, and from cutting to order preparation. But Emilio Ruiz of ISIS believes that the proprietary design of current control systems stifles innovation by inflating the cost of automation.

"Closed systems create a real barrier for small industrial equipment producers who want to incorporate intelligence into their products," he says. "The control systems themselves are expensive, and each is tied to a

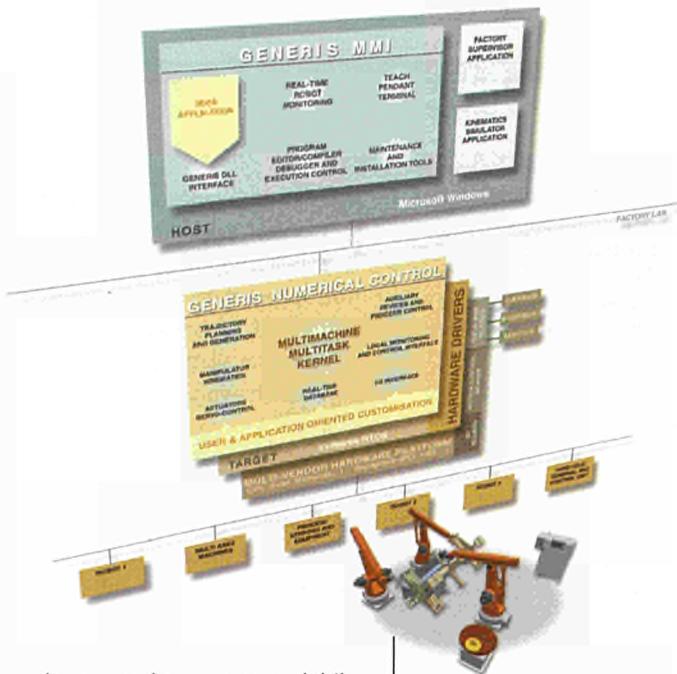
specific hardware platform, which is not always the most cost-effective one. Few offer a modern development environment, so even a simple product can take five man-years to program. And to add new functions you have to purchase additional software modules. Ultimately, all these costs are passed on to industry, and many smaller manufacturers are discouraged from automating at all."

By contrast, the Generis package is open, user-friendly and hardware-independent. Its design dramatically shortens the development cycle, and allows producers to use the best available hardware. Its performance in demonstration palletisation and cutting and welding applications have also shown it to be astonishingly robust.

But the system's real power lies in its multi-machine capabilities, and Ruiz and his team are now developing a highly complex laser welding work cell. "Running on a single processor, Generis will control a conveyor, two large manipulators equipped with numerous sensors, and a sophisticated system for transmitting the laser beam," he says.

An Open Solution

Generis consists of a Windows or NT-based man-machine interface and a numerical control, which issues the time-critical commands to the mechanical devices. Industry standard interfaces and communication proto-

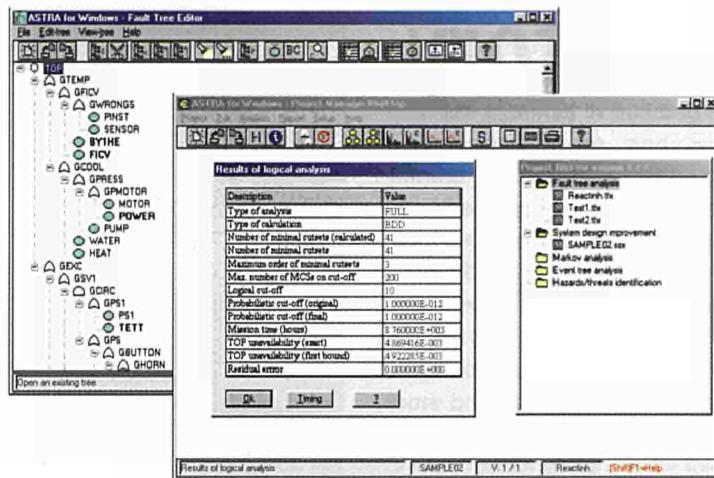


cols are used to ensure scalability — new functions and new devices can be added at any time, with little effort.

The system's revolutionary architecture is a product of the JRC's nuclear fusion research. "Our experiments with Robertino, a massive robot for handling very large equipment⁽¹⁾, required flexibility," explains Ruiz. "We needed to add new sensors, change control algorithms, and test new processes. None of the commercial systems offered the required openness, so we developed our own generic solution, from scratch."

Generis itself is the result of a further two-year development effort, which ISIS undertook in partnership with the Italian industrial automation engineering company, Erxa. "We wanted to bring the advantages of cost and flexibility to small equipment producers," Ruiz says.

Connected to the numerical control system via TCP/IP, Generis's Windows95/NT man-machine interface allows an operator to monitor the status of connected devices, and manipulate them manually using a software joystick.



Astra gives engineers unique insight into the functioning of complex manufacturing or embedded systems, allowing them to build in safety and reliability from the start of the development process.

"Generis is a pleasure to use. If a customer asks for a specific capability, you can simply select the appropriate function from a library. If a better processor becomes available, you can use it without having to change anything."

The JRC has licensed Erxa, which has an established Italian sales network, to distribute the package — though the licence is not an exclusive one, and Ruiz is looking for additional distributors in other parts of Europe. Trade fair demonstrations have already generated a great deal of interest. "But people are naturally cautious about such a novel concept," Ruiz admits. "We are waiting for the first opportunity for the system to prove itself in an industrial application."

Reliability Assurance

Astra has followed a very similar path, from advanced research aid to commercial product.

Originally developed in the late 1970s for nuclear applications, the software was adapted by ISIS for use in the aerospace and process industries. It offers engineers a comprehensive set of tools for optimising the design of complex systems, where failure would pose a serious threat to the environment, to workers or users, or to property and other valuable business assets. Now, with the launch of

Astra, the technology is being transferred to a broader group of applications.

"Complex manufacturing set-ups with numerous interacting sub-systems create very difficult design problems," explains Marc Wilikens of ISIS. "And as the complexity of consumer products grows, their designers must increasingly deal with the same issues. Astra enables engineers to identify the critical parts of a system, in order to achieve defined levels of reliability or safety by increasing the strength of particular components, or by incorporating fault-tolerant systems."

Key applications are likely to include medical devices and other embedded systems where the security of data is as important as that of equipment, users or environment. But Wilikens expects Astra's first application to be in the car industry.

"Thirty per cent of automotive systems are already software-based," he says. "ABS brakes, airbags and electronic engine control are now standard features. Soon, steer-by-wire systems will appear, and cars will increasingly have to interact with external navigation, road-charging and remote diagnostic systems. The integration of these functions makes analysis much harder. Ensuring the reliability of individual components is no longer enough — you have to ensure the reliability of the system as a whole."

Trade-Offs

None of the current generation of design support tools can cope with this level of complexity, Wilikens says. Astra adds a highly efficient algorithm for the analysis of 'fault trees' representing all the possible sequences of events which may occur in a system. It also offers the ability to assess multiple fault trees at the same time, allowing optimal trade-offs to be made between different design objectives.

"Improving the safety or reliability of a system always has a cost," Wilikens explains. "Astra enables designers to achieve the highest level possible at a price acceptable to their target market."

Like Generis, Astra will be marketed under licence by software distribution and maintenance specialists with the capacity to offer support and ancillary services to industrial end-users. The first such agreement is with the Italian company Infocon. "Others have expressed a keen interest, but initially we want to build up some experience through our collaboration with Infocon," says Wilikens.

(1) See 'A Boost for European Heavy Industry', edition 1/97.

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Intelligent communication technologies and applications

5-7 May, Neuchâtel (Switzerland)

The workshop, part of a COST action, will discuss recent developments, highlighting results and their potential impact on advanced applications. It will emphasise mobile communications and foster interaction between research groups and industries — including small and medium-sized enterprises — at an international level.

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Preparation and use of reference materials

20-22 May and 14-16 October, Geel (Belgium)

Two three-day training courses on the preparation and use of reference materials will provide, in a series of lectures, workshops and studies, information on the in-house preparation and use of various reference materials — an essential tool in the quality control of chemical analysis. The courses will cover the analysis of compounds in environmental, biomedical, clinical and food matrices. Participants will visit the materials preparation facility at the Institute of Reference Materials and Measurements of the European Commission's Joint Research Centre.

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ECMAST'99: Multimedia applications, services and techniques

26-28 May, Madrid (Spain)

The event aims to disseminate the results of research and development projects on multimedia issues and related activities being carried out in Europe and elsewhere. It will be the first world-wide forum on the new sector of multimedia technologies, services and applications, and will present the results of work carried out under FP4.

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<http://www.hispasat.com/ECMAST99/>

Precision engineering and nanotechnology

31 May — 4 June, Bremen (Germany)

The European Society for Precision Engineering and Nanotechnology (Euspen) was founded as part of a Brite-Euram concerted action to promote European collaborative research and technology transfer in these fields. Its first international conference and general meeting will focus on topics such as: nano-fabrication processes and assembly; material properties on the molecular/atomic scale; and modelling and simulation in micro- and nanotechnologies.

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Fx. +49 421 218 4455
E-m. euspen@iwt.uni-bremen.de
<http://www.euspen.com>

Forward Thinking: Keys to the future in education and research

14-15 June, Hamburg (Germany)

As part of a series of events launched by the German Presidency in the first half of 1999, the German Federal Ministry of Education and Research (BMBF) will host an international foresight conference to identify educational and research initiatives which can increase European competitiveness and create new networks of science, industry and policy in Europe. It will also explore the interaction between technological trends and the social and economic environment. Through the conference, the BMBF hopes to stimulate Europe-wide technology foresight activities.

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ITS'99 — intelligent transport systems

14-17 June, Amsterdam (The Netherlands)

Supported by the European Commission and the Dutch Transport Ministry, this event is targeted at senior transport policy makers, executives and other decision makers, and will provide an opportunity to exchange information, share ideas and view the latest intelligent transport system technologies (ITS). Parallel and poster sessions, showcases and technical visits will give an overview of the ITS industry in Europe, focusing on airports, ports,

cities, and regions, as well as travel and tourism. The results of research projects undertaken within FP4 will also be presented. The exhibition will showcase applications in areas such as vehicle detection and navigation, aircraft control, driver assistance, traffic management, public transport, incident management, freight and fleet management and digital mapping.

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<http://www.itseurope99.com/>

Telematics conference will raise awareness

15-16 June, Tanum (Sweden)

To raise awareness of the benefits of telematics technologies in regional development, this conference will promote the results of European joint pilot projects among regions, towns and cities. Themes will include: rural development; the extension of urban telematics services; teledemocracy and culture heritage; services for SMEs; and the reorganisation of work in European regions.

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EDC coordination office
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Prevention of work accidents and professional diseases

5-8 July, Luxembourg

The European Commission, DG V, is organising a conference to present results from the social research programmes of the European Coal and Steel Community (ECSC) over the last five years. Topics will include ergonomics, industrial medicine, pollution in the steel industry, and health and safety in coal mining. Research has contributed to the development of a prevention culture in Europe, and the event aims to encourage the transfer of results to other industrial sectors.

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Blueprint for interactive classrooms

ISBN 90 6186 867 X

This handbook, which encapsulates the practical expertise gained by universities in five EU Member States which built pilot classrooms between 1996 and 1999 as part of a project supported under the Education and Training strand of the Telematics Applications Programme, provides practical information and advice on setting up and using interactive telepresence classrooms for teaching purposes.

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gee.cammaert@linov.kuleuven.ac.be
http://www.linov.kuleuven.ac.be/bic

The business platform: Entrepreneurship and management in the early stages of a firm's development

€25

Published by the European Association for the Transfer of Technologies, Innovation and Industrial Information (TII), this book presents three case studies, and identifies eight factors which contribute to the success and growth of new technology based start-ups. Written by Dr Magnus Kofsten of the Centre for Innovation and Entrepreneurship at the University of

Linköping in Sweden, the publication is also designed as a self-test aid for entrepreneurs or business support professionals seeking to evaluate a company's progress in the early years of development.

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Technology validation and Technology transfer results

Updated abstracts of all 110 Innovation projects which entered a full implementation phase under FP4, together with 12 accompanying measures projects, have been published in three volumes — Project Abstracts 1995, 1996, and 1997. The projects cover a very wide variety of industry sectors and regions, and have demonstrated the multifaceted nature of innovation and technology transfer. Each abstract describes the work of the project, and gives Web-site and e-mail addresses for its co-ordinators.

Following requests for further information on the 24 projects featured in *Innovation & Technology Transfer*'s special edition of July 1998, a brochure 'Success Stories in Innovation: 24 case studies' has now been prepared, giving details of these projects and their co-ordinators, partners, Web-site and e-mail addresses.

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http://www.cordis.lu/tvp/

Note

Publications are free unless otherwise stated. If specific contact information for obtaining a publication is not supplied, and there is a price listed in euros, then the publication can be purchased from the sales and subscription office in your country of the Office for Official Publications of the European Communities (Eur-Op). Addresses can be found in most EC publications, on the WWW (<http://eur-op.eu.int/en/general/sad.htm>) and by contacting Eur-Op (fax: +352 2929 42759).

Large-scale facilities 1998

EUR 18149; ISBN 92-828-2598-1

The Training and Mobility of Researchers (TMR) programme has enabled over 2,000 scientists from EU and associated states to visit Europe's top research facilities each year. This book describes the 116 facilities and the type of research carried out, and summarises other TMR-funded activity at the institutes, including 24 transnational research projects and 10 concerted actions which encourage the pooling of information and resources.

Contact:
European Commission, DG XII
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