

# Innovation & Technology Transfer

6/97

ISSN 1013-6452

LIBRARY

## Financing Innovation



### Plus:

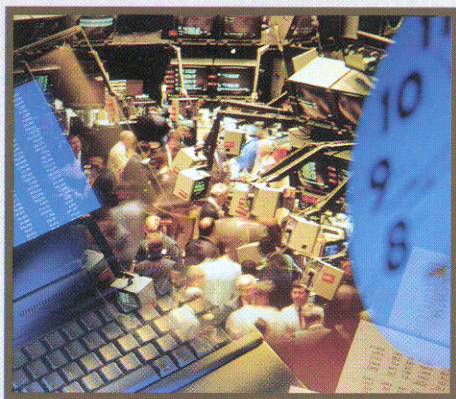
- Innovation Relay Centres
- European research in figures
- Genome sequencing: the industrial angle

... and more



EUR. 83

# C O N T E N T S



*Financing Innovation, page 13*

## Building bridges between researchers, entrepreneurs and investors

When you back the industrial and commercial development of a technological innovation, you are betting on the future. But one of the major obstacles facing innovative enterprises in Europe is finding the necessary finance. To grow, or even exist, they must attract venture capital. This is particularly true in the case of SMEs. They must convince very specific investors who are prepared to inject money into their equity capital and thus back up their wager with real commitment.

Although available funds for venture capital do exist and have greatly increased in Europe over recent years, investments in technological innovation remain far from adequate. This is not due to any "ill-will" on the part of the financial world, but is because the bridges between researchers and industrialists are poorly structured.

This is why the Action Plan for Innovation in Europe - launched by the Commission about a year ago, following a wide-ranging public debate - has set itself the task of bringing together these various actors. Three new pilot actions have just been launched to mobilise venture capital to finance technological innovation. They will be followed by even more ambitious initiatives in this area, which will be undertaken in the next Framework Programme.

**Edith Cresson**

### **POLICY NEWS** 3-5

Debate: young people in Europe's programmes  
■ European R&D: by the numbers

### **INNOVATION PROGRAMME NEWS** 6-12

Innovation project case study: flash memory ■  
Event: RTD information systems ■ CORDIS: Call for tenders ■ IRC newsletter: Great Expectations  
■ IRC case study: networking for technology transfer ■ WebWatch ■ Calendar of Events

### **DOSSIER:** 13-18

Financing Innovation

### **CASE STUDY** 19-20

Biotechnology: Industrial applications of genome sequencing ■ Telematics Applications: videoconferencing for education

### **PROGRAMME BRIEFING** 21-22

Education/Training: Internet for schools  
■ Evaluating Esprit

### **CONFERENCES AND PUBLICATIONS** 23-24

Cover: European Service Network.

## INNOVATION & TECHNOLOGY TRANSFER



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

*Innovation & Technology Transfer* is published six times a year in English, French and German by the Innovation Programme. The Programme aims to strengthen Europe's innovation infrastructure and foster the application of research results to industry.

#### **PUBLISHED BY:**

**European Commission, Directorate-General XIII**  
Telecommunications, Information Market  
and Exploitation of Research  
**Directorate XIII-D**  
Dissemination and Exploitation of RTD Results,  
Technology Transfer and Innovation  
**Address**  
DG XIII/D-2, EUFO 2291, L-2920 Luxembourg  
Fax: +352 4301 32084

#### **WRITTEN AND PRODUCED BY:**

**ESN, Brussels**

#### **LEGAL NOTICE:**

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the information contained in this publication.

© European Communities, 1997

Reproduction is authorized, provided the source is acknowledged

**Printed in Belgium**

#### **WWW ADDRESS:**

**[Http://www.cordis.lu/itt/itt-en/home.html](http://www.cordis.lu/itt/itt-en/home.html)**

Subscription to *Innovation & Technology Transfer* is free - please fill out the request form on the back page and fax or post it back to DG XIII/D-2.

# Listening to the Future

**Over 300,000 young Europeans benefit from the Commission's research, innovation, education, training and youth programmes every year. What do they think of this experience, and how can these programmes be improved in the future?**

There is a very good reason why European Commissioner Edith Cresson's portfolio combines research and innovation with education, training and youth. The issues share a common theme - Europe's future. For if European competitiveness depends on advanced technologies, then it depends on training researchers and employees to develop and use them.

The Commission therefore runs several education, training and youth programmes, and actively encourages the participation of young people in its research programmes.

## Workshops and Debate

How can these programmes be improved in the future? Commissioner Cresson recently invited 100 young participants to discuss their experience and suggest ways of strengthening their impact.

The majority, in fact, consider these programmes already very successful: 83% believed that their involvement had enhanced their career prospects. "It opens your horizons," explains Christian Tils, a Dutch biotechnology expert who spent a year at the JRC's Institute for Prospective Technological Studies before becoming an independent business consultant. "You're elevated to a European perspective, with all the contacts that come with it."

He and the other participants discussed the programme's benefits and problems before



**“ Another area in which the Europeans are lacking is in the readiness to take risks, to trust in the future. Failure is seen as something to be ashamed of in Europe. This is not the case elsewhere. The essential key lies in the spirit of innovation. If we do not make up for lost ground in the new technologies we are destined to lose jobs. ”**

*Edith Cresson*

debating them with Mme Cresson. The 'research and innovation' students broadly agreed with the thrust of the Fifth Framework Programme, but stressed the need for fundamental research and suggested that more opportunities be provided to help young scientists commercialise their research.

The biggest problem cited by many participants, however, was that the grants - which frequently arrive late - are often highly taxed. They feared that this closes out students from less privileged backgrounds, particularly as they usually hear less about the programmes in the first place.

Mme Cresson promised to try to reduce the bureaucracy that delayed the arrival of the grants, but pointed out that this

problem was not limited to youth programmes. "The Commission operates under conditions which no national department would tolerate - we have to answer to fifteen governments."

The fact that many Member States taxed the students' grants was something she took seriously. "It really is ridiculous - the sums involved are minimal," she said. "I'm working at it from my side, but you must exert democratic pressure on your governments to stop this."

The meeting, she concluded, was successful enough to repeat next year, and could lead to an Internet site to improve awareness of the various programmes. □

## THE PROGRAMMES IN BRIEF

### RESEARCH AND INNOVATION

- **Training and Mobility of Researchers: 'Marie Curie'** grants for young people to carry out research in another Member State;
- **The research programmes:** the projects created nearly 25,000 research posts, many for young people, in 1996, and each programme supports training grants;
- **Joint Research Centre:** hosting around 150 grant-holders annually - either PhDs or candidates preparing their theses.

### EDUCATION, TRAINING AND YOUTH:

- **Socrates:** helping students study in another Member State, and supporting transnational projects and exchanges;
- **Leonardo da Vinci:** similar to Socrates, but aimed at apprentices, young people in vocational training, and trainers;
- **Youth for Europe:** transnational projects for youth, particularly from disadvantaged backgrounds;
- **Tempus:** grants for students from Central and Eastern Europe to study in an EU university;
- **European Voluntary Service:** young volunteers working in community projects in another Member State.

## ► RTD STATISTICS

# The Union's Research in Figures

*Last year, the EC's R&D programmes received some 24,000 research proposals and signed contracts to fund over 6,000 research projects involving 25,000 participants, according to a recently published report.*

The third in a series, the report<sup>(1)</sup> examines EU-funded research and technological development activities in 1996 and looks forward to the launch of the Fifth Framework Programme next year.

It covers research undertaken across the entire range of Community programmes, providing both statistical and general information, and offers an analysis of research funding, participation and collaboration. An overview of the research policy context and outlook is also presented.

Available in all 11 official languages from the European Commission, the report emphasises that interest in EU research and technological development programmes remains high. At the end of 1996 there were over 9,000 projects under way. Some 24,000 proposals were submitted during the year, and contracts for more than 6,000 research projects were signed. These involved 25,000 research partners in Europe and other parts of the world, and over 70,000 inter-partner links.

A number of key results are highlighted, including the sequencing of the yeast genome<sup>(2)</sup>, the study of the sub-glacial Vatnajökull volcano in Iceland, and the development of an underwater robot capable of operating at a depth of 6,000 metres. The report notes that EU-supported research gave rise to over 3,000 publications and patents in 1996.

## 1996 Project Activity

The report's Annexes give data for projects whose contracts were signed in 1996, some of which are illustrated in the accompanying charts.

■ At current prices, EU spending on research has increased nearly sixfold between 1984 and 1998, rising in every year

per project were in the fields of marine science and technology, controlled thermonuclear fusion, and transport, and the lowest in those of international co-operation, training and mobility of researchers, and dissemination and utilisation of results (Chart B);

■ Both in terms of EU contribution and numbers of partners, industrial participation was

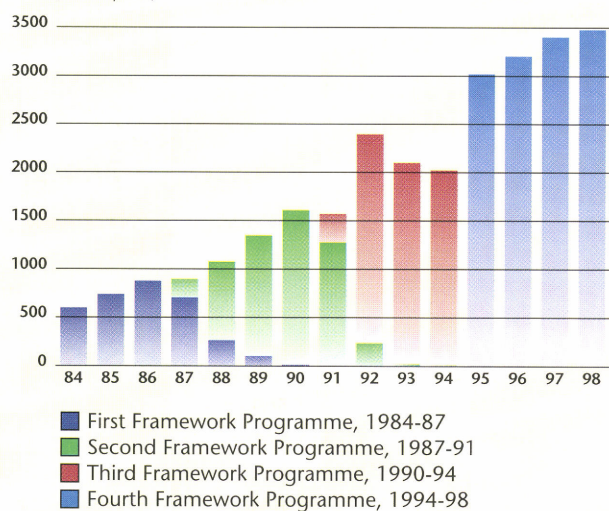
materials technologies;

■ The size of research partnerships was particularly high in the fields of communications technologies, transport, telematics, and biomedicine and health, with an average of more than 8 partners per project in each case (Chart C);

■ The transnationality of partnerships (that is, the number of different Member States involved) was generally proportional to the number of partners. On average, for every three partners, two Member States were represented. Transnationality was especially high in the field of information technology, and particularly low in the fields of marine science and technology, telematics, and biomedicine and health (Chart C).

## A. EU research Funding, 1984-1998

MECU (current prices)



except 1991, 1993 and 1994 (Chart A);

■ The total EU contribution to research projects launched in 1996 was nearly 3 billion ECU. 34% of this total (1,032 MECU) was devoted to the two fields of information technologies and industrial and materials technologies (Chart B);

■ Overall, the average EU contribution per project was just under 500,000 ECU. The highest average EU contributions

greatest in the fields of information technologies and industrial and materials technologies, while that of research bodies and higher education institutes was highest in those of training and mobility of researchers, environment and climate, and biotechnology;

■ For projects launched in 1996, SMEs constituted 18% of all participants. SME participation was particularly strong in the field of industrial and ma-

## Without Parallel

The report notes the findings of the overall assessment of the research Framework Programme prepared by an Independent Panel chaired by Professor U. Colombo, which took into account assessments of each of the 18 Specific Programmes. It quotes the Panel's view that "there is no parallel to the Framework Programme endeavour among other collaborative programmes, anywhere in the world. The Commission Services have shown a remarkable ability in handling such a complex and diversified RTD programme involving many thousands of projects and researchers."

**C** o n t a c t  
 Communications  
 Unit, DG XII  
 Fx. +32 2 295 8220  
 E-m. info-dg12@dg12.cec.be

The 13.1 billion ECU budget for the Fourth Framework Programme, which comes to an end in 1998, was increased by 115 MECU following agreement between the European Council and Parliament.

The new funds will be split between most of the research programmes - almost a third of the extra funds (35 MECU) will be devoted to BSE research, for example, and that will be split between the

Biomedicine and Health, Agriculture and Fisheries, and Biotechnology research programmes. The other 80 MECU will be dedicated to Aeronautics (20 MECU), Anti-personnel mines (15

MECU), Educational multimedia software (12 MECU), Transport inter-modality (12 MECU), Environment (water research, 12 MECU) and Renewable energy (9 MECU).

It notes the Panel's conclusion that the Framework Programme is, overall, developing in a positive way, with substantial achievements and steady improvement in programme management — but that more attention should be paid to the commercial exploitation of project results, as well as to securing benefits at European level.

In the area of research policy, the report summarises the formal proposals for the Fifth Framework Programme adopted in April, and provides a useful overview of the contributions to the planning process made by the European Parliament and nearly 200 public and private, European and national bodies and associations.

### The Innovation Programme

In reviewing the 1996 activities of the Innovation programme, the report highlights some notable statistics:

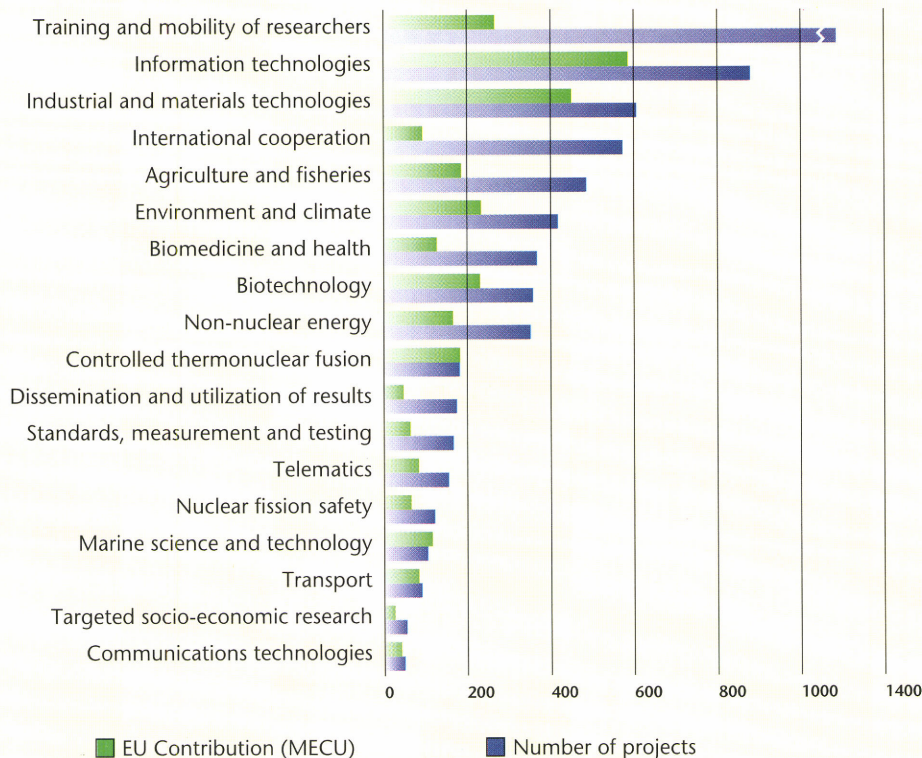
- In its first eight months, the Innovation Relay Centre network (see pages 9-12) handled 39,000 requests for assistance related to programme participation or technology transfer, helped to negotiate 370 transnational technology transfer agreements, and successfully concluded 103.

- Following the launch of the CORDIS website, 1996 saw a threefold rise in the number of users to more than 25,000 per month.

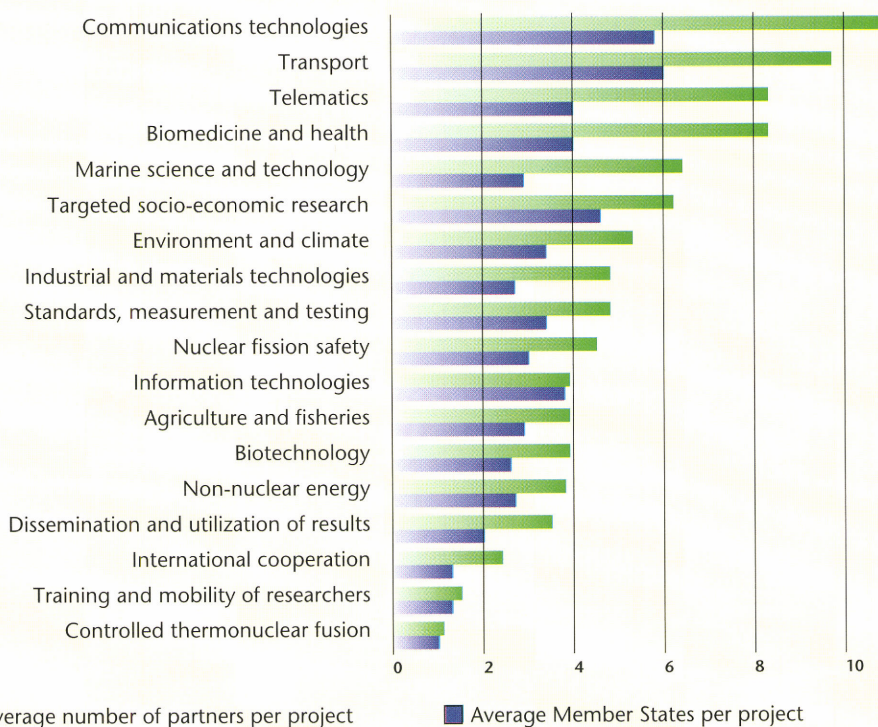
- The definition phases of 100 technology transfer and validation projects were funded, of which 60 were subsequently supported through to full implementation. □

(1) *Research and Technological Development Activities of the European Union — 1997 Annual Report: COM(97)373 final*  
 (2) See page 19.

### B. 1996 new projects I: Number and EU Contribution by Programme



### C. 1996 new projects II: Scale of Partnership and Transnationality



**► INNOVATION PROJECT**
**THE INNOVATION PROGRAMME IN BRIEF**

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

**C o n t a c t**

- Unit D-1: Technology transfer and validation projects, JRC liaison, intellectual property  
Fx: +352 4301 34129
- Unit D-2: Community Information and Dissemination Service  
Fx: +352 4301 35389
- Unit D-3: Relay Centres and other services  
Fx: +352 4301 34009
- Unit D-4: Innovation policy, regional aspects, financing, EIMS  
Fx: +352 4301 34544

**Innovation Home Page**  
[Http://www.cordis.lu/innovation/home.html](http://www.cordis.lu/innovation/home.html)

# A Flash of Inspiration

*The results of an Esprit project will make cost-effective new 'system on a chip' solutions possible for a range of automotive, telecommunications and industrial electronics applications. The IEDEA project is ensuring that the technology reaches the market in the shortest possible time.*



*The clean-room in Thesys' fabrication facility in Erfurt, Germany.*

Car-makers are increasingly turning to reprogrammable high-density memory to create cheap, compact electronic components. The integration of non-volatile flash EEPROM (Electrically Erasable Programmable Read Only Memory) allows them to use a standard part, configuring it to the needs of a particular model at assembly stage by changing the contents of the memory chip. Smart cards, mobile telephones, and other portable electronic devices also make extensive use of the technology.

The market for these non-volatile memory (NVM) chips, which retain the information stored within them when the

external power is turned off, is currently growing at 40% per year. It is also dominated by US manufacturers.

But there are problems with the current generation of chips, which suffer from slow programming speeds and high power consumption. They are also expensive, and are difficult to integrate into low-volume products, placing smaller companies at a disadvantage.

An entirely new flash EEPROM cell called HIMOS (High Injection Metal Oxide Semiconductor) promises to overcome all these problems, reducing European reliance on imported NVM chips, and improving European competitiveness in key growth sectors.

## Embedded Memory

Invented by Dr Jan Van Houdt of the Flemish Research Centre for Microelectronics (IMEC), and developed in an Esprit project, the patented HIMOS technology is now on a fast track to market entry thanks to support from the Innovation programme. "What is exciting about HIMOS is that it combines low processing cost with very high programming speed and low power consumption," explains Dr Van Houdt. "This makes it ideal for embedded memory applications, which are exactly what the market is starting to demand."

The Innovation project sees the transfer of the HIMOS technology to Thesys Microelectronics, a German supplier of application-specific integrated circuits (ASICs), under a licence agreement. Also taking part is French systems house MS2 (Mixed Silicon Structures), which will be the first external end-user of Thesys' enhanced fabrication process.

Thesys is incorporating HIMOS into its existing 0.8 micron chip production process, allowing EEPROM of up to 256 kbits to be integrated with logic elements on a single chip. According to Dr Konrad Bach, who leads the Thesys development team, such 'system-on-silicon' solutions offer clear advantages over the currently available dedicated NVM chips.

"Single-chip systems are inherently more reliable and easier to handle than ones which

use multiple components," he says. "They are cheaper to design and produce, and the 'one size fits all' approach reduces assembly costs for the end-user, whether they are making cars or mobile phones. We have no intention of entering the mass market for high capacity NVM chips. But for the huge number of applications where 8 or 64 kbits of memory is enough, HIMOS is a clear winner."

### It's an Analogue World

Thesys' focus is on mixed-signal ASIC designs — that is, chips which combine digital and analogue circuits. The devices made by the company's customers incorporate a growing number of features which depend on digital procedures, but their job is to interact with the analogue world of fluctuations in electrical current or radio frequency.

"Think of the lighting controls in a car," says Dr Bach. "In a fully-featured modern vehicle, the system should be capable of reacting to digital instructions about when to dim the interior lights, for example. But it also needs analogue switches, buffers and amplifiers to drive the signals down to the light bulbs, which are analogue components. And if a bulb fails, it must be able to respond appropriately to the change of current."

Thesys' designs combine both digital and analogue capabilities in one chip. The addition of non-volatile memory will enable end-users to give a standard product a range of different identities. "Our customers are delighted," says Thomas Hartung, Thesys' marketing manager. "They see the possibility of adding features and improving price-competitiveness at the same time."

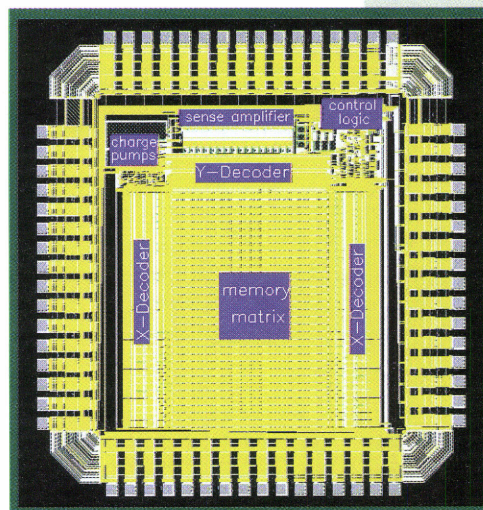
### Backward Compatibility

But compatibility with current processes is critical. "It was essential that we could offer EEPROM as an add-on to existing chip designs," says Hartung. "Customers want to add features. But they also want to avoid the expense and the delay of developing a completely new design, and they have to be able to use the resulting chip in their current products without modification."

The key to the project's success in overcoming this obstacle has been Thesys' modular design and production process, based on a library of standard elements. "We were also fortunate that IMEC's technology base closely matched our own, in terms both of feature size and of process architecture," says Konrad Bach. "The EEPROM module has been incorporated in Thesys' 0.8 micron process with comparative ease."

By spring 1997, the team had succeeded in integrating a single HIMOS cell into the process, and were able to replicate IMEC's laboratory results in the Thesys facility. And by the end of August they had created and tested a demonstrator circuit with 64 kbit of NVM. The results — in terms of program and erase speeds, and the integrity of stored data — were excellent.

The team is currently working on the optimisation of chip yield. "Our fabrication process involves 500 separate steps," says Bach. "Incorporating HIMOS memory involves changing around 50 of them. At the moment we have simply left the remaining steps as they were, and the chip works. What we have to do now is to refine those process steps in order to increase yields and stabilise production."



### Record Speed

On-chip NVM also opens up new application possibilities, and Thesys hopes that it will enable the company to enter new markets. But as well as designing chips in-house to meet the needs of its own customers, Thesys also makes a design kit available to outside systems houses such as MS2, who use its facilities to supply other markets.

The design kit has already been modified to include the NVM module, and MS2 has just started their first project using the new specification. A second, in-house design project, for an automotive application, is also under way, and Thesys expects to deliver the first engineering samples by the end of 1997. "The Innovation project has enabled us to bring the HIMOS technology to market in record time," says Konrad Bach. "Normally, we perfect the technology and then test the design tools before making a new process available. Involving an end-user has allowed us to carry out the two development phases in parallel, saving us as much as 12 months." □

*Developed in Esprit and transferred through an Innovation project, the High Injection Metal Oxide Semiconductor EEPROM cell combines low processing cost with very high programming speed and low power consumption.*

**C** o n t a c t  
**K. Bach, Thesys  
 Microelectronics**  
 Tl. +49 361 427 63 85  
 Fx. +49 361 427 61 71  
 E-m. bach\_konrad@ccgate.  
 thesys.de  
 Http://www.thesys.de

# CRIS Is Critical!

**Current Research Information Systems (CRISs) are key tools for European competitiveness, offering industry rapid access to research results. Early interest in the 1998 CRIS conference (Luxembourg, 12-14 March) has exceeded expectations.**

The return on Community investment in research and development depends upon full and rapid exploitation of results. Assessments of the Framework Programme emphasise the need to improve performance in the area of dissemination, in order to ensure that innovative technologies reach the market more rapidly<sup>(1)</sup>. CRISs will be critical in enabling companies, and especially SMEs, to make productive use of Europe's technological resources.



The Fourth CRIS Conference will focus on:

- methods to promote better use of research information by industry; CRIS as a technology watch and technology transfer tool; its use in monitoring and evaluation;
- web and indexing technologies for delivery of CRIS; data standards; integration of different

types of research data; the ERGO project<sup>(2)</sup>.

It will include demonstrations and a Conference Cybercafé, linked to sub-sites across the European Union.

A public-access CRIS98 web-site will be on CORDIS from the start of November, with background information, programme details and registration form. An extended site will be launched at the event itself, to give access to conference papers, case studies and a

**C** o n t a c t  
 L. Van Woensel  
 Fx. +352 4301 34989  
 E-m. [cris98@lux.dg13.cec.be](mailto:cris98@lux.dg13.cec.be)  
 Http://www.cordis.lu/cris98

wide range of related information resources.

The call for papers, now closed, had a huge response, and the conference has been extended to accommodate additional contributions. The closing date for reduced rate registration is 27 February.

(1) See for example this edition, page 22  
 (2) See edition 5/97.

► CORDIS

# Developing CORDIS Further

The European Commission expects to publish a Call for Tenders on 5 December related to the operation and further development of CORDIS, the EU's information service on research, technological development and innovation. As part of the Commission's Innovation Programme, the aim of CORDIS is to promote innovation and the exploitation of new technologies, particularly among SMEs.

Information for CORDIS is gathered from a variety of sources and made publicly available via the CORDIS online information service. The

primary means of dissemination is the Internet - at present the CORDIS web-site sees over 800,000 user actions per month (<http://www.cordis.lu/>). CORDIS also distributes information on CD-ROM and through printed media.

Two distinct activities will be covered by the Call for Tenders:

- information collection and production;
- user service and support.

The Call for Tenders will be published in the *Official Journal of the European Communities*. For more information, see the Preliminary Notice of the

Call, published in *Official Journal*, No. S 132 of 11 July 1997, page 37, or contact DG XIII/D.

**C** o n t a c t  
 B. Niessen,  
 DG XIII/D  
 Tl. +352 4301 33638  
 Fx. +352 4301 34989  
 E-m. [Bernd.Niessen@lux.dg13.cec.be](mailto:Bernd.Niessen@lux.dg13.cec.be)



**The latest feature on CORDIS - RAPIDUS (RAPid Delivery of Updates on Search-profiles) - allows you to save your most commonly used searches of the CORDIS databases, reducing the time you spend on line. RAPIDUS will also e-mail you any new records which match your search profile as soon as they are added to the databases.**



# Innovation Relay Centre

N e w s l e t t e r

## Great Expectations

*After two years of operation, the IRC Network has the tools, contacts and experience to support the acquisition and dissemination of technologies by companies and research organisations.*

Two years after its September 1995 launch, the Innovation Relay Centre network has acquired a solid body of experience and good practice, says Javier Hernández-Ros, Head of the European Commission's unit responsible for the management and development of the network.

"We have now completed the establishment phase," he says. "Creating a network out of a set of independent offices involved training, staff exchanges and the creation of sectoral Thematic Groups, as well as investment in modern communication tools and the development of results-oriented performance indicators."

### Preferred Technology Transfer Agents

Even during this initial phase, the network has achieved considerable success, as the performance indicators show. "The independent evaluation of the first two years was extremely encouraging," says Mr Hernández-Ros. "Among the 700 companies interviewed, satisfaction was very high. IRCs may not be the only technology co-operation agents in Europe, but they are now widely seen as the preferred first point of contact for expert advice and support on transnational technology transfer."

At the heart of the IRC philosophy is a proactive, demand-led approach, strongly focused towards the completion of transnational deals. "Increasingly, competitiveness depends on continuous innovation," Mr Hernández-Ros stresses. "The job of the network is to give European companies easy access to the scientific and technological solutions they need for growth, and to promote technologies developed under national or European research programmes."

The network enables local companies to draw on technological capacity anywhere in Europe,

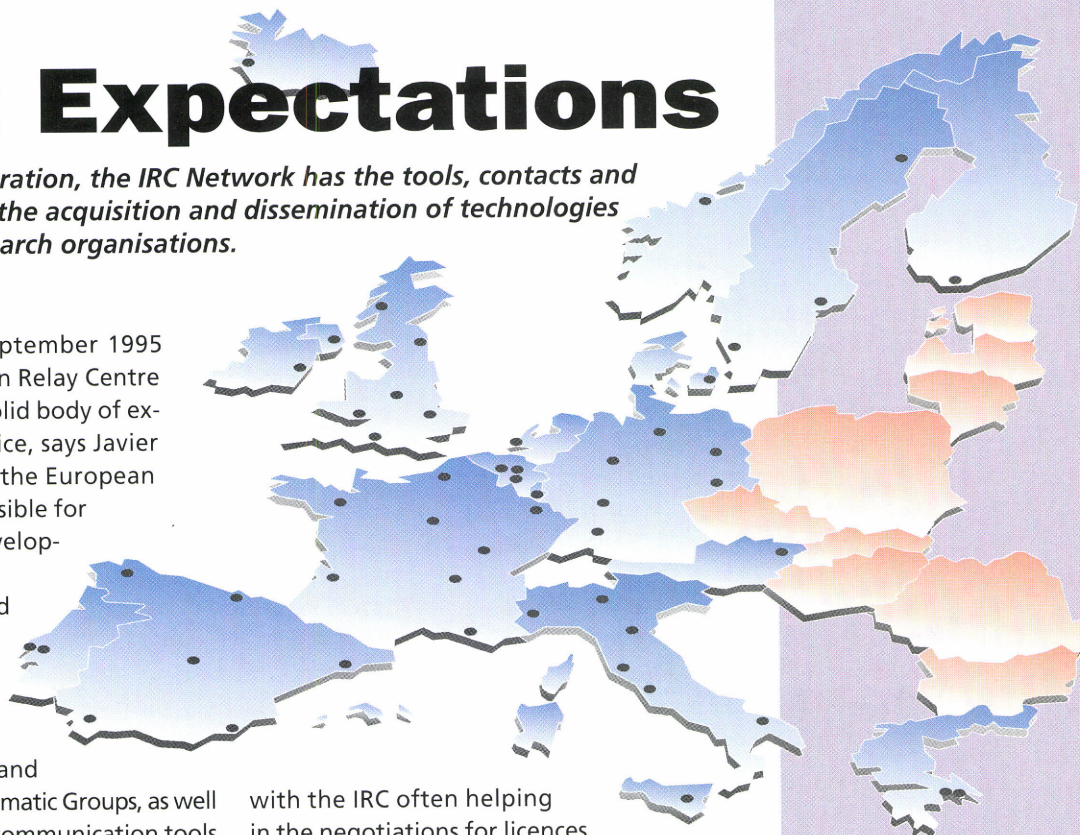
with the IRC often helping in the negotiations for licences or technology transfer agreements with a company or institute in another Member State. Clients may also be helped to set up a new R&D project through one of the EC's research programmes.

### Network Showcase

This IRC Newsletter will appear in *Innovation & Technology Transfer* several times a year. It will also be printed separately and sent directly to EU and national R&D policy-makers, as well as to other technology intermediaries such as chambers of commerce and regional technology centres.

Mr Hernández-Ros knows how busy they are. "Detailed information is available on the IRC web site," he says. "But many people do not have time to make use of this. We want to reach a wider audience, giving them regular updates on the work of the IRCs and offering concrete examples of what we do."

Looking to the future, Mr Hernández-Ros is bullish about the network's prospects. "The network is mature. Its profile and reputation are good. Expectations are very high. We are looking forward to achieving maximum impact in the two remaining years of the Fourth Framework programme."



### THE IRC NETWORK IN BRIEF

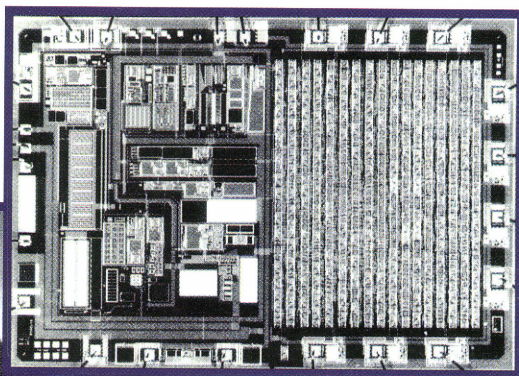
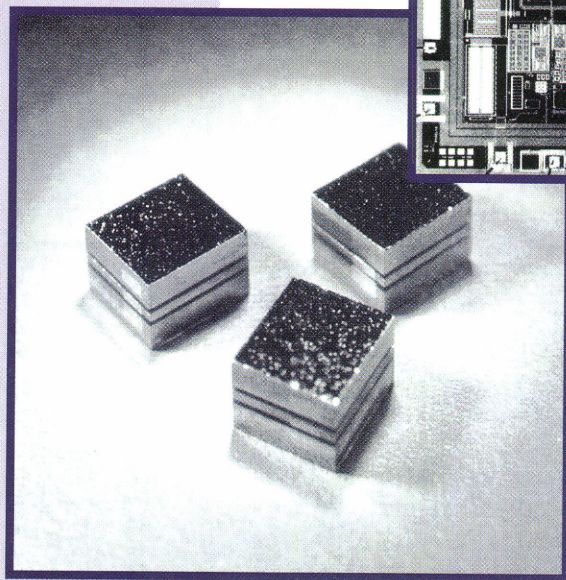
The Innovation Programme's network of 52 Innovation Relay Centres (IRC) spans the EU, Iceland and Norway (see map), with 'twinning' arrangements extending it to some Central and Eastern European countries (shaded in red).

Each IRC is its region's window on European innovation, helping companies and research organisations transfer technologies to and from the rest of Europe and access the EU's research programmes. See the Dossier in edition 4/97 for more details

**► CASE STUDY**

# Smarter Brains for Crash-Test Dummies

*One of Germany's Innovation Relay Centres helped three companies from across Europe team up and access Innovation Programme funds to develop an advanced inertial microsensor for the European market. By combining skills in silicon bulk-micromachining, sensor design and electronics, the German, Austrian and Finnish partners aim to achieve mass-production of an inertial microsensor which is cheaper, more accurate and more robust than comparable devices based on conventional technologies.*



*The new inertial sensor represents the different companies' skills in silicon bulk-micromachining, sensor design and electronics (inset: Austria Mikro Systeme International's chip)*

**A**stronauts, pilots, deep-sea divers, oil exploration teams and even crash dummies may all find it easier to get their bearings in the future, thanks to a new generation of microsensors being developed by a consortium of European companies.

Accelerometers, as their name implies, measure the rate of change of velocity, producing an electronic signal which can be measured or used to control a process. Common applications include the activation mechanisms of

automotive seat belts and air bags, where the accelerometer senses sudden deceleration and causes these safety devices to engage.

These sensors employ a mechanism that is analogous to stretching a spring. Acceleration stretches the spring, higher acceleration stretches the spring further. Measure the lengths of the deformations and acceleration can be determined. Add in a known initial velocity and the time element and simple physics allows us to calculate the distance travelled. Make the system three dimensional by adding sensors to monitor longitudinal and rotational movement and we have what is, in theory, the basis of an automatic navigation system.

In reality, accelerometers display limited accuracy, commonly  $\pm 5\%$ , which precludes their use in navigation systems. The way to achieve the

much greater precision required is to use 'closed loop' inertial microsensors. In these, continuous electrical feedback from the signal output to the sensor probe exactly balances the incoming mechanical forces, eliminating inaccuracies and allowing the tiniest changes to be detected. The precision of these inertial sensors is several orders of magnitude greater than that of conventional accelerometers and makes their use in navigation systems a realistic proposition.

With support from VDI/VDE-IT, the North German Innovation Relay Centre, the NAVACCEL-100 project has brought together companies from different industrial sectors to design and manufacture an inertial microsensor which combines a robust design, a wide measurement range and higher accuracy than comparable products. In addition to improving the sensor performance, the partners aim to reduce Europe's dependence on the single current non-European manufacturer of these components, ensuring adequate production capability and continuity of supply - often a problem with such strategically-sensitive technology.

## A Sensible Sensor Partnership

It all began at the German systems house, iMAR GmbH, whose customers were asking for a European source for these inertial microsensors. iMAR realised that the answer lay in adapting established silicon microchip production technology to produce both the silicon microsensor and its associated microelectronics. Only a mature, well-understood process technology would allow the devices to be produced at high enough production yield to ensure their commercial viability.

Enlisting the help of a consulting microsystems engineer, iMAR was soon able to identify two partners with the complementary expertise required to turn a market-driven, technologically feasible idea into an economic reality. The first was the Finnish company VTI Hamlin Oy, which has developed micro-machining techniques to mass produce precision silicon accelerometers for automotive applications. The other was Austria Mikro Systeme International AG, a well known silicon microchip manufacturer. The partnership offered a unique combination of design expertise, production technology and access to potential customers, giving the project vertical integration and reducing the time-to-market for the new sensors.

It was at this point that the North German IRC coordinator was able to offer valuable assistance. It was already known to the partners, having organised a conference on Advanced Microsystems for Automotive Applications. During discussions following the conference, the IRC was able to guide the three com-



panies towards the appropriate EU funding programmes. The Centre also advised the partnership on the application process, and in 1997 the project was successfully nominated for funding under the Innovation Programme's Technology Transfer and Validation action line.

### Staying on the Straight and Narrow

The first commercial application envisaged for the sensors is in crash-test dummies, where three precision accelerometers and three gyros will track the trajectory of the head. This is normally monitored using high-speed cameras, but when air-bags deploy in the last stages of a crash, the dummy's head is obscured from view.

If the project is successful the benefits will extend far beyond the creation of sensitive dummies. The development of a stable, yet highly accurate inertial microsensor will have ramifications for all forms of navigation. The partners are already examining the microsensor's use in navigation applications including remote-controlled aircraft and unmanned submersible probes.

The partnership has even looked at opportunities in the oil exploration field. Anyone who has tried to hang a picture on a wall will be familiar with the difficulty of drilling accurately. No matter how carefully a drill is aligned, it will always move slightly before burrowing into the wall.

Engineers face the same problem when sinking boreholes. Every time the drill hits a layer of hard rock it skids slightly, knocking the borehole off alignment. The project team believe that their inertial microsensor will be small enough to fit within the head of a drill, strong enough to withstand the harsh environment and accurate enough to let engineers know exactly where they are drilling. As the sensor will be mass-produced, it will also be cheaper than conventional closed loop accelerometers.

Thanks to support from the EU and the German IRC, the project is now moving into its developmental phase. As the list of future applications continues to grow and the technology becomes a reality, the project partners can now sense with accuracy that they are on to a winner.

*The first application of the new inertial microsensor will be to make crash-testing more accurate.*

**C** o n t a c t  
Wolfgang Gessner  
VDI/VDE

Technologiezentrum  
Informationstechnik GmbH  
Tl. +49 3328 435 173  
Fx. +49 3328 435 216  
E-m. gessner@vdivde-it.de  
Http://www.vdivde-it.de/irc/

**► WEBWATCH**

# Networking the IRCs

*WebWatch is an irregular column highlighting WWW pages of particular interest to both network members and their customers. The IRC Home Page is an obvious place to start.*

The IRC Home Page is divided into two parts - publicly accessible information and a range of password-protected services for the IRCs themselves.

For the moment, the publicly available information consists of contact information for each IRC and a number of relevant EC offices. In addition, both the Calendar of Events and the complete list of IRC addresses can be downloaded as a word processing document. This November will see the launch of a new section on the site featuring stories on IRC case studies.

## Networking Services

The IRC-only services, however, form the core of the site, and will play an increasingly important role in networking the 52 IRCs together. Each IRC can access the site to read, post, edit and delete a number of types of records:

- 'Technology Offers', detailing technologies that a company or research institute has developed and is interested in transferring to other organisations throughout Europe;
- 'Technology Requests' are the reverse - an IRC posts the technologies that companies and research institutes in its region need;
- 'Partner Searches', from companies or research institutes which would like to launch a research or technology transfer project, and are

interested in finding partners before submitting a proposal to the EC;

- Entries for the 'Calendar of Events'.

Each of the IRC network's active Thematic Groups also

has a Home Page connected to the site, providing their members with information specific to their mission through meeting and discussion documents, a bulletin board service, and so on.

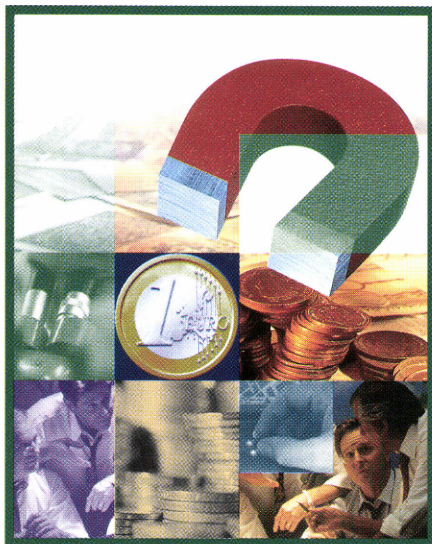
<http://www.cordis.lu/irc/home.html>

## Calendar of Events

4-6/11/97 Birmingham (UK)	<b>AUTOTECH '97</b> The IRC Automotive Group involving nine IRCs will be represented on the 'Prosperity through Partnership' stand together with Jaguar Cars plc, Texas Instruments and the UK Department of Trade and Industry.	IRC Midlands Tel: +44 1203 838 143 838 146 Fax: +44 1203 221 396
5/11/97, Hannover (DE)	<b>Research in Practice</b> The Institute of Machine Components, Construction Technology and Tribology will be presenting application orientated research results in order to strengthen active dialogue with SMEs.	IRC Lower Saxony Tel: +49 511 762 5726
5-7/11/97, Edinburgh (UK)	<b>Second International Campus Companies Conference</b> A look at the funding of university spin out and high technology companies.	IRC Scotland Tel: +44 141 248 2700
6-7/11/97, Stuttgart (DE)	<b>European Information Society</b> Where does the European information society stand? What opportunities do European companies have to compete with companies from Japan, USA, etc.?	IRC Steinbeis Tel: +49 711 123 4010
10/11/97, Paris	<b>TRANSTECH 98</b> <b>International Business Convention on Technology Transfer</b> Neither an exhibition nor a conference, Transtech 98 offers 300 participants (enterprises and research centres) the chance to develop new cooperation through individual meetings.	IRC Paris Tel: +33 1 4508 35 39 Fax: +33 1 4508 39 79
21/11/97, Belfast (UK)	<b>New Technology from Russia</b> A technology transfer event to give local companies access to the newest technologies which have been developed in Russia.	IRC Northern Ireland Tel: +44 1232 491031 Fax: +44 1232 691432
28/11/97 Brussels	<b>IT Brokerage Event</b> Four ESPRIT and ACTS projects will be presented to a target public of potential end users from various countries.	IRC Brussels Tel: +32 2 422 00 21 Fax: +32 2 422 00 43
4-5/12/97, Stockholm	<b>Estonia-Sweden Brokerage Event</b> Organised by the Estonian FEMIRC (Fellow Member to the Innovation Relay Centre network) and the Swedish EC R&D Council, the Estonian-Swedish Brokerage Event aims to develop contacts and promote cooperation between Swedish, Estonian, Lithuanian and Latvian businesses dealing with high tech production and R&D.	FEMIRC Estonia Tel: +372 7 44 73 28 Fx: +372 7 44 17 22 rene@eenet.ee
10-11/12/97, Utrecht (NL)	<b>ECOparters</b> ECOparters is a European business contact event, held during the Ecotech-Europe Fair.	IRC Senter Tel: +31 703 467 200 Fax: +31 703 562 811
11-12/12/97, Jena (DE)	<b>BIOAPPLICA '97</b> The BIOAPPLICA '97 event is aimed at companies and research providers from the following areas: biomaterial and bioinstruments, precision instruments/measuring techniques, environmental technology, food and agricultural industries, pharmacology, cosmetics, chemistry/biochemistry, genetic engineering.	IRC Saxony: Thüringer Agentur Tel: +49 36 1 3484 130 Fax: +49 36 1 3484 288

# Attracting capital to major companies...

## when they are still small businesses



*As became clear during discussions on the Green Paper on Innovation, it is principally new small and medium-sized enterprises which are best placed to innovate, transforming inventions into new products or processes and thereby creating new jobs. Provided they have the means to do so. After having first looked at the mechanisms which allow private capital to be invested in innovation, the Commission is now launching a number of initiatives designed to encourage the emergence of a critical mass of technologically innovative companies.*

“

*Financing is the obstacle to innovation most often quoted by firms, whatever their size, in all Member States of the European Union and in virtually all sectors*

”

*The Green Paper on Innovation*

### ***I. Financing Innovative Enterprises***

In most cases it is the entrepreneurs themselves who provide the initial funds to launch a new business based on technological innovation. At this initial stage, in which the cultural dimension is paramount (country, training, socio-economic and political environment, etc.), Europe ranks behind the United States, where there is a class of managers who know how to create wealth with research backed up by finance.

Most innovative European enterprises still have to rely on bank loans as the major source of external finance, but unfortunately only a minority among them are likely to obtain the long-term loans required to develop innovation. Many technological projects are simply unable to satisfy the traditional requirements laid down by the banks (healthy and balanced financial structure, equity capital plus liquid assets, sufficient guarantees). For their part, the banks and other financial institutions generally lack the skills and resources to effectively handle the financing of innovative projects which, moreover, often have specific needs for which existing highly standardised financial instruments are ill-suited.

Nevertheless, attempts have been made in Europe over recent years to take this technological dimension into account when financing companies, for example through methods such as technology rating, guarantee systems based on industrial property rights, and the creation of special units specialising in innovation and technology within the major high street banks. Technology rating is a method of classification and assessment which combines an assessment of the technological potential, the market and the way the company is managed.

#### ***Venture Capital: A Crucial Role***

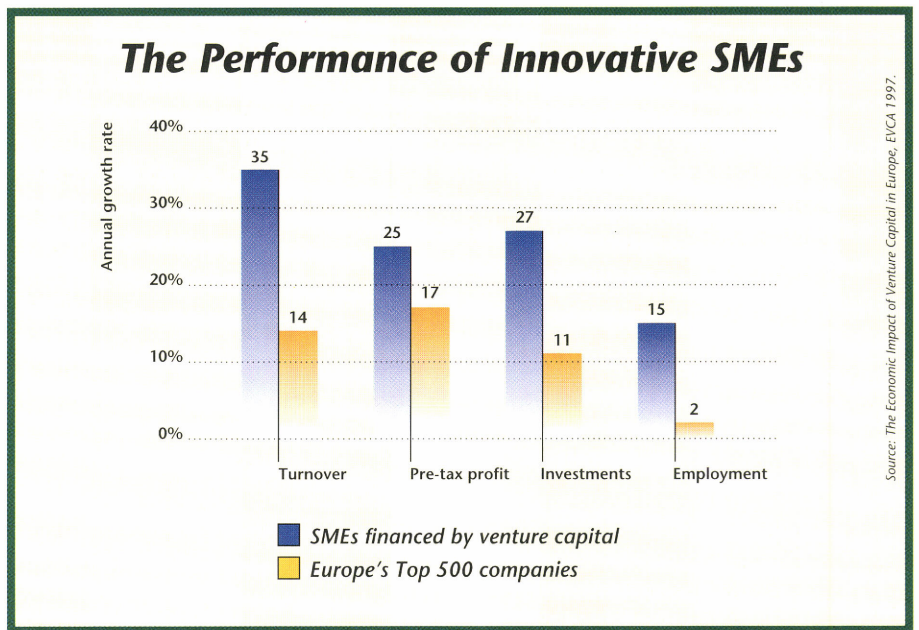
Companies which are recording very rapid growth require access to venture capital in order to fund their investments. This venture capital consists of funds raised on the capital market by specialised operators. The investors buy shares or invest convertible bonds in the company, of which they become co-owner.

Venture capital operators do not invest with the idea of receiving an

immediate dividend, but in order to allow the company to expand and ultimately make a capital gain on their investment. Their job consists of identifying companies with good prospects and injecting them with sufficient funds for them to grow to the point where they can be listed on the stock exchange, thereby allowing them to trade their shares on the open market. Few companies actually achieve this and it is estimated that just 4% of European SMEs are sufficiently attractive to draw in venture capital.

A recent macro-economic survey of the economic impact of venture capital in Europe compared the performances of 500 companies having benefited from this kind of financing with the performances of Europe's Top 500 companies, as established by the Financial Times (FT-Extel Top 500). The survey (see graph) showed that over the past five years SMEs which benefited from venture capital recorded an annual increase in employment of 15%, compared with just 2% for the Top 500. They also showed a 35% annual growth in sales, twice that of the large companies. The vast majority of the business managers interviewed claimed that without the injection of venture capital they would have recorded much less or even zero growth.

Another kind of investment which is crucial for encouraging innovation is the setting up of seed capital for new companies or companies being



**The above graph eloquently contrasts the performance of a sample of 500 innovative SMEs which received venture capital with the performance of Europe's "Top 500" companies, over a 5-year period (1991-95).**

formed. Once again the need is for venture capital, as banks are not able to back projects without references or solid guarantees.

Although the total volume of venture capital invested in the United States (5.74 billion ECU) and the European Union (5.54 billion ECU) is comparable, the share which goes to the initial stages of a business start-up is much higher in the USA (26%) than in the European Union (5.7%).

Finally, new companies can also usefully benefit from the interest of informal

investors, or 'business angels' as they are sometimes called. These are individuals, generally from the immediate area, with money to invest. They act at a local level through their personal contacts, so their activities - very numerous but totally independent - are difficult to analyse and quantify. Nevertheless, this type of investment is believed to account for three times the total volume of funds available for venture capital.

### Financing Difficulties

Almost ECU 8 billion was raised for venture capital in Europe in 1996, just a small proportion of which is available for venture capital investment. Technology sectors are receiving a gradually shrinking share of total investments: an average of just 24% of European investments now go to technological development, compared to 70% in the USA.

Information and Communication Technologies (ICT) received 16% of total investments in 1995 compared to 13.5% in 1996. Investment in biotechnologies fell over this same period from 8 to 6.5%. However, in terms of absolute value, the new technologies are attracting more venture capital (ECU 441 million in 1996 compared to ECU 320 million in 1995), even if there has been little change in the number of beneficiaries of start-up investments (939 in 1995 and 941 in 1996).

As these companies are an unknown quantity, investors must study each

## Context

### Factors for Finance

**The financing needs of innovative SMEs are determined by three kinds of factors.**

#### The project's stage of development:

- development of a new technology;
- industrial and marketing feasibility studies;
- initial industrialisation and marketing;
- international development.

#### The extent to which the project is innovative:

- innovation of a radical nature, involving new products or processes;

- innovation of a progressive nature, such as extending a product range;
- technological modernisation (new for the company but not for the sector in which it operates).

#### The company's stage of development:

- newly formed company;
- established company.

## II. Europe's Role

case in detail. In Europe, the initial project evaluation for a company start-up requires an investment of 1 to 5 man-days per project, plus the costs linked to 'hands on management'.

Injecting venture capital into technological projects is even more costly - venture capital operators specialising in this sector focus their attention on an average of five cases every year, while their general counterparts handle an average of twelve. They also spend more time following up their investment: 220 hours a year, compared to 118 for non-technology sectors.

Operators are currently detecting a positive trend towards more venture capital financing for innovative enterprises, but are concerned at the low return on seed capital which remains essential for innovations originating in research.

As the low level of investment in innovative SMEs in Europe is not due to a shortage of capital but the lack of a specific infrastructure, public funding is not the only solution. This is especially true as finance is a sensitive subject which requires the public authorities to intervene indirectly, for example by removing technical obstacles which act as a disincentive to innovation financing professionals.

### **Indirect Actions**

One of the European Union's major responsibilities is to harmonise the operational framework - the administrative and fiscal environment. Nevertheless, certain actions can be supported by the public authorities, provided they are managed and conducted by private operators who respect the rules of the market place. Finally, as the question of innovation also involves a crucial

cultural dimension, the public authorities must support steps to promote its financing through the exchange of good practice and by establishing contacts between operators at European level.

The first European Action Plan for Innovation identified four levels of action to improve innovation financing:

- fostering investment in venture capital and equity capital, particularly for new enterprises (seed capital) and high growth companies, a major source of new jobs;
- developing a trans-European capital market for innovative enterprises as a counterpart to the American NASDAQ;
- improving interfaces between innovation actors, starting with participants in the Community's research programmes and financial circles;
- fostering access to long-term banking finance for advanced technology companies generally.

### **Context: European Council**

## ***Innovation financing targeted at the highest level***

In June 1997, the Amsterdam European Council stressed the need to increase support for technologically innovative SMEs which play a key role in creating new, competitive and stable jobs. In particular, EU heads of state and government asked the European Commission and the European Investment Bank (EIB) to cooperate more closely in the area of venture capital financing for innovation and advanced technology enterprises.

In July of this year I-TEC Finance (see page 18), the new pilot action launched in the framework of the Action Plan for Innovation, immediately acted on this recommendation. In addition to the incentives offered by I-TEC to venture capital operators investing in innovative SMEs, the European Investment Fund - 40% funded by the



EIB, 30% by the Commission and 30% by the European banking world - was given the go-ahead to set aside ECU 75 million for the acquisition of shareholdings in venture capital companies participating in this action.

In September, the EIB announced that it was setting aside 1 billion ECU for investments designed to create new jobs, a move which, thanks to a vast range of financial instruments, could

generate between 5 and 9 billion ECU in available capital. Thanks to the European Investment Fund, a new instrument, known as the European Technology Facility, will also be created before the end of 1997.

These initial actions clearly demonstrate that the European institutions are determined to combat unemployment, the central topic at the special European Council to be held in Luxembourg in November. On this occasion, the EIB will be presenting the actions it will be launching over the next three years under the ASAP (Amsterdam Special Action Programme).

The European Commission will endeavour to ensure that a favourable framework is created, in particular by the completion of the single market and respect for the rules of competition. For this to be possible, Member States must complete the process of

## Context

# Obstacles to Finance

### Initial financing (seed and start-up capital):

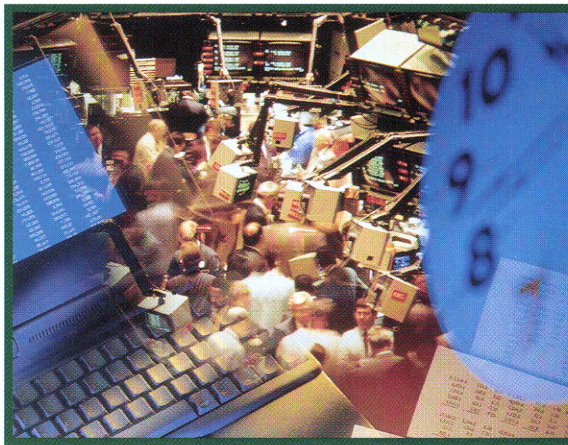
- high costs of initial evaluation;
- high costs of involvement in the company's management;
- highly specialised cases (based on science and technology) presenting a very high risk (few reference models);
- long investment period generally required;
- low initial investment but need for subsequent financing for several investment cycles;
- shortage of entrepreneurs able to develop innovative enterprises.

### Capital mobilisation:

- shortage of institutional resources in Europe (pension funds, for example);
- lack of freedom available to existing institutional resources to invest in innovative enterprises;
- need for comparison of profitability and risks with other kinds of investment;
- difficulty in mobilising informal investors (business angels) which could represent a very considerable potential.

### Exit mechanisms:

- investments are not recycled, or do not offer a sufficient return;
- absence of liquid assets in existing market mechanisms to attract institutional investors;
- there are now capital markets in Europe for high growth enterprises, such as the EASDAQ or the Euro NM, but their long-term viability will require further support actions to create a favourable environment for their development.



**Specialised capital markets are being developed on the American NASDAQ model, such as the EASDAQ (Europe), the Euro Nouveau Marché (France, Germany, the Netherlands, Belgium), and the Alternative Investment Market (United Kingdom).**

transposing directives on financial and information services in respect to companies. There must also be increased cooperation between the national regulating authorities, and the remaining legislative or administrative obstacles must be removed.

More directly, the Commission will promote, in particular through the Innovation Programme, the dissemination of good practice in order to direct investments towards technological innovations. Finally, as stated in the recommendations of the European Council in Amsterdam last June, the Commission will increase cooperation with the European Investment Bank and the Structural Funds in order to develop new financial instruments in favour of innovative enterprises and projects in less-favoured regions.

## A Growing Experience

### European Venture Capital Association (EVCA)

Since 1984 the European Commission has encouraged and supported the development of the European Venture Capital Association (EVCA) which brings together the vast majority of professionals. This completely independent association is now fully self-financed.

Founded by 43 members in 1983, the membership currently consists of more than 350 venture capital operators from 30 countries. The association's purpose is to promote venture capital among institutions and decision-makers in order to create an environment which is more favourable to this type of investment.

### The emergence of European capital markets for high-growth enterprises

A number of initiatives have been taken at various levels in recent years in

order to establish specialised European capital markets for high-growth innovative enterprises. In 1994 the European Commission supported the creation of the EASD (*European Association of Securities Dealers*), an association of 75 bankers and venture capital operators which initiated the EASDAQ (*European Association of Securities Dealers Automated Quotation*).

Other markets have also been set up by Europe's principal financial centres: AIM in London, the Nouveau Marché in Paris and its equivalents in Frankfurt, Amsterdam and Brussels, and the METIM in Italy (not yet operational). Their aims, structures and operating rules generally take their inspiration from the tried and tested principles of the American NASDAQ. With modern data processing and telematics resources, they offer a vast range of potential financing and the opportunity for investors to acquire a stake in companies while avoiding the difficulties and costs of international transactions.

### TIF (Transnational Investment Fora)

A total of 16 Fora attended by almost 500 innovative entrepreneurs and financiers from various Member States have been held over recent years, in cooperation with the national promotion and innovation agencies and with financial backing from the European Commission, in particular towards organisational costs and the costs of networking the different actors.

### ESCFN (European Seed Capital Fund Network)

This pilot project was launched in 1989, also at first with Commission funding. It has supported 23 seed capital funds in 8 Member States, each of which received a 5-year loan of 50% of the annual fund management costs



over a period of 5 years, with the possibility of repayment spread over 10 years if investments prove successful.

In addition, for 15 of these funds

located in less-favoured regions, the European Commission contributed up to 25% of the invested capital, with a maximum of ECU 250,000. The funds

created in this way total ECU 52 million, 35 million of which was invested in SMEs, permitting the creation of 2,238 jobs.

## Case Study

# The Sound of Success

**To develop new voice control products invented by an SME, a Belgian operator took a chance and made a tenfold return on its investment in just three years.**

When Joe Lernout and Pol Hauspie first showed an interest in voice-based man-machine interfaces - the simplest form of communication imaginable - existing products on the market were both expensive and not very effective. Voice recognition was limited to the words spoken by a single individual, and the technologies used were based on an identification of complete words rather than phonemes (the sounds of which they are composed).

The two partners, very excited by prospects for technological innovation in this field and convinced of its commercial interest, approached a number of investors with the help of the EVCA. They managed to persuade GIMV, a Flemish regional investment company in Belgium, to acquire a shareholding of 1.5 million dollars, or 70% of the capital, in their new company, Lernout & Hauspie N.V. Unfortunately, the company lacked an export strategy at the time and with no real prospect of growth the investor decided to pull out in 1991.

But in 1992 L&H succeeded in developing a very innovative product which had no real competitor on the market. This combined in a single product the three basic voice technologies: compression, recognition and synthesis. Better still, their software was adapted to a multilingual approach - the company was able to



**GIMV, which not only invested funds but also helped guide the development of Belgian firm L&H's innovative voice-computer interfaces, received a tenfold return in three years.**

develop the product in a new language in under 12 months.

This success was based on an original method of assembling words, known as "the linguistic factory", using an expert system combined with phoneme identification technology. In the meantime, the founders had also gained solid experience and began to explore the US market.

The two managers went back to GIMV with an ambitious plan based on a strategy of granting non-exclusive international licences offering considerable growth potential. The investment company returned in November 1992 with an investment of 5 million dollars, subsequently approving the acquisition of equipment worth a million dollars. The high growth this permitted in turn attracted the attention of the US giant AT&T, which acquired a 5% stake in L&H.

### The Investor's Crucial Role

The regional investor thus played a crucial role. Philip Vermeulen, the GIMV manager who had monitored the company from the start, took a seat on the Board of Directors, guiding the company's market positioning and overseeing the high growth recorded in 1994, during which they sold licenses and opened two offices in the USA. GIMV's strategic and operational role made it possible to attract several new investors to the company and achieve a successful launch on the NASDAQ in December 1995, by which time it employed a staff of 300.

Today L&H is also quoted on the EASDAQ, has a range of 20 products, and is working on a future voice-operated computer which has no keyboard and records all data in ASCII format. The Internet also offers new growth potential and the voice technology market, worth 165 million dollars in 1994, is expected to have expanded to 3.5 billion dollars in 1998.

For the investor, L&H's rapid growth required just a short-term (3 years) investment. GIMV received a tenfold return on its investment and still has a 7.6% shareholding in the company. At the end of September 1997, the giant Microsoft also invested in this Belgian company, the ultimate testimony to the value of its innovations.

## Eurotech

The two pilot projects, Eurotech Capital and Eurotech Data, are designed to encourage private investment in high-tech transnational projects. In 11 EU Member States, some 15 venture capital funds, with a minimum of ECU 50 million, have set aside 20% of their capital for investments of this kind. The Commission makes a capital contribution of 4% of this reserved capital plus privileged access to the Eurotech Data service, which provides information on the potential market in technologies, industrial property rights, scientific research, etc.

## New Pilot Actions

Today's Innovation Programme is financing three actions - I-TEC Finance (7.5 MECU), I-TEC Partner (2 MECU), and I-TEC Info (2 MECU) - plus a number of 'identification studies' of needs, obstacles, actors and so on.

Together, these activities will allow the Commission to launch more ambitious actions under the Fifth Framework Programme (1998-2002). The aim will be to bring together two worlds which do not always share the same visions of the present and future: financiers and scientists.

### I-TEC FINANCE

I-TEC Finance is a pilot project which aims to foster investments in start-up capital in technologically innovative SMEs. It was launched in 1997 by the Innovation Programme in cooperation with the European Investment Fund (EIF) and in direct application of the

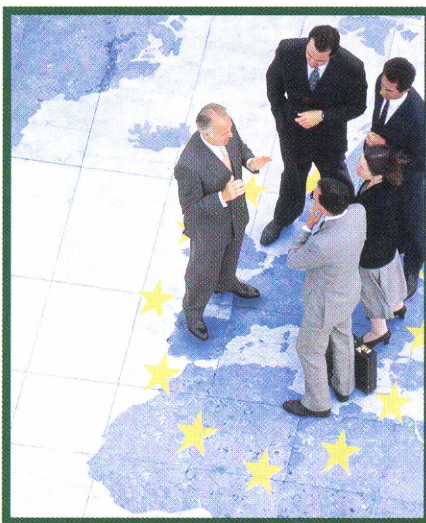
## Additional Information

### ■ I-TEC

M. Verlinden, DG XIII/D-4  
 TI. +352 43 01 34 194  
 Fx. +352 4301 34 544  
 E-m: marc.verlinden@lux.dg13.cec.be

### ■ European Venture Capital Association

TI. + 32 2 715 00 20  
 Fx. +32 2 725 07 04  
 E-m: evca@evca.com  
 Http:// www.evca.com



**Business managers who have recourse to venture capital believe that strategic advice on management matters and the international contacts offered by the investor are just as important as the injection of funds.**

guidelines set by the European Council in Amsterdam.

It is intended for European venture capital operators which want to specialise in financing new technologies. They must show that they have made efforts to harness new capital and undertake to invest more than 25% of it in innovative SMEs. Priority is awarded to innovations which stem directly from the Community's research programmes and to enterprises in the European Union's less-favoured regions.

The Commission's financial contribution covers a part of the initial evaluation and management costs of investments in start-up capital, up to a maximum of 500,000 ECU per investment fund. It can also be used to finance access to information services specialising in technologies, European and global markets or intellectual property rights.

The Commission allocated 7.5 MECU from the Innovation Programme to I-TEC, and the EIF has been authorised to set aside 75 MECU until 1998 for the acquisition of holdings in European venture capital funds.

### I-TEC PARTNER

This is a pilot project - limited to 3 years - which is designed to create an interface between the Community's research programmes and the financial sector. The many programmes (Esprit, Biotech, FAIR, etc.) involve a great many partners, including an ever grow-

ing number of SMEs.

The technological results have been increasingly exploited over the years, in particular in terms of their dissemination, the registering of patents and technology transfer, without any explicit recourse to technology investment professionals for financing purposes. Many researchers, particularly those employed by public bodies, are unfamiliar with these operators and virtually unaware of all the existing mechanisms for financing innovation. There is thus every reason to bring together these two worlds, venture capital operators generally being poorly informed of the scientific results achieved by the thousands of research projects.

By following the example of initiatives already undertaken by certain programmes, such as the Biotechnology Entrepreneurship Forum, and developed in accordance with the general orientations of the Fifth Framework Programme, ITEC Partner could function as a kind of 'help-desk' for innovation financing, placed at the service of participants in the Fifth Framework Programme. It should be in place by the end of 1997.

### I-TEC INFO

Each Member State has measures to support innovation financing. But young innovative enterprises do not receive all the attention they deserve at the European level. This action aims to boost transnational information exchanges, in particular in the field of best practices for innovation financing. It will also make it possible to identify and assess the approaches and methods adopted in this area in the USA and Japan.

The principal activities will be studies and analyses, comparisons between countries, sectors and type of actors, the organisation of meetings (most importantly involving political decision-makers and actors in the field) and possibly pilot projects, with the subsequent dissemination of best practice.

The priority task for I-TEC Info must be to look at how to bring innovative enterprises to the attention of investors and to develop technological criteria to be used in the economic evaluations of financial institutions. Attention must also be paid to developing local sources of capital for young enterprises and new guarantee mechanisms. □

► BIOTECHNOLOGY

# Genome Sequencing: Industrial Exploitation

**In July, a European research network supported by the Biotechnology programme announced the completion of its 7-year project to determine the 4.2 million bases of the genome of the bacterium *Bacillus subtilis*. Commercial exploitation of the results is likely to be rapid thanks to the involvement of an industrial platform of nine interested companies.**

Coming soon after the sequencing of the yeast genome, this achievement confirms Europe's strong commitment in this field. The results are of huge commercial and medical significance, and will give Europe's pharmaceutical and biotechnology industries a valuable competitive advantage.

Since 1994, the members of the industrial platform, BACIP, have collaborated closely with the 28 laboratories which carried out the research work, in order to maximise and hasten these benefits.

Professor Wim Quax, who chairs the group, identifies two types of interest. "*Bacillus* has been used for decades in the production of industrial enzymes for food-processing, detergents and textile applications. But until now trial and error has been the only way to improve performance. The transparency of the genome is a dramatic change. For the first time, companies can identify and modify the key genetic components."

Commercial interest also focuses on the close similarity between the genetic structures of *Bacillus* and those of other organisms. "*Bacillus* provides a template for the investigation of other bacilli, such as those used to produce vitamins," says Professor Quax. "It has never been clear which enzymes are involved in this process. The genome sequence has revealed the mechanism in *Bacillus*, making possible manipulation of the bio-synthetic pathway in related organisms."



The research team, announcing the completion of their work at the 9th International Conference on Bacilli, Lausanne, July 1997.

CAV-UNIL. S Prada, 1997

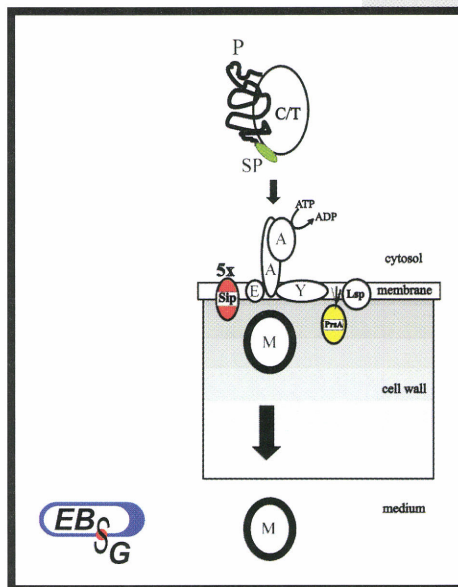
## Patents the Key

The most exciting application of the *Bacillus* genome sequence is as a template in the search for new antibiotics. As resistance to current antibiotics has grown, pharmaceutical companies have begun to search for new targets in bacteria.

"We are looking at a range of potential targets, including cell wall components and essential enzymes" explains Professor Quax. "If we can develop a drug which inactivates an essential enzyme in *Bacillus*, then it may have the same effect in a pathogen, and could form the basis of a new antibiotic."

BACIP's contribution to the sequencing itself has been critical. Its members have helped to identify genetic functions with commercial potential, and have advised researchers to file patents on potential applications of particular sequences.

The relationship has been close, according to Professor Quax. "Emerging research results were circulated weekly,"



The secretion pathway studied by the European *Bacillus* Secretion Group (EBSG) should be of major interest to European industry, which collaborated with the EC-funded re-search network through an industrial platform.

he says. "In total, we identified 50 genes with the potential for commercial application. Patent protection is crucial to subsequent exploitation, enabling the companies to protect their investment in further development through licence agreements or sale of the right to file a patent, negotiated with the individual laboratory responsible."

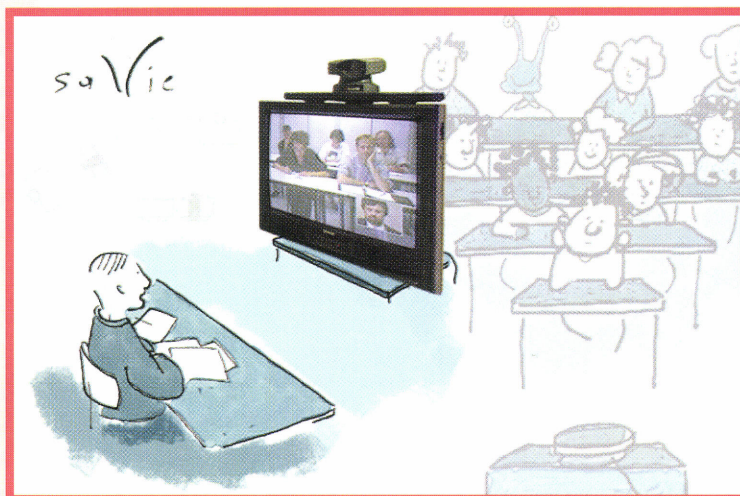
**C** o n t a c t  
**W. Quax, Genencor International**  
 Tel. +31 15 284 3137  
 Fax. +31 15 284 3076  
 E-m. wquax@genencor.com  
 Http://www.pasteur.fr/Bio/SubtiList.htm

## ► TELEMATICS

# Training for Video-Trainers

**The use of videoconferencing for training and education is growing rapidly. A Telematics Applications project has produced two specialised training modules, designed to help teachers and trainers to make the most of the technology's considerable advantages.**

**Videoconferencing puts the teacher right inside the remote classroom.**



Piloted and refined during the project, the two training modules are already available in English, Dutch and French, with Spanish and German versions in preparation. The first, aimed at individual teachers, consists of a handbook and video. It represents about four hours of self-study, and costs 95 ECU. The second, costing 950 ECU, is aimed at small groups in institutions which have recently bought videoconferencing equipment. It includes two hands-on sessions delivered via videoconference link by experienced trainers.

Videoconferencing offers training providers and educational institutions enormous flexibility. It allows tutors to teach at a distance, gives students access to remote expertise, and enables groups of learners in different countries to undertake collaborative projects. Although it rarely replaces traditional methods entirely, it can increase contact time while reducing travel costs.

To date, however, there has been no suitable training material to help teachers use the technology effectively. The Catholic University of Leuven (K. U. Leuven) and Helsinki University of Technology, both long-term users of videoconferencing, have just completed a 12-month project supported by the Telematics Applications Programme to remedy this gap.

As Sally Reynolds of the Belgian university explains, the Support Action to facilitate the use of Videoconferencing in Education (SAVIE) meets a press-

ing practical and strategic need. "New users were relying solely on manufacturers' manuals," she says. "They had no information about how other teachers employed the equipment. We wanted to help them to use the current ISDN-based technology as productively and as quickly as possible."

## By Teachers, for Teachers

The project enabled the two universities to pool their experience, producing packages specifically designed for teachers, trainers and lecturers. "The materials were produced by teachers for teachers," Reynolds stresses. "They give clear, independent information about technical issues, addressing the limitations of the technology in a straightforward way. And they offer practical advice about preparing and delivering video-tutored sessions, based on real experience."

## The Spice of Life

An experienced video-tutor herself, Reynolds claims that it is no harder than teaching face-to-face. "Teachers can continue to use the techniques and materials they have developed in a conventional setting," she says. "However, sessions do need to be adapted in small but important ways. It is essential to build in variety, for example — students are quickly bored by a static shot of the tutor's face. The SAVIE modules explain how to avoid basic mistakes, ensuring that the first experience with the equipment is a positive one. These skills can only grow in value as Web-based videoconferencing appears in the future." □

**C** o n t a c t  
**L. Mees,**  
**Audiovisuele Dienst**  
**K. U. Leuven**  
**TI. +32 16 32 92 50**  
**Fx. +32 16 32 92 98**  
**E-m. savie@avd.kuleuven.ac.be**  
**Http://www.savie.com**

# Tomorrow's Workforce On-Line Today

*The first European Netdays took place in October, demonstrating the educational potential of the Internet to teachers, students and communities. They form part of a wider initiative to stimulate the use of new multimedia and communications technologies in schools.*

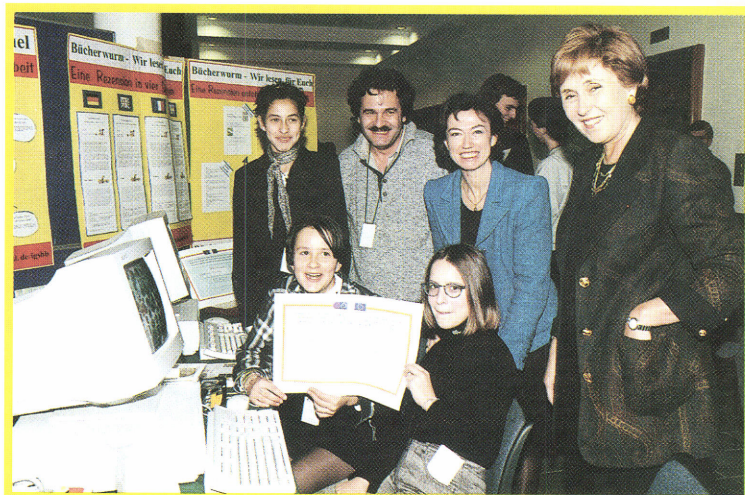
Launched just over a year ago, the Commission's Action Plan 'Learning in the Information Society'<sup>(1)</sup> is designed to accelerate the entry of schools into the information society. It focuses on interconnecting new and existing school networks, developing and disseminating educational multimedia content, training teachers in new technologies and media, and disseminating information about new products and technologies.

Last month's Netdays projects contributed to all four key tasks. Based on a successful US model, the week-long event included 270 projects run by companies, local authorities, and schools, involving thousands of teachers and pupils in all parts of the Union.

## Private Sector Involvement

Europe has 100 established school networks, making widely differing uses of Internet technologies. The aim of the Netdays event was to raise awareness of the Internet's enormous educational potential among teachers, policy-makers, business people and the public. Projects were selected to show the diversity of Europe's current experience, and to extend the capacity of existing networks.

In the UK, for example, Leeds hosted a project which included hands-on demonstrations, transnational video-conferen-



cing, and 'peer tutoring' workshops for school, further education and university students. The City Council wanted to increase understanding of the Internet's role as a teaching and learning tool, and involved the private sector in order to show how industry can contribute to the creation of an IT-literate workforce.

## Network of Networks

Cross-border exchanges between schools can add value to education, and the Action Plan seeks to realise this synergy by linking existing networks. Led by Sweden, the Member States have now established a global server to host the European Schoolnet (EUN). The service offers schools access to information about teaching materials, as well as the means to exchange technical and pedagogical experience and to establish collaborative projects.

A high level working group has been set up to investigate mechanisms for cooperation between educational content providers, and will ensure that TV is fully exploited as a platform for new types of multimedia content, as well as the Internet. In early 1998, a multimedia foundation will be established to stimulate public-private partnerships in this area.

The first European Educational Multimedia competition, held in 1996 as part of the Year of Lifelong Learning, drew high-quality entries from primary, secondary and technical schools. It will be repeated this year in the framework of the Action Plan, to stimulate the development of new talent, and the production and exchange of content. □

**Commissioner Edith Cresson congratulates the team from Collège du Plateau à Lavans, France, winner of the schools section of the 1996 European Educational Multimedia competition.**

(1) COM(96)471 final. See <http://europa.eu.int/en/comm/dg22/planht.html>

**C** o n t a c t  
 ■ A. Dumort / J. Jamar,  
 DG XXII/U-2  
 Fx. +32 2 296 7012  
[alain.dumort@dg22.cec.be](mailto:alain.dumort@dg22.cec.be)  
[joseph.jamar@dg22.cec.be](mailto:joseph.jamar@dg22.cec.be)  
 ■ Netdays projects:  
[Http://netdays.eun.org](http://netdays.eun.org).  
 European Schoolnet (EUN):  
[Http://www.eun.org](http://www.eun.org).

► ESPRIT

# Research for the Information Society

**An independent 5-year assessment of Esprit has concluded that a more co-ordinated European response is required to cope with the convergence of digital technologies and the industries which use them.**

‘Innovation and Entrepreneurship in the Information Society’ (EUR 17601<sup>(1)</sup>) is the report of the expert panel, chaired by Professor Roberto Carneiro, which assessed the Esprit programme 1991-96. It provides an interesting insight into the reasoning behind the Commission’s proposals for an integrated Information Society Technologies (IST) programme within the Fifth Framework Programme (1998-2002).

The report notes that Esprit’s objectives have widened in response to the growing importance of Information Technologies as a source of competitiveness for European industry as a whole. It acknowledges the programme’s considerable achievements, especially since the launch of the Fourth Framework Programme in 1994. Esprit has adopted a stronger market orientation, promoting collaboration between technology users and suppliers, and has succeeded in speeding the take-up of new technologies. It has stimulated cross-border collaboration, and has fostered valuable partnerships between large companies, SMEs, universities and research institutes.

But, the Panel says, the research context has changed, and is still changing. Deregulation of Europe’s telecommunications, rapid growth in the use of the Internet and the spread

of new multimedia technologies will hasten the arrival of the Information Society, with profound social and economic consequences.

## A Single Research Programme

An effective response to these challenges and opportunities requires a single programme, retaining Esprit’s market orientation but with a clearer focus on the development of Europe’s Information Society. It should address not only issues of competitiveness and employment, but also society’s broader needs for new infrastructures, services and applications. Close-to-market development of innovative applications should be complemented by strategic, long-term research.

Specifically, the panel recommends the integration and extension of ACTS, Telematics Applications and Esprit - the three programmes covering information and communication technologies in the current Framework Programme. The resulting programme should:

- focus on the technologies needed to build the Information Society;
- develop new means to promote research exploitation;
- be flexible enough to respond to rapid market change, and ensure that results reach



the market more quickly;

- halve the time taken to negotiate contracts and make payments, and adopt more user-friendly procedures for young companies and SMEs;
- incorporate more extensive benchmarking of ICT-based competitiveness;
- evaluate project performance more strictly.

The Commission’s proposal for the Fifth Framework Programme (1998-2002) includes an integrated and balanced programme of research, technological development, demonstration and technology take-up, and thus is closely aligned with the Panel’s recommendations. □

(1) The report can be viewed or downloaded at <http://www.cordis.lu/esprit/src/carneiro.htm>.

**All eighteen Specific Programmes of the Fourth Framework Programme, as well as the JRC, were evaluated in this way. The resulting reports were key inputs into the overall assessment of the Framework Programmes by an independent panel. Their report, and the Commission’s response, are presented in a single 60-page book, available from all EU Sales Agents (EUR 17644, 8.5 ECU).**

**C** o n t a c t  
 G. Comyn, DG III  
 Fx. +32 2 296 6613  
 E-m. gerard.comyn@dg3.cec.be  
[Http://www.cordis.lu/esprit/src/isttemp.htm](http://www.cordis.lu/esprit/src/isttemp.htm)

## ► CONFERENCES

### Creating revenue from DVB services 25-26 November, London

The international conference on Digital Video Broadcasting (DVB), "DVB'97 - Creating revenue from DVB services" will cover DVB worldwide, developing and enhancing DVB, value-added services, DVB and the consumer and much more.

A session on the European policy perspective with regard to DVB will address the lessons to be drawn from the DVB experience, and will focus in particular on the definition of an appropriate regulatory framework for convergence. The conference will close with a panel discussion involving major industry players on the theme "DVB and its implications in the uptake of new TV technologies". A post-conference seminar will provide an overview of the latest technologies in this area and their application in real-world situations.

**Contact:** Liz Burns,  
IBC UK Conferences Limited  
**TI.** +44 171 637 43 83  
**Fx.** +44 171 631 32 14  
**E-m.** liz.burns@ibcuk.co.uk

### The Virtual Campus - Trends for higher education and training 27-29 November, Madrid

Organised by the International Federation for Information Processing (IFIP), this conference will provide the opportunity for in-depth debate on recent trends in the use of telematics for higher education and training. It will also aim to explore further key themes for the next "Tele-teaching" conference in 1998. The conference will address topics such as:

- Distributed learning environments;

- Instructional telecommunications models;

- Computer-supported collaborative work at a distance;

- Tools for distance education;

- Evaluation, scalability and social issues;

- Collaboration between industry and higher education;

- Competition and collaboration: the role of the commercial provider of virtual higher education and training.

There will also be a presentation on "New research avenues on multimedia-based learning in the European Union" by a Commission official from the Telematics Applications programme.

**Contact:** 1997 IFIP 3.3 and 3.6 Joint Working Conference Secretariat

Departamento de Ingenieria, Electrica, Electronica y Control, Universidad Nacional de Educacion a Distancia

Apartado 60149

E-28080 Madrid

**E-m:** ifip97@ieec.uned.es

**Http:** //www.ieec.uned.es/~ifip97

### New Developments in Electronic Copyright 12-13 February 1998, Copenhagen

The conference and workshop on new developments in electronic copyright, postponed until February due to the Commission's revision of its timetable for the adoption of the proposed Directive on copyright, is being organised by the Danish Library Association, in cooperation with the (Danish) National Library Authority and EBLIDA (the European Bureau of Library, Information and Documentation Associations). Participants will discuss recent international and European developments in copyright, to prepare an EBLIDA position paper in response to the Commission's forthcoming proposals in the field, and

to discuss future strategy at national and European level.

The meeting will, in particular, address the Commission's proposals in areas such as reproduction rights, distribution rights, right of communication to the public, and legal protection.

The conference on the first day is open to all, while the workshop (day two), which is concerned directly with preparing a position paper and EBLIDA's future strategy, is open only to EBLIDA members.

**Contact:** EBLIDA Secretariat

**TI.** +31-70-3090608

**Fx.** +31-70-3090708

**E-m:** eblida@nblc.nl

**Http:** //www.kaapeli.fi/eblida

### Bringing Information Technology to Education 25-27 March 1998, Maastricht, (the Netherlands)

The BITE conference will focus on the need within higher education to develop and implement strategies to integrate information and communications technologies in the curriculum. Whilst considerable research has already been done on developing new electronic learning environments, current guidelines for integrating this research into educational practice are either too global or too limited in approach.

The aim of the conference is to bring together researchers and educational practitioners to exchange information and experiences, and establish links between the two. It will focus on institutional strategies, educational innovation, new tools and applications, and organisational issues.

**Contact:** Hannie Spronck, Conference Secretariat, Universiteit Maastricht

**TI.** +31 43 388 25 26

**Fx.** +31 43 325 29 30

**E-m:** h.spronck@educ.unimaas.nl

**Http:** //www.unimaas.nl/~electra/conference/

### TTI'98 - Technology transfer and innovation in small firms 6-8 July 1998, London

Submission papers deadline: 1 December 1997

The Fourth Biennial International Conference on Technology Transfer and Innovation in Small Firms is intended to encourage innovation in industry and commerce, in particular in small firms, by identifying good practice in innovation from around the world. Discussions will aim to identify factors of success in small firms, and to examine ways in which business support can be made more effective.

It is directed primarily at practitioners, decision makers and others involved in the exploitation of new ideas in industry, academia and government, including staff from small firms or from organisations representing the interests of small firms. It will include keynote presentations, selected papers, workshops, posters and an open debate. The workshops will cover themes such as:

- The small firm experience of technology transfer within the supplier chain;

- Foresight and small firms;

- People and process: the lever and fulcrum for small firm advancement;

- Adding international dimensions to future industrial leaders;

- Financing innovation.

**Contact:** Ms. Sarah Goodyer, TTI'98 Conference Secretariat

**TI.** +44 1367 24 28 22 / 24 52 00

**Fx.** +44 1367 24 28 31

**E-m:** s.goodyer@tcd.co.uk

**Http:** //www.tcd.co.uk

# CONFERENCES AND PUBLICATIONS

## ► PUBLICATIONS

### **IPTS Technical Reports**

The Institute of Prospective Technological Studies, part of the Joint Research Centre (JRC), has recently published four new studies (English only, free) in its "Technical Report" series:

■ Towards an integrated conceptual framework - Modern biotechnology and the greening of industry (EUR 17340EN);

■ The dynamics of innovation in bio-engineering catalysis - Cases and analysis (EUR 17341EN);

■ Identifying "hot spots" in engineered biocatalyst research and applications by means of bibliometrics (EUR 17342EN);

■ A technological and market study on the future prospects for titanium to the year 2000 (EUR 17343EN).

**Contact:** Institute for Prospective Technological Studies  
JRC Seville

**Fx.** +34-5-4488339

**E-m:** blanca.galmes@jrc.es

### **Brite-Euram:**

#### **A Decade of Developing Competitiveness**

CG-NA-17-647-XX-C, 8.5 ECU  
Published in late October, this 50-page book charts the progress, achievements and future of the EC's Industrial Technologies research programmes, from the original Brite pro-

gramme, launched in 1985, through to today's Brite-Euram III programme and on to the future under the Fifth Framework Programme (1998-2002).

It also sets them in the larger context of European integration, discussing the reasons for European research in general and industrial research in particular, and how the Framework Programmes work as part of an overall European strategy towards improving both industrial competitiveness and the quality of life.

It includes several case studies and interviews with Viscount Davignon, who oversaw the development of the First Framework Programme, Professor Scapagnini (President of the European Parliament's Committee on Energy, Research and Technology), and representatives of Aérospatiale, ICI and Pirelli. The future of industrial research under the Fifth Framework Programme is discussed by Edith Cresson, Commissioner responsible for Research, Innovation, Education, Training and Youth.

Available from the EU's Sales Agents in English and French, with German, Spanish and Italian versions on the way (when ordering, replace XX in the catalogue number, above, with two-letter language code: EN, FR, DE, ES, IT).

## NOTE

If specific contact information for obtaining a publication is not supplied, refer to the 'Quick Reference Guide' (1/97). Publications are free unless otherwise stated.

### **EIMS: Impact of innovation on employment in Europe**

A report on "The impact of innovation on employment in Europe" has recently been published by the European Innovation Monitoring System (EIMS), part of the Innovation programme. The report, based on an analysis of the 1993 Community Innovation Survey (CIS), attempts to shed light on the empirical relationship between technology, technological innovation and employment.

The aim of the report is to assist governments in optimising their employment policies through appropriately targeted policy action. Four strategies to fight high unemployment in Europe are suggested:

■ The promotion of innovation, in the form of improved processes, improved or totally new products as a key to more employment in both the short and long term;

■ Improved competition in the product and labour market;

■ Promotion of growth through the promotion of investment and enhanced macroeconomic demand;

■ Strengthening the labour supply through education and training and improving the flexibility of working conditions (work, time and pay).

The executive summary of the report will shortly be available on the Innovation Programme's Home Page on the CORDIS WWW server (<http://www.cordis.lu/innovation/home.html>), while paper copies may be ordered free of charge from the EIMS.

**Contact:** EIMS, DG XIII/D-4

**Fx.** +352 4301 34544

**Further information:** Dr. Georg Licht, ZEW

**TI.** +49 621 123 51 77

**Fx.** +49 621 123 51 70

**E-m:** licht@zew.de

## SUBSCRIPTION FORM

### INNOVATION & TECHNOLOGY TRANSFER IS FREE

- Keep up to date on all EC actions relevant to innovation and technology transfer: General Policy News, News from the Innovation Programme, Results and Activities of the Specific Programmes, Case Studies, Upcoming Conferences, New Publications.

Please write clearly

NAME: .....

ADDRESS: .....

ORGANISATION: .....

• For bulk quantities, state the number of copies you want to receive:  .....

• ITT is produced in three languages. Please indicate your preference:  English  French  German

**To subscribe, fill in and fax this form to: RTD HELP DESK: FAX: +352 4301 32 084**

**WWW ADDRESS:** <http://www.cordis.lu/itt/itt-en/home.html>