

Opportunities *for*

SMEs

Plus

- Vaccination without tears
- Satellites help forecast floods
- Learning to be an entrepreneur
- Health telematics — giving doctors access to the latest medical research

... and more



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Innovation & Technology Transfer



Innovation & Technology Transfer is published six times a year in English, French, German, Italian and Spanish by the 'Innovation and participation of SMEs' programme, part of the European Commission's Fifth Research Framework Programme. The Innovation and SMEs programme promotes innovation and encourages the participation of small and medium-sized enterprises (SMEs) in the framework programme.

Innovation and SMEs

Europe's technology-oriented small and medium-sized enterprises (SMEs) have a central role in converting research into enhanced quality of life, improved competitiveness and new employment. Not only is the SME sector an increasingly significant source of scientific skills and ideas. It is also a key channel for the flow of technological innovation from academic institutes to industry, and between sectors and regions.

This is why, in the Fifth Research Framework Programme (FP5), innovation is an underlying theme, backed by measures to encourage SME participation in research.

Each thematic programme of FP5 will be supported in their approach to innovation and SMEs by the "horizontal" programme for the promotion of innovation and encouragement of SME participation. This horizontal programme will also be active in innovation policy, operate information and support services, and offer a new generation of pilot and demonstration projects experimenting with new approaches to innovation and technology transfer. The article on the facing page describes the Innovation and SMEs programme in detail.

Also in this issue, the Dossier beginning on page 12 focuses on the opportunities for SMEs in FP5, and the thinking behind them. The dossier includes case studies showing how SMEs have profited from the previous generation of support measures available under the preceding framework programme.

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A Catalytic Role

Positioned at the interface between research and industry, the new Innovation and SMEs programme serves both communities. Its integrated range of information and support services is designed to streamline the process of technological change, especially among SMEs.

The detailed objectives set out in the work programme are outlined below, but encompass three broad functions — the programme will act:

- as a 'service provider', helping SMEs take part in Fifth Research Framework Programme (FP5) research, and assisting SMEs and others in gaining access to new technologies — not only those developed in FP5 itself
- as a 'clearing house', collecting and analysing data on innovation practice at Community, national, regional and firm level, and identifying and spreading best practice
- as a 'test bed', piloting new approaches and instruments related to the practice of innovation, and to the creation of an innovation-friendly environment

The programme incorporates co-ordination of the SME specific measures introduced under FP4⁽¹⁾, but will no longer directly support the dissemination of research results, instead co-ordinating the performance of this function by each of the thematic programmes.

The Innovation and SMEs programme's own innovation projects will in future concentrate on exploring the process of innovation itself — with a view to identifying principles, approaches and techniques that can be applied more widely to streamline the transfer of new technologies.

Programme Outline

In concrete terms, the key elements of the new work programme comprise:

1) The promotion of innovation

a) studies and good practice — including the trend chart on European innovation⁽²⁾, the Community Innovation Survey⁽³⁾, and a Regional Innovation Observatory

b) new approaches to technology transfer — technology transfer projects, clustered to address common non-technical barriers to innovation⁽⁴⁾.

2) Encouraging SME participation

a) a single entry point for SMEs — an 'SME Helpdesk', through which all proposals for exploratory awards and cooperative research (CRAFT) projects may be submitted⁽⁵⁾, and simplified and standardised arrangements for their evaluation, and for the negotiation and management of contracts

b) support and assistance for SMEs — user-friendly information packages, project management tools, and training

c) economic and technological intelligence services — collection, analysis and dissemination of key technological and market issues, assessment of SME needs by sector and region, and workshops and brokerage events.

3) Joint innovation and SMEs activities

a) network of CRAFT National Contact Points (NCPs) — support, co-ordination and training at European level for national networks of information and assistance points established by Member States to raise awareness of EU research among SMEs, to support their involvement, and to direct them to other relevant services

b) network of Innovation Relay Centres (IRCs) — further development of the IRC network in

(1) See this edition's Dossier, starting on page 12.

(2) See this edition, page 9.

(3) See 'Mapping the Innovation Universe', edition 2/98.

(4) See this edition, page 17.

(5) See this edition, page 15.



The Innovation/SMEs Programme In Brief

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

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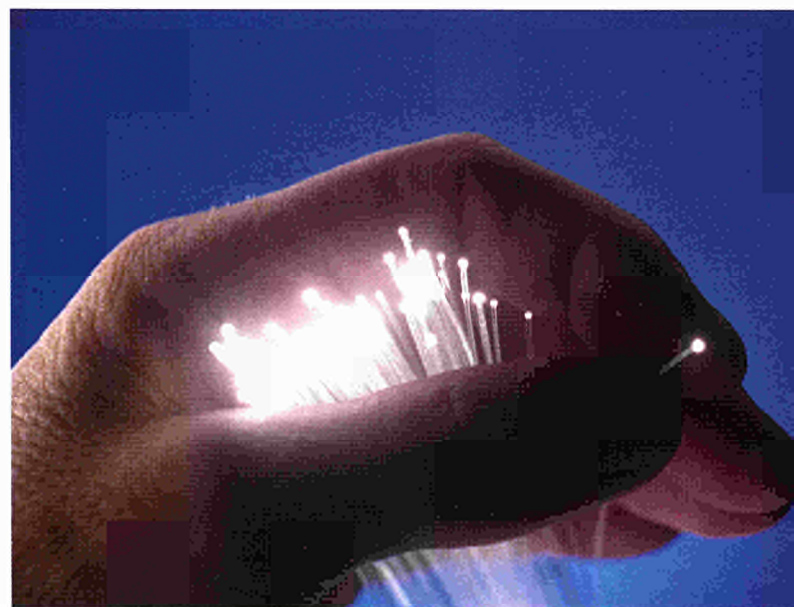
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First Call for Innovation Projects

The first call for proposals for new Innovation projects⁽¹⁾ was published on 23 March, with an indicative budget of €30 million, and covers:

- a) Innovation projects
- b) three types of accompanying measures:
 - cluster support measures
 - common promotional structures
 - innovation policy interfaces

The call texts, together with all the documentation necessary to prepare a proposal, are available on CORDIS, at <http://www.cordis.lu/innovation-smes/calls/calls.htm>

The closing date for this call is 24 June. A further call is planned for March 2001.

(1) See also page 17.

support of the transnational transfer of new technologies, especially by SMEs, the dissemination of research results, and the stimulation of regional technology transfer capacity

c) electronic and other information services

— further development of the Community Research Information Service (CORDIS) as a channel for the information required by those running, or wishing to run, EU research projects, and for the dissemination of research results

d) intellectual property

— extension of the IPR Helpdesk⁽⁶⁾, maintenance of the Community's own IPR portfolio with a view to exploitation, and pilot activities related to IPR training and the development of the role of National Patent Offices

e) innovation financing

— further development of the LIFT Helpdesk⁽⁷⁾ and the Financing Innovative Technology (FIT) initiative, and new pilot activities, for example to promote transnational networking of investors and policy-makers, and to build venture capital investment capacity

f) the establishment and development of innovative firms

— support for regional and sub-regional initiatives, and for the exchange between them of experience and good practice, in order to create a showcase of successful schemes, in line with

the conclusions of the Vienna Forum⁽⁸⁾ on innovation and the creation of new businesses and jobs.

Co-ordination and Support

Additionally, the Innovation and SMEs programme will provide a range of co-ordination and support services to the thematic programmes of FP5:

- It will help the new Innovation Units within each programme to orient projects towards the solution of practical problems, and to test and implement those solutions once research is completed. It will, for example, train project officers on selected aspects of innovation management, and will provide guidelines for the monitoring of projects' technology implementation plans, as a means of assessing the innovative impact of research.

- It will support and monitor the implementation by the thematic programmes of the CRAFT and exploratory award schemes, and of programme-specific take-up measures such as first user actions, best practice actions and industrial platforms. ●

(6) See this edition, page 18.

(7) See facing page.

(8) See the Special Edition of December 1998.



Need a LIFT?

The difficulty of finding appropriate financing for the commercialisation of a new technology is often the principal barrier to the exploitation of research results. A new helpdesk will provide participants in European Union research programmes with a range of practical support services.

The Innovation Financing activities of the Innovation and SMEs programme address at several different levels the relative scarcity of development capital faced by European early stage high-tech projects.

FIT (Finance for Innovative Technology) promotes the exchange of experience among investors and national and regional policy-makers, with a view to creating an environment more favourable to the financing of innovation. I-TEC⁽¹⁾ helps venture capital funds to invest in high tech start-ups with high growth potential by contributing to the associated management costs.

Expert Advice

By contrast, LIFT (Linking Innovation, Finance and Technology) will offer assistance to research practitioners, designed to improve their understanding of the issues involved in attracting investment in their business ideas, and help them identify appropriate sources of finance.

"The service will be available to anyone who has taken part in an EU research project," says the European Commission's Marco Cecchini. "That means technology users as well as technology suppliers. And the sign-posting will not just be to venture capital funds. Depending on the investment opportunity, we will also direct people to banks, business angels, or institutional investors."

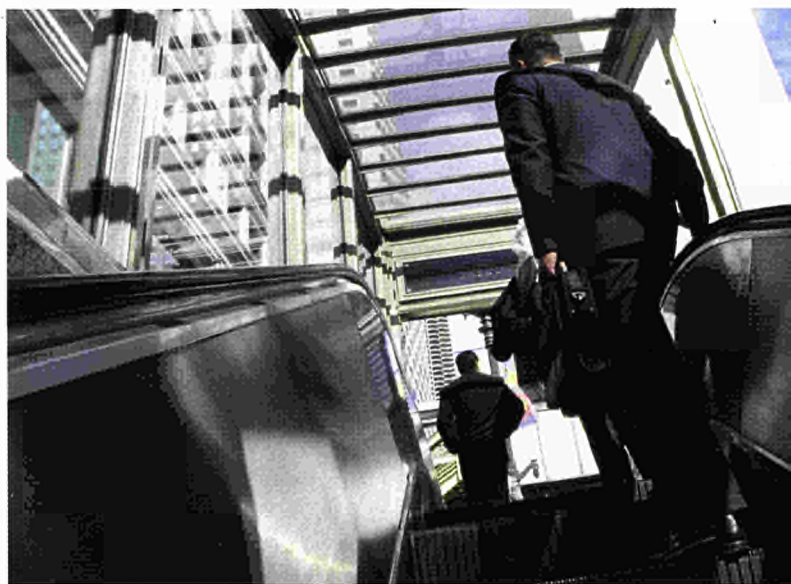
A range of LIFT services has

been in preparation since January, and the first were introduced for selected groups in April, in what Cecchini describes as a phased approach. "LIFT will offer different levels of service," he says. "Generic information and tools — such as a self-assessment procedure for company technology rating, for example — will very soon be available to any organisation at the LIFT website."

First-line individual advice, through telephone or face-to-face consultations with expert advisers, will be introduced gradually during the year, being made available to the participants of one research programme at a time. "Many clients will be referred to LIFT by the Commission officials who work with Community research projects on a day-to-day basis," Cecchini explains, "and we still need to educate them about this area of financing. We will start with the Information Society Technologies and Quality of Life programmes, with which we have on-going working relationships developed through initiatives such as the Biotechnology and Finance Forum⁽²⁾."

Training Events

LIFT will also offer introductory training seminars for entrepreneurs and the staff of organisations such as innovation centres. "Training will address questions such as how to start a company, how to raise finance, and how to satisfy investors' expectations,"



says Cecchini. "LIFT will organise seminar series, if asked to do so by the research programmes. But it will also provide input into the development of training curriculums by the programmes themselves."

Like the other Innovation Financing initiatives, LIFT's primary aim is to support the creation of new companies. "By definition, start-ups are small companies," says Cecchini. "But we do not want them to stay small for long. Our real target group is those with the potential to grow rapidly and to create new employment." ●

(1) See this edition, page 19.

(2) See 'Investors and Biotechnologists Do Business', edition 4/98.

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Vaccination Without Tears

No one likes injections. Now fear of syringes as spreaders of disease rather than protectors against it is further undermining third world immunisation campaigns. But effective nasally administered vaccines are on the way, thanks to an innovative European technology.



Intramuscular inoculation against diphtheria and other respiratory diseases will soon be replaced by effective nasal vaccines, thanks to DanBioSyst's patented delivery system.

Diphtheria is a killer, but immunisation programmes are only really effective when everyone is vaccinated, and fear of the needle keeps too many patients away from the clinics.

"People have been working on alternatives for some time — and the first nasal vaccines will soon start to appear on the market," says Professor Lisbeth Illum of the British company DanBioSyst, which specialises in new drug delivery systems. "They are simpler to administer, so they will save health service resources. And because they are painless, they should help to improve immunisation rates. But we are concerned that they will produce an immune response which is too weak to provide particularly effective protection against disease."

(1) INT01001 — 'Mucosal vaccines for respiratory diseases based upon nasal administration'.

Now DanBioSyst and its partners in a three-year Innovation project⁽¹⁾ have overcome this problem. The company is applying a patented delivery technology, which it successfully developed for the nasal administration of peptide and protein drugs, to a new diphtheria vaccine produced by the Italian pharmaceutical company Biocine. Illum expects Phase 1 clinical trials with human volunteers to be launched before the project ends in 2000.

Shot in the Arm

In theory, nasal vaccination against respiratory diseases such as flu, whooping cough and diphtheria should provide improved protection. "Intramuscular injection of a vaccine elicits a strong systemic immune response, characterised by the production of IgG antibodies, which attack the target antigen once it has passed into the bloodstream," Illum explains.

"But respiratory diseases enter the body through the mucosal lining of the nose and lungs, when infected droplets are inhaled — that is where the bacterium or virus starts to proliferate. Delivering the vaccine to the nasal cavity itself stimulates the production of local secretory IgA antibodies as well as of IgG, providing an additional first line of defence which helps to knock out the disease before it can take hold."

The problem is that drugs are poorly absorbed across the nasal mucosa — in the case of peptides and proteins, less than 1% of the dose enters the bloodstream. The DanBioSyst technology, which uses a non-toxic, biodegradable substance called chitosan, derived from shellfish, boosts absorption to as much as 40%.

Enhanced Response

Chitosan's effectiveness, not just as a medium for the nasal delivery of vaccines and other drugs, but as an aid to their absorption across the mucosal surface, is now established. How it achieves this is only now becoming clear.

"As scientists, we were keen to understand exactly why chitosan works so well as a delivery system," says Illum. "Our Irish partners at the University of Maynooth are conducting detailed studies of the mechanism, and of its effect on immunity. We now know that chitosan opens up the junctions between cells in the nasal cavity, allowing far more of the protein molecules contained in the vaccine to reach the lymphoid tissue where antibodies are produced."

From laboratory studies and animal tests, the technology looks extremely promising. Delivered with chitosan, a nasal vaccine produces the same level of IgG as an injection, together with a high level of IgA. And evidence

is emerging that, as well as stimulating antibody production directly, nasal vaccination also elicits the more powerful cell-mediated immune response, in which cytokines stimulate killer cell activity and the production of antibodies at cell level.

DNA Vaccines

Traditional vaccines consist either of inactivated toxins, or of purified preparations of membrane proteins, or — as in the case of the conventional diphtheria vaccine, of inactivated whole pathogens. The Innovation project focuses on a new, genetically detoxified diphtheria

vaccine developed by Biocine, using recombinant DNA technology.

With Phase 1 clinical trials less than two years away, Professor Illum is upbeat about the prospects for the future. "This project is helping us to demonstrate the applicability of the technology for inoculation against diphtheria," she says. "But we are confident that we will also be able to optimise it for other vaccines, including the new DNA vaccines, in which the proteins which trigger the immune response are produced by the body's own cells, under the instruction of a package of DNA code."

DNA vaccines are currently

one of the hottest topics in the world of pharmaceuticals. But long before they start to appear Illum expects a standard chitosan-delivered nasal vaccine for diphtheria to be available. A flu vaccine could be ready before that — perhaps as soon as 2002.

It may not be long before the world gets another opportunity

to eradicate killer diseases such as diphtheria — and before we can all receive protection against winter flu without suffering the discomfort of an injection. ●

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FLOOD FORECASTING

Damage Limitation

River flooding places a huge economic burden on many regions of Europe. Using satellite data to improve the accuracy of catchment modelling, an Innovation project is providing river authorities with tools to help them forecast flood events and minimise the resulting damage.

The Tagliamento river, in north-eastern Italy, has not flooded seriously since 1966. Even so, the cost of flood prevention measures, and of maintaining adequate rescue services, added to that of the damage caused to crops and property by minor flooding, is unacceptable.

Here, as in many major European river basins, investment in effective management support tools based on sophisticated digital modelling of the contours of the river, its embankments and the surrounding flood-plain, would quickly pay for itself.

"The authorities responsible for managing large rivers require several things," explains Augusto Pretner of the Società Generale di Ingegneria (SGI), which is leading the WAMM project⁽¹⁾. "First, they need to predict accurately where and when flooding will actually occur, so they can mobilise emergency services to evacuate endangered areas at an early stage. Second, they need accurate mapping of water depths as a flood progresses, in order to direct rescue vehicles efficiently, as well as normal road and rail traffic.

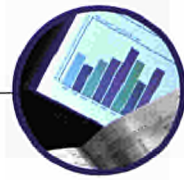
"Third, they want to test different flood management strategies. For example, breaking an embankment in one place might flood 1,000 homes, but would divert the water from a large town and a power station. To calculate the relative costs of such options, you need accurate information about their consequences. Finally, the authorities would like a better basis for planning. Where is it safe to build houses? How large do dykes and reservoirs need to be to contain floodwater?"



1993 flooding of the Lesse river in Belgium. Ministère Wallon de l'Équipement et des Transports – Service d'Études Hydrologiques.

(1) Innovation project IN206001, Water Management Model (WAMM)

Benchmarking Innovation in Europe



The Trend Chart on Innovation in Europe was established to help tackle the objectives of the First Action Plan on Innovation – fostering an innovation culture, establishing a framework conducive to innovation, and gearing research to innovation.

The trend chart will put in place — at a European scale, and in close collaboration with Member States and the Associated States — a common reference framework for picturing trends in national innovation policies, as an aid to the benchmarking of experience and the promotion and dissemination of good practice.

Examples of the kinds of trend which will be charted include the number of jobs created by new technology based firms (NTBFs), and the amounts of venture capital available to start-up companies in comparison with infrastructure support.

Seeing What Works

The delineation of recent trends in innovation is fundamental to an understanding of the past, present and possible future directions of innovation, and for shaping Europe's emerging innovation policy. Analysing practical measures implemented in different countries and sectors is a necessary part of improving policy and gearing it towards the type of actions that work.

This should improve the efficiency of the interface between national and Community policies, helping to match future European Union innovation policy more closely to the innovative needs of the Member States and their respective innovation

communities. Academic and industrial researchers will also benefit directly by the promotion of innovation benchmarking and of good practices.

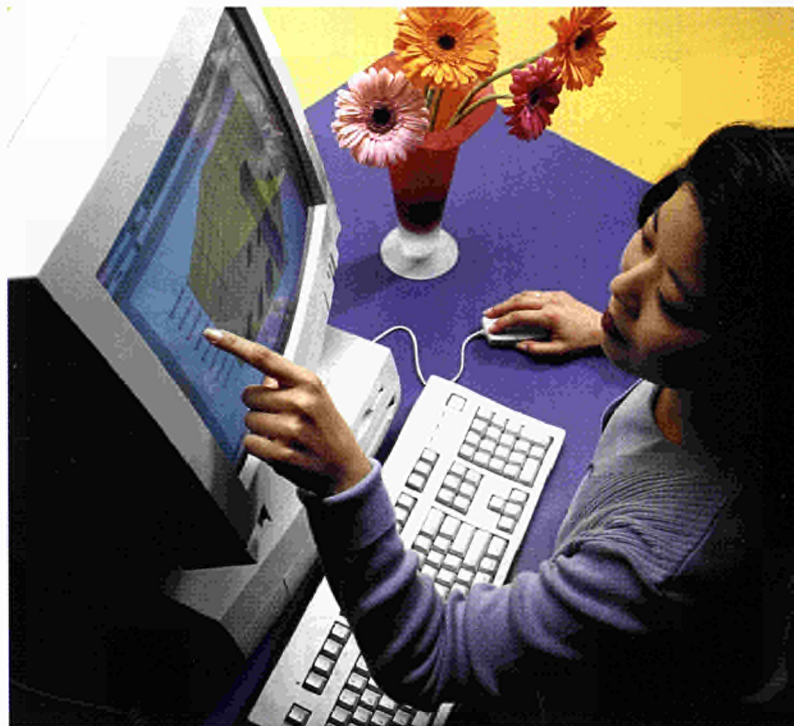
Because it will be produced in close relation with the Member States and Associated States, as well as other major organisations such as the OECD, the trend chart will not only provide information but will also help to enhance collaboration and exchanges of experience.

Regular Reports

The Trend Chart on Innovation in Europe is a key priority for the new Innovation Policy unit within DG XIII/D.

It will form the basis of a regular report on innovation, intended primarily for policy-makers, national administrations and for Commission departments. It will also be of interest to the wider community involved in innovation — researchers, industry, public and private laboratories and others.

The establishment of a website for the Trend Chart on Innovation in Europe — which should be available by the end of the year — will make the exchange of experience and good practices all the easier, providing a common platform for discussion between policy makers across the EU and Associated States.



Similarly, regular workshops will provide policy-makers with opportunities to discuss, and to enhance, their knowledge of matters relating to the fostering of an innovation culture. ●

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Participants Warmly Welcomed at Essen

Industrial and academic researchers flocked to Germany in unprecedented numbers at the end of February to witness the launch of the European Union's Fifth Research Framework Programme – eager for concrete details of the forthcoming opportunities for participation.



Grouped by FP5 programme theme, over 80 successful FP4 projects were exhibited at Essen.

Over 2,000 delegates had been expected to attend — but in the end, nearly 5,000 packed the Messe Essen for the two-day event. Parallel policy sessions, project presentations and practical workshops were balanced by a less formal exhibition, in which each of FP5's seven programmes, and the European Commission's Joint Research Centre, were presented, together with examples of successful research conducted under predecessor programmes.

A Platform for Inventing Tomorrow

In the crowded opening session, Professor Umberto Scapagnini, Member of the European Parliament and Chairman of the

Committee on Research, Technological Development and Energy, told delegates that the final FP5 budget represented a triumph for the Parliament and the Commission, and created an 'island of stability' for scientists and policy-makers, lasting until 2002.

Mrs Edelgard Bulmahn, German Federal Minister for Education and Research, said that the EU framework programme was more than ever necessary for European competitiveness, and welcomed its increased focus on key actions with high European added value. Barriers to the development of European scientific and technical knowledge remained — for example, the lack of transnational recognition for qualifications. But FP5 gave this development valuable impetus.

Mrs Edith Cresson, European Commissioner for research, commended the framework programme to the European research community in the context of the large political and institutional challenges of the coming years, in particular, unemployment and EU enlargement. Society was making ever greater demands on science and technology, she said. FP5 had deliberately been designed along lines which crossed traditional disciplinary boundaries in order to achieve the critical mass needed to address specific problems associated with the EU priorities of employment, competitiveness and quality of life.

Orientation

The Essen event gave researchers and companies an excellent opportunity to orient themselves to FP5's new structure and approach, ahead of the first calls for proposals in March. The rationale and priorities of each of the seven programmes were presented in the main hall, while the arrangement of the exhibition, with stands grouped together by programme, provided an easily grasped conceptual map of FP5's overall design, as well as identifiable points of access for detailed advice in relation to each specific programme.

Most of the work programmes had still to be finalised, and even the common guidance to would-be applicants was marked 'provisional'. But sufficient information was available — well-presented, and well-supported by Commission officials who really knew what they were talking about — to allow people to begin putting together partnerships and drawing up research plans.

Many of the workshop sessions — on rules for eligibility and procedures for submitting proposals, for example — were over-subscribed, with delegates following the presentations from other parts of the conference via video feeds.

Guide for Proposers

The draft 'Guide for Proposers' distributed at Essen — now available in the full version for each specific programme, which also includes information about the programme and its current calls — gave a clear indication of the new harmonised procedures which will be employed throughout FP5, for its whole duration. Points of particular interest include:

- There is considerable emphasis on the **clustering** of research projects — across key actions, across thematic programmes, and with other European programmes such as Eureka and

COST — as a means of establishing a critical mass of resources, and of maximising synergies, in relation to particular problems.

- **Electronic submission** of proposals is encouraged, using a new software tool known as Pro-Tool which is available for download from the FP5 website (<http://www.cordis.lu/fp5>) or on request from each specific programme.

- Applicants will be told the main **reason for rejection** if their proposal is not successful.

- Each research project will be required to produce a **technology implementation** plan indicating how the partners will ensure that the knowledge gained is used. Where necessary, the confidentiality of these plans will be protected.

Contact

The texts of many of the policy presentations made at Essen are available on-line at:

<http://europa.eu.int/comm/dg12/fp5/conf-speakers.html>

Non-EU Participation in FP5

The globalisation of research, as much as of markets, makes it ever more important for European scientists to secure access to world-wide facilities and skills, and FP5 will be even more open to international collaboration than predecessor programmes.

International organisations, and companies and research organisations from third countries, will be

able to participate in all the thematic programmes — in addition to opportunities for participating in the horizontal programme 'Confirming the International Role of Community Research'. The table briefly summarises opportunities for non-EU participation — full details appear in programme-specific documentation.

Associated States may participate, with Community funding, as soon as FP5 association agreements enter into force in 1999.

- *Candidates for EU membership:* Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

- *EFTA-EEA and others:* Iceland, Liechtenstein, Norway, Israel, Switzerland

Other countries may participate, on a project-by-project basis, without Community funding, provided this participation is in the interests of the EU.

- *Other European, NIS and Mediterranean partnership countries (on a self-financing basis):* Albania, Bosnia-Herzegovina, Former Yugoslav Republic of Macedonia; Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, Ukraine; Algeria, Egypt, Jordan, Lebanon, Malta, Morocco, Palestine Authority, Syria, Tunisia, Turkey

- *Countries with a cooperation agreement (on a self-financing basis, in areas covered by the agreement):* South Africa, United States of America, Canada, China, Australia, Argentina, Russia

- *On a self-financing basis, where participation adds substantial value to FP5:* any other country

- *On a self-financing basis:* international organisations



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Opportunit

Innovation is an integral part of the entire Fifth Research Framework Programme, at every level. The active involvement of small and medium-sized enterprises – as developers, users and spreaders of new technology – is essential. The opportunities available to them have therefore been both streamlined and enlarged.

“*Under FP5, innovation will be built into each research programme from project level up.*”

“**T**he ball is in your court,” Giulio Grata told an audience of researchers and entrepreneurs at February’s conference to launch FP5 in Essen⁽¹⁾. SMEs in particular are key players in the European research effort, and the new Innovation and SMEs programme will actively promote their participation in research itself, as well as continuing to support the development of Europe’s wider innovative capacity. Now Europe is relying on them to make the most of these opportunities.

New Centre of Gravity

“Research is essential for Europe’s competitiveness and long-term prosperity,” said Mr Grata, who is Director of the European Commission’s Directorate-General XIII/D (Innovation). “But research and technological development alone are not enough. The successful realisation of the social and economic value of research needs something more, which we call innovation. The new framework programme, and its innovation and SMEs component in particular, is designed to provide the conditions for this to happen.”

Referring to the new requirement introduced in FP5 for all research proposals to include outline plans for the exploitation of their research results — the so-called ‘technology implementation plan’, Mr Grata continued: “The centre of gravity of EU research has shifted significantly. Under FP5, innovation will be built into each research programme from project level up.”



Simon Blackley, ESN

The Greek SME Marlit, leader of a CRAFT project which developed a technology for the production of high-quality fibreboard from straw, was one of the exhibitors at Essen.

⁽¹⁾ See this edition, page 10. For an overview of FP5, see ‘Fifth Research Framework Programme Launched’, edition 2/99.

es for SMEs

CASE STUDY

Technology Upgrade

In the face of competition from low-wage economies, European manufacturers of protective masks must innovate. As SMEs, they can best carry out the necessary research collaboratively.

Gas masks are standard safety equipment for large numbers of workers in the chemical and nuclear industries as well as for public and industrial firefighters. Modern masks employ highly effective filters, but these can only absorb a certain quantity of organic vapour, after which they must be changed in order to maintain adequate protection.

No current design offers an objective means of telling when toxic gases enter the mask — whether through a saturated filter or through an imperfect seal with the face. If filters are seldom changed, workers lose confidence in the masks. If they are changed frequently, this may impose an unnecessary cost on their employer.

Modern sensor technology offers European manufacturers the opportunity to gain a substantial competitive advantage by producing models capable of alerting the wearer as soon as a toxic compound is detected inside the mask, thus offering maximum safety at minimum cost. Now four small and medium-sized enterprises have joined forces in an Innovation project⁽¹⁾, in order to meet this challenge.

Agriculture to Industry

Umweltsensortechnik (UST) and Elektronik Technologie Rump (ETR) — respectively a manufacturer of advanced sensors and a signal-processing equipment specialist — had worked together on an earlier Innovation project⁽²⁾, in which a mixed-metal oxide sensor

was employed in a system to alert tractor drivers to the presence of agricultural chemicals inside their cabs.

"We approached UST and ETR with the idea of building their system into our gas masks," says Dr Roland Fangeat of SNAP, Société Nouvelle d'Articles de Protection. "This would require miniaturisation of the electronics, and a portable power supply. UST would also need to develop a broad-band sensor capable of detecting in minute concentrations any of the wide range of toxic compounds found in different industrial environments. In everyday use, we knew that it would not be practical to ask users to fit different sensors for different types of hazard."

The three partners were joined for the project by a second mask manufacturer, the Belgian company Engicom Systems. "We are not direct competitors," explains Fangeat. "Our combined experience of slightly different segments of the market will help to ensure the widest possible applicability of the new technology."

European Patent

Six months into the 18-month project, the problems of miniaturisation and battery life have already been solved, with sensor and electronics successfully integrated into various mask designs. "Now, the challenge is to demonstrate that the alarm works in a range of toxic environments," Fangeat says.

Testing is being carried out in SNAP's own laboratory, and Fangeat is confident that the



An advanced sensor system, integrated into SNAP's gas masks, will alert the user when a leak occurs or when the filter needs to be changed. Here, a prototype is tested.

first products will be available in 2000, soon after the project finishes. As a consortium, SNAP, UST and ETR have submitted a common European patent application, and expect other manufacturers to be eager to license their technology.

(1) IN20558I, *Masksens*.

(2) *Agrasens*, see 'Technology — the Healthy Alternative', edition 2/98.

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Hans-Werner Müller (left), Secretary-General of UEAPME, and Hendrik Tent, Deputy Director-General of DG XII, debating the barriers to SME participation in EU research.

I. SMEs – A Strategic Role?

Europe's high-tech SMEs may be a source of long-term prosperity, but individually they are more concerned with winning orders today. FP5 comes closer to reconciling these viewpoints.

"Nearly 13,000 SMEs have taken part in research under FP4!" noted Hendrik Tent, Deputy Director-General of DG XII (research), at Essen.

He was responding to a criticism levelled by Hans-Werner Müller, Secretary-General of the European Association of Craft and Small and Medium-sized Enterprises (UEAPME), at the efforts of the previous Fourth Framework Programme (FP4) to involve SMEs.

"The requirement that funded research should be at least three years from the market created major difficulties in sectors with short product life-cycles," said Müller. "The large number of programmes was confusing for small companies, and the application procedure was too complicated and too slow.

"If you really want to encourage SMEs to take part, you should respond rapidly to unsuccessful proposals, explaining exactly why they failed," he went on, to applause from SME representatives in the audience. "And you should try to improve the ratio of funded projects to proposals."

Criticisms Answered

In fact, UEAPME was consulted in detail throughout the preparation of FP5, and most of its criticisms have been fully met in the new rules and mechanisms for participation. But Müller warned that SMEs would continue to press for even better support.

"Until 1995, new jobs created by SMEs balanced losses among large companies," he said.

"That is no longer the case. The huge employment potential of SMEs — in particular that of the technology-oriented ones — will not be realised without renewed efforts. FP5 is designed to be SME-friendly. But CORDIS⁽²⁾ is not sufficient as a means of publicising the opportunities. Only 8% of European SMEs use the Internet. We are not yet convinced that the CRAFT National Contact Points⁽³⁾ are going to deliver the direct, personal and pro-active support service that is needed. Existing information networks should also be used, and for its part UEAPME will do what it can to ensure that SMEs get the information they need to participate fully in FP5."

Responding on behalf of the Commission, Mr Tent pointed out that the increasingly tight focus of calls for proposals, together with growing transparency about the criteria for selection, had already improved the success rate of proposals across FP4 as a whole to one in three, during its latter stages.

"Among proposals for CRAFT projects, for which only SMEs are eligible, over 40% were funded, thanks to the success of the exploratory awards," he said. "Speed and efficiency has to be balanced against proper accountability for public money. However, we are confident that we can do even better in FP5. CRAFT has been made much more flexible, and we have committed ourselves to respond to all proposals within 13 weeks of the cut-off date⁽⁴⁾. But we also want to increase SME involvement in normal collaborative research projects. There is certainly no room for complacency."

Problem-Oriented

"The new Innovation and SMEs programme provides an interface between FP5 and the European community of research-oriented SMEs," says Jean-Noël Durvy, Head of the Innovation Policy Unit in DG XIII. "It integrates the closely related tasks of bringing SMEs into the research programmes, and of getting research results out into the wider industrial world, where SMEs can make use of them."

Durvy is keen to explain how FP5's problem-solving approach informs the range of services offered by the Innovation and SMEs programme. "Imagine you are an entrepreneur, wishing to improve your company's productivity through technological innovation," he says. "The Innovation Relay Centres (IRCs) are there to help you find the technology you need — or to locate development partners — if it does not already exist.

"If joint research is required, the IRC will refer you to the CRAFT National Contact Point (NCP), which can help you to apply for an exploratory award or submit a CRAFT proposal to the new single entry point in Brussels. You no longer need detailed knowledge of the structure of the EU research programmes. We have done everything possible to enable SMEs to remain focused on solving their business problems."

(2) *The Community Research and Development Information Service, see the Supplement 'On-line Support for Participation in FP5' in edition 2/99.*

(3) *See facing page.*

(4) *See box 'SME Specific Measures'.*

2. More Money – Smaller Companies

The SME-specific measures introduced in FP4 were an outstanding success. The changes introduced for FP5 will make them useful to even larger numbers of SMEs.

SMEs represented 32% of all participants in FP4, and received 21% of all research funding. Five thousand, predominantly technology developers, took part in the regular collaborative research programmes. A further 7,000 participated through the SME-specific measures. Of these, 83% were technology users or end-users, rather than developers, and for more than 75% of them, this was their first experience of transnational research⁽⁵⁾.

"This demonstrated the appetite of technology-oriented SMEs for transnational research, and their ability to contribute to European research and innovation," says Robert-Jan Smits, Head of DG XII's SME co-ordination unit.

"Funding for the SME-specific measures has been doubled in FP5 — to 10% of the total budget," he says. "This gives a clear political signal that SMEs are considered to have a key role in achieving European prosperity. But it is a minimum, not a maximum. We have streamlined the application and evaluation procedure as much as we can, to make it as quick and easy as possible for SMEs to benefit, and the National Contact Points will be recruiting participants in a much more focused and pro-active way than before. We really want to attract as many small companies as possible to take part."

Bottom-Up

A notable change is that to be eligible SMEs must have fewer than 250 employees — under FP4, the cut-off point was 500. "Research was the only area of EU policy not to use the legal definition adopted in 1996," Smits explains. "This anomaly has now been corrected. In future, companies with between 250 and 500 on the payroll must go through the same channels as large companies, universities and research institutes."

In practice, this group accounted for only 5% of FP4 CRAFT projects, so the impact is

unlikely to be dramatic. "Over two-thirds of the SMEs which took part in FP4 had fewer than 50 employees," Smits points out.

These very small companies in particular will appreciate the efforts that have been made to simplify the application process. "CRAFT will now be truly bottom-up," he says. "SMEs do not think in terms of programmes,

they think in terms of problems, so we have issued an open call for proposals on any research topic, as long as it addresses one of the overall objectives of FP5. Proposals no longer need to relate to the detail of the specific programmes, and will be submitted via a single entry point." Evaluation will be speeded up, too.

CONTEXT

SME Specific Measures



SMEs⁽¹⁾ are, of course, eligible to participate directly in any of FP5's specific programmes of collaborative research, either as project leaders or as members of project consortiums.

However, certain types of project are available *only* to SMEs:

- **Exploratory Awards** cover 75% of the cost of preparing a research proposal, up to a maximum of €22,500. At least two SMEs, from two different Member States, must be involved, one of which must lead the project. An award may be for the preparation of a proposal either for a collaborative research or Innovation project (in response to a call for proposals), or for a cooperative research (CRAFT) project.

- **Cooperative research (CRAFT)** projects enable at least three SMEs, from at least two Member States, to undertake joint research either by pooling their own research resources or by contracting research to an outside research performer. Fifty per cent of total project costs will be funded, up to a maximum of €1 million. CRAFT projects will normally last not more than two years. They no longer need to

address the specific research objectives of the research programmes. Any topic is eligible, provided that it is in line with FP5's broad objectives.

Proposals may be submitted at any time, but will be evaluated in batches three times a year. The cut-off date for the next evaluation, for both Exploratory Awards and CRAFT projects, is likely to be 15 September.

For more details, contact the SME Helpdesk (see Contact).

(1) An SME is an independent enterprise with fewer than 250 employees and either an annual turnover of not more than €40 million or net assets of not more than €27 million, which is not more than 25% owned by another, non-SME, organisation (other than as a financial investor).

(5) Figures taken from the report 'SME Participation in FP4'. See also 'Small Companies Play a Bigger Part', edition 1/99.

CASE STUDY

SMEs Get Organised

Twelve small organ builders are using advanced research techniques to upgrade centuries-old expertise.



A Mühleisen organ in the Solitude chapel, Stuttgart.

Every pipe organ is unique — lovingly crafted to fit a specific space, and producing a musical tone perfectly suited to a particular building. But the skills employed in their design, construction and repair are more intuitive than scientific. An organ builder knows at once when the sound is not quite right, but he rarely knows why. Identifying and correcting faults is a slow process of trial and error.

False Note

Since 1994, Dr Judit Angster of the Fraunhofer Institute for Building Physics (IBP) in Stuttgart has been running courses for members of this most traditional of trades.

"We have given craftsmen an insight into the mechanical and acoustic principles which underlie their subjective impressions of sound," says Angster, who comes from an organ-building family herself. "This has really helped them to avoid mistakes, and to fix them when they occur."

Konrad Mühleisen runs a small family company of just 28 people in Leonberg, close to the Institute, and was an enthusiastic participant in the course. "He approached us with the idea of converting this theoretical knowledge into actual tools and organ parts," recalls Angster. "He was especially interested in improving the design of the wind system, which produces the pressurised air needed to sound each note. But the necessary research effort was far beyond his company's resources."

Now the Mühleisen Organ Workshop has joined forces with another 11 SMEs, from nine European countries, in a CRAFT cooperative research project⁽¹⁾. Following a successful definition phase, funded by an exploratory award, they have contracted IBP to develop special design software and a new wind system, incorporating for the first time electronic valves and controls.

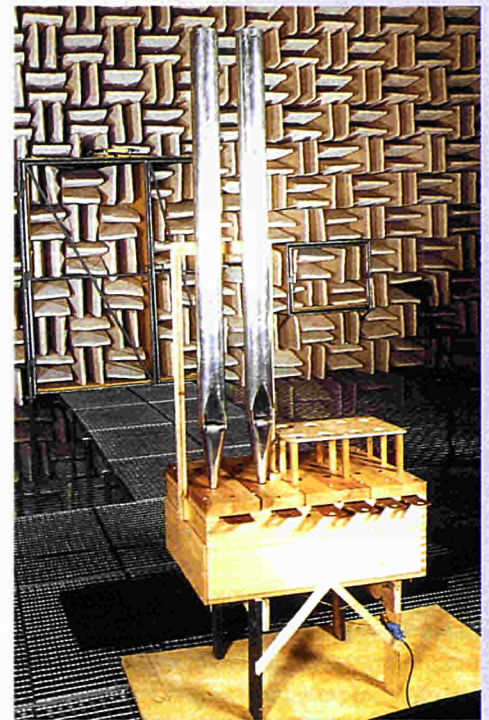
Living Music

"Poor tone usually results either from an insufficiently powerful wind system, or from fluctuating air pressure caused by turbulence in the flow of air or acoustic resonance in the wind system," Angster explains. "We will measure the key acoustic and fluid mechanical properties of a number of different organs in order to define quantitative parameters for these factors. The study will provide the basis for objective design principles, which can then be incorporated in the software."

Mechanical control of the wind pressure gives rise to modulations of frequency and amplitude which can also adversely affect an organ's tone. Newly designed electronic components will allow organ builders to 'tune' the modulation.

"These new technologies are not intended to create a uniform sound," says Angster. "After all, it is the tiny imperfections which bring each organ's music to life. But they will enable organ builders to avoid big mistakes, greatly improving their productivity and competitiveness."

Towards the end of the project, in September 2000, Mühleisen will use the project's design tools and components to build a demonstrator instrument. The partners then plan to develop both the design software and the electronic controls as commercial products, making them available to Europe's 400 other small organ-building enterprises.



A test model in the acoustic laboratory of the Fraunhofer Institut für Bauphysik.

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(1) Brite-Euram project BRST-CT98-5247.

•••

Integrated Follow-Up

CRAFT will also be made considerably more attractive by the optional inclusion of an integrated validation phase. "Throughout FP5, much greater attention will be paid to the transition from research to commercialisation," Smits says. "Each research project will have a technology implementation plan, and the Innovation Units in each thematic programme will help them to tackle problems of financing, intellectual property rights and exploitation."

"In CRAFT, applicants can now include the validation of the research — its testing or scale-up, for example — as part of the funded project. They will only need to look for separate funding if they want to carry out a demonstration."



3. The Process of Innovation

As research follow-up is integrated into the mainstream research programmes, the emphasis of the innovation projects will change.

In FP4, innovation projects provided an avenue for selected research projects to carry their work through to the exploitation stage by testing or demonstrating new technologies, to support their transfer to end-users.

"Innovation projects will not be available for the follow-up of FP5 research projects," says Guido Haesen of DG XIII/D. "That role will be taken over by the Innovation Units within each thematic programme. Innovation projects will continue to deal with technologies emerging from industry, universities and regional support networks — or from earlier EU research. But we are going to place much greater emphasis on the *process* of innovation."

In effect, the projects will serve as test-beds. "We want to help project consortiums to identify, test and optimise widely applicable solutions to common non-technical barriers to technology transfer," Haesen explains.

Projects will, as far as possible, be clustered around issues of common concern associated with the human and cultural, rather than technological, aspects of innovation — trade union involvement, for example, or the emergence of new professions. Each cluster will be given dedicated support, while the additional costs of cluster participation will be fully funded. "We have no desire to place extra burdens on the projects," says Haesen. "On the

contrary, we want to help them to get the most out of their technology transfer."

Clusters will bring together people from different sectors and regions to discuss common problems in a structured way. "Innovation is about human factors as much as technical factors," says Haesen. "We think projects will benefit directly from this new dimension. But cluster co-ordinators will also extract good practice — approaches, techniques and tools — which may be useful to other SMEs engaged in technology transfer, whether or not they are involved in EU research." ●

“ We really want to attract as many small companies as possible to take part. ”

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• **A full list of National Contact Points, including those for CRAFT, can be found at** <http://www.cordis.lu/fp5/src/ncps.htm>

• **Global access to information and support services relevant to participation in FP5 is available at** <http://www.cordis.lu/fp5>

A Personal Service



As SMEs prepare proposals for new FP5 research projects, the IPR Helpdesk can help them build protection for existing know-how into their partnership agreements.

Worries about sharing valuable knowledge with partners — and concerns about the complexity and cost of protecting that knowledge — still prevent many small companies from undertaking joint research. And among those which have taken part in previous European projects, too many have only considered the security of their intellectual property after a problem has arisen.

"People tend to enter into a partnership agreement without really understanding the IPR issues, in order to get the research funding," says Mónica Miñana, one of the Helpdesk's team of legal experts. "We would like them to address these issues at the outset, so that later problems can be avoided."

Help with Proposals

The Helpdesk, operational since last September⁽¹⁾, aims to raise awareness about the

importance of intellectual property rights (IPR) in the process of technological innovation, and to promote the use of patent searches to prevent resources being wasted on problems which have already been solved elsewhere.

But it also offers a free personal advice service. In the five months to February, the flow of enquiries was modest, but the Helpdesk's legal team anticipates a rapid increase as research consortiums start to respond to FP5's first calls for proposals.

"We aim to become a key resource for the research programmes," she says. "In the past, many IPR questions have been directed to project officers, who have no specialised training in this field."

To date, the majority of enquiries have come via e-mail — and most have received a written response within 24 hours. The team has dealt both with requests for general information on

patents and other means of IPR protection, and with specific queries about contractual issues related to planned joint research projects.

Research Contracts

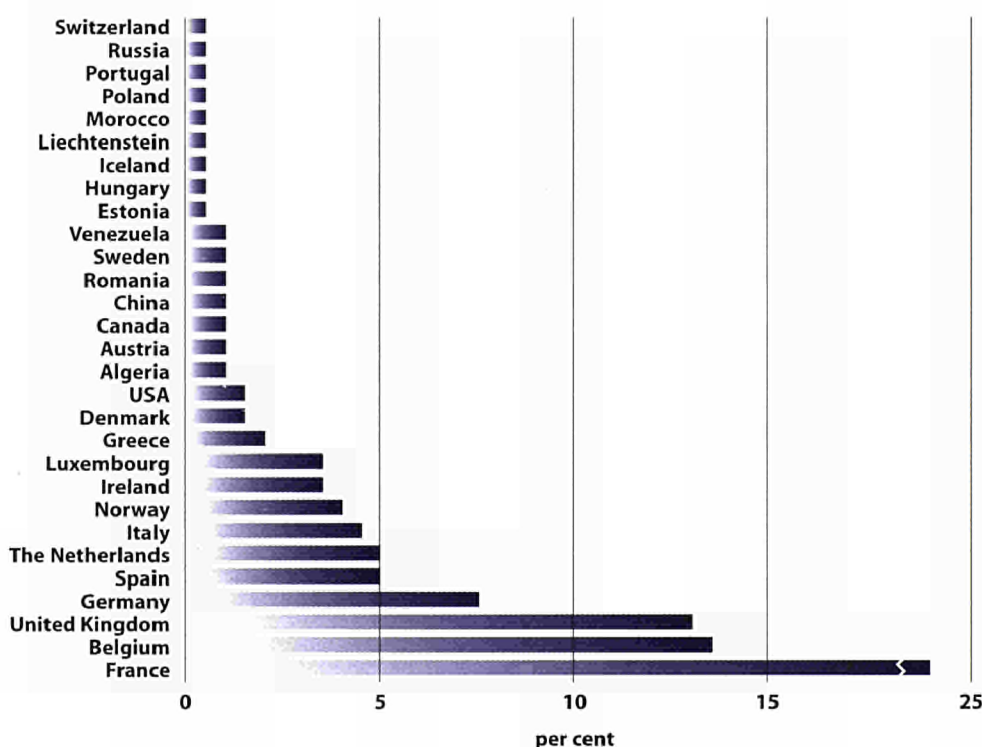
"I have just dealt with one person who sent a whole list of questions relating to the protection of a gene sequence, which he hoped would form the basis for further research with other partners in a European project," she recalls.

"Should he protect his IPR before looking for partners? Should he ask potential partners to sign a confidentiality agreement? Would he need to file a patent before entering into a research contract? What rights and obligations would a contract imply? These are typical concerns — but in a difficult area, given the development of EU law on the patentability of biotechnology products."

Miñana responded with basic information about the various forms of protection available, the requirements for filing a patent, and about the way a research contract works. "We cannot file a patent for you," she explains. "But we have information about patent agents and patent offices in each Member State. In this case, I gave him contact details for an agent in his own region, as well as for the European Patent Office. But I invited him to come back to the Helpdesk again, once he had studied the information we sent."

(1) See 'Stand Up for Your Rights', edition 5/98.

Enquiries to the IPR Helpdesk, by country



Deep Pockets, Lengthening Arms

Turning an innovative technology into a company capable of creating wealth and jobs requires capital. I-TEC is opening up new financing opportunities for high-tech SMEs.

L launched in July 1997, the I-TEC (Innovation and Technology Equity Capital) pilot scheme⁽¹⁾ has now moved into its operational phase. The first network meeting to include all 28 of the European participating venture capital funds took place in Lyon during March, in parallel with the BioTech Investment Forum⁽²⁾ and the second Biotechnology and Finance Forum conference.

"The network is complete," says Marc Verlinden of the Innovation and SMEs programme. "The funds are raising new capital and are starting to make use of the scheme's support services." Over the next four years, their commitment to increase investments in high-tech start-ups will make a real difference to large numbers of research-based entrepreneurs. In the longer term, the Commission hopes that I-TEC will provide a model for similar national schemes.

Expert Appraisal

With today's booming stock markets, why do high-tech entrepreneurs still find it hard to fund their business ideas? "It is true that venture capitalists have deep pockets. But we also have short arms," explains Niels Mengel, Director of Øresund-Lifecare, a fund focusing on the Scandinavian healthcare sector. "We need to be certain that there is real potential for rapid growth — not only to compensate for high levels of risk, but to secure our exit route."

For a successful investment, three things have to come together fast, since a technological innovation typically offers only a small window of opportunity. "Capital and management expertise we already have. The third ingredient is reliable information about the market and regulatory environment in which the product will be launched. This is essential as the basis not just for the investment decision, but for planning project milestones and an exit strategy. But it is difficult and expensive to acquire. That is where ITEC comes in."

I-TEC contributes up to 50% of the costs of expert appraisal bought in by the fund, and



provides its own appraisal service through a contracted team of professional analysts.

Impressive

Mengel gives the example of OM AB, a Swedish company formed to exploit a patented compound for magnetic resonance imaging. Designed to be taken orally, the inventor hopes it will complement the current injectable form in a range of clinical applications.

"A quick decision would have been hard without I-TEC," Mengel says. "In fact, our initial impression was that the market was quite small. But within ten days the appraisal team had made a comprehensive evaluation which

convinced us that the potential was bigger. The information lowered the perceived risk, and enabled us to invest at once. We have been extremely impressed."

By assisting them to invest in high-tech start-ups, I-TEC is also helping the funds to increase their own appraisal capacity, both individually and as a network. "Particularly for small funds, venture capital is all about networking," says Mengel. "I-TEC provides an excellent platform for day-to-day exchange of ideas, which really stimulates the flow of deals."

(1) See 'From Strength to Strength', edition 3/98.

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

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Recognition for Market Innovation

Smart card certification for secure Internet banking. An advanced anticopy system for CD-ROM software. Multiband antennas allowing cost-effective migration to new mobile telephony standards. IST 1998 Grand Prize winners will help to maintain Europe's leadership in key Information Society Technology markets.



Smart cards currently offer the only simple and reliable way of verifying electronic transactions.

The products which receive the European Information Society Technologies Prize not only contribute to the creation of a citizen-friendly Information Society in Europe. They also help to push forward the boundaries of European competitiveness in an industrial sector of vital importance.

Launched in 1995, the annual prize⁽¹⁾ is jointly organised by the European Commission and the European Council of Applied Science and Engineering, EuroCASE. "Our aim is to improve the visibility of European technological innovation," says Kostas Glinos of the Commission, "and to help

companies which have succeeded in taking an innovative idea all the way from research to product launch to achieve public recognition."

Each year, a jury of respected industry experts considers around 300 entries, selecting 25 winners on the basis of their scientific and technological excellence and their ability to penetrate their target markets rapidly — and awarding three of them Grand Prizes of €200,000 each.

Media Attention

But the prize money itself is only the beginning — the extensive press coverage which the winners receive is worth considerably more.

"Banks and venture capital funds are not always qualified to judge the potential of an innovative product, but they know that the IST Prize jury is," explains Glinos. "Past Grand Prizewinners tell us that the prize has been a real help in attracting development finance. Perhaps even more important, the prize gives credibility to an untried product, and has helped the winners to secure orders from large, blue-chip companies."

These advantages are of particular value to very small companies, and although the prize is open to any European company or research institution, regardless of its size, the majority of prizewinners have been small and

medium-sized enterprises (SMEs). There were 22 SMEs among the 1998 winners — and they can look forward to a period of very rapid growth, according to Glinos. "Among previous prizewinners, three-figure percentage growth in turnover has been common," he says. "One 1997 Grand Prize winner doubled its staff in the 12 months following the award, while its turnover leapt by 450%."

Smart Move

Swedish company iD2 Technologies, one of the 1998 Grand Prize winners, has achieved extraordinary success since it was founded in 1996. Focusing on software systems providing high-level security for electronic transactions, it has gained over 1,500 man-years of experience in the development of a range of commercial products, and has established offices in Stockholm, London and Munich.

Traditionally, the parties to any financial agreement expect to conclude it face-to-face and in private, signing their names on a physical contract. To achieve the same degree of assurance and security in the virtual world of the Internet, new means are needed for individuals to identify themselves.

Some applications, such as electronic ID cards, require digital certificates issued by public authorities. Others, such as

on-line banking, require digital signatures. Public Key Infrastructure (PKI) currently offers the best way to give electronic documents legally binding status. With iD2's Certificate Manager, both certificates and signatures can be reliably issued and verified using smart card technology.

The product has been designed for customers such as banks and other large organisations wishing to build high-volume Internet services requiring maximum security. In one application, smart cards — combined with readers that are easily attached to home computers — already provide 40,000 customers of one Swedish bank with secure and convenient home banking.

Pirates Sunk

The second Grand Prize winner, Greek specialist MLS LaserLock International, provides security for a different, but equally important Information Society constituency — software producers. Many market leaders now use the company's products to protect their intellectual property rights.

Software piracy is very big business indeed, and the falling price of CD writer drives has made the problem worse. Worldwide, illegal copying costs the software industry an estimated €10 billion each year, inflating the cost of legally purchased products, and raising artificial barriers to innovative new software technologies.

LaserLock is the first complete software copy protection system developed especially for the CD-ROM. Combining sophisticated code encryption software, a physical CD signature created during a special mastering process, and state-of-the-art debug prevention engineering embedded in the encryption code, it provides high-security, low-cost protection against illegal reproduction and remastering.

According to the company, the concept behind the latest version of the product is unique. It uses an analogue locking parameter to protect digital data, offering flexibility and ease of use to developers, transparency to legitimate end-users — and an impenetrable barrier to pirates and hackers.

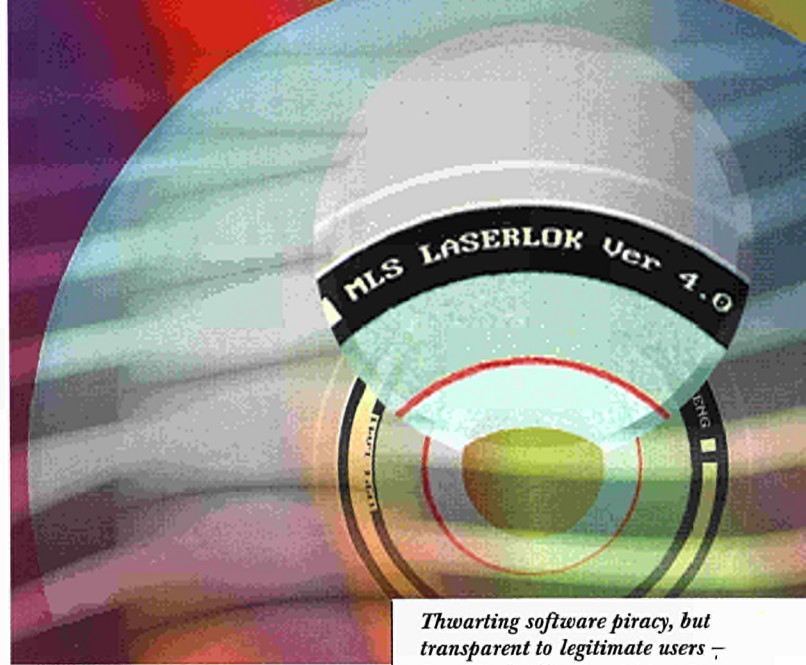
Fractal Telephones

The last of the 1998 Grand Prize winners has found a revolutionary solution to a problem which has long baffled radio engineers. The performance of an antenna is highly dependent on its physical size, relative to the wavelength of the signal it is designed to carry — one antenna, one wavelength.

How then to handle the migration of Europe's cellular mobile telephony network from the current GSM system's 890-960 MHz to the 1710-1880 MHz band of the future DCS system? Until now, the only solution has been to erect two sets of masts, massively increasing both the cost and the environmental impact of network upgrade.

Now, a partnership between the Universitat Politècnica de Catalunya (UPC) and a leading Spanish TV and radio broadcasting equipment manufacturer, Sistemas Radiantes F Moyano (SRFM), has produced the multi-band Fractus⁽²⁾ antenna, capable of operating simultaneously at both wavelengths.

In a research project supported by the European Commission and the Spanish government, the Spanish research team has used a patented fractal technology to construct an antenna with self-similar geometry at several different scales. The unique design principle has huge potential for the numerous Information Society Technology applications which require a multi-service antenna.



Thwarting software piracy, but transparent to legitimate users — LaserLock offers complete copy protection for CD-ROM software.

Action This Day

The closing date for submissions for the European IST Prize 1999 is 18 May — entries must be received at Euro-CASE's Paris office by 17.00 CET. But Kostas Glinos urges any potential entrants to act immediately, even if they have not considered doing so before. "The entry form can be downloaded from the web-site, and has deliberately been kept simple," he says. "It should be possible to complete it in a couple of hours." ●

(1) Formerly known, until 1997, as the ITEA prize.

(2) Fractus is a registered trademark of Sistemas Radiantes F Moyano SA.

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Selling Yourself

Increasingly, scientists are learning to see their work from the viewpoint of a potential customer. To start their own companies, they must go one step further and see it through the eyes of a potential investor. Four targeted schemes are helping them to do just this.

"**F**or most software entrepreneurs, their own business plan is the first they have ever prepared," says Annie Brooking of British consultancy firm The Technology Broker. "They are technical people with no experience of commercial financing, and their projections are very often based on totally implausible assumptions. As investment opportunities, the plans simply do not add up."

As part of the Esprit programme, The Technology Broker has

been running the Midas pilot scheme⁽¹⁾, helping 44 early-stage British and Scandinavian software companies to prepare themselves for the search for investment finance.

A second Esprit project, TRAIN-IT, has developed sector-specific business planning software of its own, to give information technology innovators the support they need to prepare sound and ambitious plans. In the biotechnology sector, the Biobiz initiative has also used custom-made

software to train would-be entrepreneurs from research institutions and large companies. The European Commission's Joint Research Centre, meanwhile, has launched a pilot training programme for researchers working in a number of different disciplines at its extensive Ispra site.

What the four projects share is the determination to support the development of European entrepreneurship not just as an aspiration, an attitude or a set of

skills — but in the concrete form of new high-tech ventures. Companies have indeed been formed, and investment agreements signed. Still in their early days, these pioneering schemes are already demonstrating that targeted professional support can improve the rate of company formation in technologically advanced sectors.

1. High Rate of Return

Venture capital funds immediately reject 99% of the business plans they receive — often because of trivial mistakes.

"The plans rarely describe an attractive business opportunity," says Brooking. "They are frequently directed to funds which have no interest or experience in their technological field. We wanted to see whether we could improve the success rate by coaching software entrepreneurs to avoid these obvious traps."

Often, plans are simply not ambitious enough. Four out of every ten early-stage investments fail, and to compensate for this risk fund managers look for ten-fold returns. "Investors need a clear exit strategy," Brooking explains. "Steady growth in turnover does not interest them — even growth of €2 million per year. To get a company off

the ground, you have to think bigger than that."

During 1998, Midas ran seven three-day workshop series — two each in Iceland, Finland and the United Kingdom, and one in Norway. A third Icelandic series will take place this year. The project has already put a total of 44 'babies' through a demanding programme of presentations and exercises, at the end of which each applies the lessons learned to the preparation of their own business plan.

Survival of the Fittest

"We spend a day analysing each plan, and provide written feedback — often listing hun-

dreds of flaws," Brooking says. "Then they come back and make a 15 minute presentation, which we criticise again. I saw one yesterday, with 36 slides. They have to adopt a completely different mindset in order to present a really sharp story."

If the treatment sounds rough, it is intended to be. Not all the Midas babies make it, but when Brooking judges a company to be ready, she arranges a meeting with selected investors. "Depending on the technology, the size of the company, and its existing shareholding structure, different deals will be of interest for corporate venturing, for independent venture capital funds, for other institutions or for high net

worth individuals," she says.

The Technology Broker is currently presenting two Midas graduates every three months, and their gruelling apprenticeship is paying off. Eight of the 44 companies have either already closed financing deals worth several million euros, or are close to doing so. That is a twenty-fold improvement on the standard success rate.

(1) Esprit accompanying measure Midas, project 26521.

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2. Growth Promotion

Science, excellent. Understanding of the market, deplorable.

Michel Lepers, the organiser of the Biobiz project⁽²⁾ for biotechnology entrepreneurs, also believes that flattery is a poor recipe for success, reserving his harshest criticism for researchers' failure to identify their target markets clearly. "I give them a hard time," he admits. "But they appreciate it."

The three-day course has already been run eight times, in seven different countries. To date, one-third of the participants have come from large pharmaceutical companies interested in establishing spin-offs, and the same proportion

from academia. The remainder have been from specialist research centres or incubators, and have wanted to assess the value of the course for their staff or clients.

Role Models

Concrete examples provide a valuable focus for learning, and each workshop includes a presentation by an established local biotech entrepreneur, and an explanation by a senior fund manager of how venture capitalists read business plans.

The central part of the course

engages participants, working in small groups, in the detailed preparation of a case study business plan. "I allow them to choose between two hypothetical but realistic business ideas," Lepers explains.

They use specially developed software, built within a standard Windows spreadsheet application. "We have created a tool which guides them through each step of a structured planning process," says Lepers. "The software takes care of the financial accounting, allowing the user to focus on the key business decisions, and provides over 800

items of specific advice on issues such as marketing and sales, intellectual property rights and regulatory requirements."

At the end of the course, each participant receives their own copy of the software, equipping them with the tools as well as the skills to prepare their own business plan. Past participants stay in touch via e-mail, and in February Lepers celebrated the first company launch by a Biobiz graduate. He is currently taking bookings for a second series of workshops, planned for autumn 1999.

(2) Biotech accompanying measure, 'Advanced Practical Workshops'.

3. Joint Research Centre Trains for Business

Entrepreneurship training at the JRC is part of a unique, multi-disciplinary, cross-border technology transfer scheme.

The European Technology Transfer Initiative (ETTI), launched at the start of 1998, is designed to accelerate the exploitation of research results emerging from the JRC's eight

institutes. Alongside schemes for the secondment of staff between industry and the institutes, and to provide outside researchers with access to their large-scale facilities, it includes

an independently managed technology transfer fund⁽³⁾ and a business incubator, each of which will support the creation of new spin-off enterprises by JRC research staff.

ETTI's fifth element, a comprehensive programme of in-service entrepreneurship training,

(3) See 'A Drop of Oil in the Right Place', edition 6/98.

contributes to the same objective. It is being piloted at the Ispra site in northern Italy, where four institutes are located employing two-thirds of the JRC's 1,500 research staff. Young researchers on short-term contracts are targeted in order to improve their future career opportunities.

"We shortlisted 35 candidates and enrolled 20 on the pilot course," says Robin Miège of the JRC. "Training started in January and is going well. We expect one-

third of the participants to go on and set up their own independent companies."

Best Practice

The seminar cycle, consisting of 200 hours of training, is delivered over a six-month period, in 18 two-day modules. The workshops take place on Fridays and Saturdays, enabling participants to continue their full-time research work during the course.

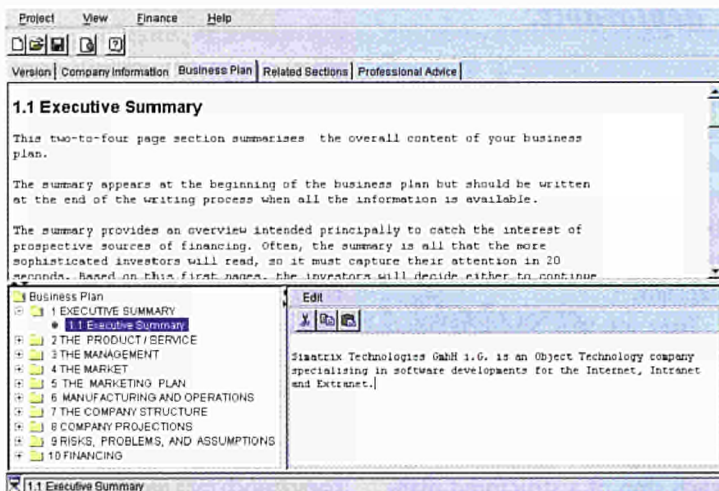
Structured to follow the business life cycle from project management through business planning to venture growth, the course draws on successful European and American models, and is delivered by outside lecturers from leading universities, business schools and consultancies.

"A curriculum designed to develop the management skills of full-time research employees is extremely unusual," says Miège. "Entrepreneurship is normally

taught to business students, not to scientists. If the method is successful, we hope it will be adopted by other research institutions."

4. Taking the Plunge

The mechanics of business planning are a real barrier to information technology entrepreneurs, but a new software tool will soon be available.



The TRAIN-IT business planning software gives IT entrepreneurs access to built-in sector-specific tips, as well as to Internet information resources.

Following the successful delivery of its first five courses, TRAIN-IT⁽⁴⁾ is now in its stride, says Dr Ingo Hussla of IZET (Innovationszentrum Itzehoe), which manages the project. A further 25 courses are planned during 1999 — in Germany, Denmark, France and Finland.

The business planning software used in the first course was less than ideal. "We used a well-proven commercial package," explains Hussla. "But our participants wanted on-line support specific to the information technology sector. They also found the interface rather dated, lacking the features they were used to in a modern word processor."

Places Available

As a participant, Dr Marwan Chabbani experienced the problem at first hand, and offered to develop a new planning tool himself. The innovative software engineered by his own new company Simatrix Technologies, and incorporating content provided by IZET, is now used on all TRAIN-IT courses.

"It is a nice deal. Simatrix gets feedback from testers who are real IT entrepreneurs, and in return we get free use of it until the end of 1999, when it should be ready for commercial release," Hussla explains. "We are delighted with the product. Participants make much quicker progress and produce much more professional plans."

The application has been developed in Java, and runs as an applet in any web browser, on any hardware platform. "All the tools are presented in a single, familiar environment, which gives the user easy access both to the built-in facilities and to external resources via the World-Wide Web," says Chabbani.

The tool includes a directory of useful links to specialised market intelligence and patent informa-

tion, a glossary of business terms, and comprehensive tips to help the user complete each section of the plan. Finally, it interacts with a ready-made spreadsheet template containing all the formulae needed to calculate projected cash flows, balance sheets, and profit and loss accounts. Outputs can be loaded easily into any standard word processor for final formatting and printing.

Places are still available for many of the 1999 TRAIN-IT courses. ●

⁽⁴⁾ *Esprit 4 accompanying measure 'Training of IT Innovators', project 25756 - see also 'Think Big!', edition 6/98.*

Medical Research at the Doctor's Fingertips



Using existing IT systems to deliver patient-specific advice based on the latest clinical guidelines directly to the doctor's desk, a new medical informatics technology will improve diagnosis and treatment and allow more efficient use to be made of over-stretched healthcare resources.

Evidence-based medicine — the use of protocols embodying current best practice — is known to improve the quality and efficiency of patient care, both in doctors' surgeries and in specialised hospital clinics. With the active support of a number of governments, expert groups are developing guidelines to cover a steadily growing range of medical scenarios, from the management of diabetes to the administration of anticoagulant therapy.

But such guidelines are not structured or presented in a way which makes them immediately useful in everyday clinical practice. They need to be studied and absorbed by individual doctors, and interpreted in relation to specific cases. It may therefore be several years before they are widely implemented. Such delays cost money, and could cost lives.

At the same time, more and more doctors use computer networks to store and retrieve patient records, and to share this information with colleagues in other units. Now a collaborative project involving 32 partners in eight countries⁽¹⁾ has developed a technology which makes use of this infrastructure to give practitioners immediate access to clinical advice relevant to the treatment of specific patients.

Missing Link

"Previous attempts to use informatics to close the gap between advanced medical research and day-to-day patient care have failed to overcome the huge technical obstacles," says Colin Gordon of the Royal Brompton and Harefield National Health Service Trust in the United Kingdom, who co-ordinates the project.

"The market does not want another comprehensive new technology. Existing computer systems represent a huge investment by health authorities, and by the staff who have learned to use them. To deliver the guidelines, we need to design software components which can be integrated with these systems. The Prestige project sets out to build a technology which would allow any guideline to be made available on a multiplicity of target platforms, and to be tailored to meet a variety of local needs."

Gordon cites the example of a guideline for the prediction of strokes and heart attacks, recently published in *Heart* magazine. Recognising that doctors are unlikely to spend time searching for relevant advice during a consultation, the academic bodies which produced the guideline also offered a simple spreadsheet application. This uses the guideline's knowledge content to calculate the likelihood of a coronary event, based on patient data entered on a simple form by the doctor.

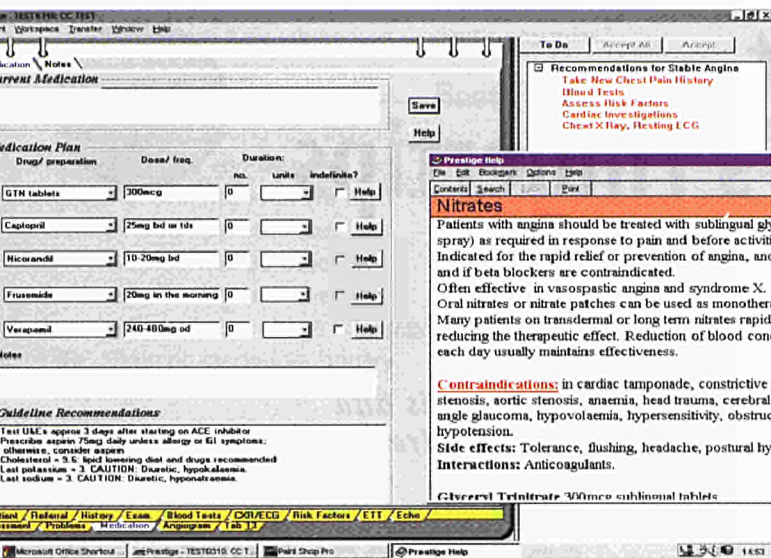


Bringing the expertise of European expert groups straight to the clinician's desktop — Prestige enables medical guidelines to be presented in a form which the doctor can use as he works.

"In theory," says Gordon, "this is much more useful than a plain text, whether in a printed journal or on the World-Wide Web. But in practice, a doctor is just as unlikely to run a special bit of software for each patient as she is to refer to a special text."

The stand-alone application has other drawbacks. Because it is not integrated with the doctor's other computer systems, it cannot call up previously stored data about the patient, or about his past treatment — information which is crucial in the management of conditions such as chronic asthma, for example. Every piece of data must be gathered anew, and can neither be stored for subsequent use, nor shared with other medical staff who are treating the same case. ●●●

(1) Prestige (Patient Records Supporting Telematics and Guidelines), project HC 1040 of the Telematics Applications Programme's healthcare sector.



A typical Windows-based Prestige application, for the management of stable angina. Here, the system offers recommendations for medication based on the patient's history and latest medical research.



All the Players

The three-year project, completed this month, has involved national medical associations, international bodies, primary healthcare authorities and individual hospitals, academic partners, and commercial companies with existing medical informatics products. "We tried to bring together all the interests and expertise needed to create a technology which could be applied across healthcare sectors and medical specialities, as well as across national boundaries," says Gordon.

The partners' first task was to agree a standard format — since published as the Prestige model — for representing clinical knowledge content in computer-readable form, whether it comes from a Dutch guideline on lower back pain, or an Italian one on influenza vaccination. They then developed an authoring tool which allows a guideline's printed text to be accurately transcribed into this format. Finally, specific pilot applications were built by different groups of part-

ners to test the new technology's capacity to meet a range of technical and medical needs.

"We tackled five representative specialities and eight specific guidelines," Gordon explains. "My own organisation has worked on an application for angina management in hospital and primary care settings in the UK. Colleagues in Portugal have developed one for the diagnosis and care of epilepsy. In due course, we hope the epilepsy guidelines can be applied in the UK, and the angina ones in Portugal. Eventually, no European doctor should be more than a mouse-click away from any of the growing number of guidelines which are relevant to the patient they are treating at the time."

Practical Edge

Translating the consensus views expressed in clinical guidelines into the practical, deterministic advice needed in day-to-day patient care was more difficult than the partners originally anticipated. But the British angina system is already attracting growing support from staff in various departments on two hospital sites, according to Gordon.

"Now, when a patient suffering from chest pain is referred by her own doctor to our busy cardiology outpatient clinic, Prestige software will display the care pathways taken to date, show the current options, and prompt the clinician to collect or review the

data necessary for a sound clinical assessment."

"It is essential to minimise the time a clinician must spend recording information during a consultation," Gordon admits. "But once the data is in the system, it is easy to automate routine tasks such as writing the letter which is sent to each patient's general practitioner after a clinic visit. When you show them that, their faces light up."

Prestige is attracting a good deal of interest from national healthcare services, and several groups of partners are incorporating Prestige technology into new commercial products, on the basis of licensing agreements negotiated with whichever partner owns the intellectual property rights for the component concerned.

In March, the partners launched the Prestige Association as a forum for the continued joint development of the standard data format — now freely available to any third-party developer — and the exchange of experience concerning its practical application.

"The project has established a solid basis for the roll-out of this technology," says Gordon. "Other health services may wish to join us, and EU support for wider dissemination of our results may be helpful, but we have reached the point where the benefits are clear enough to ensure that work will continue after the current funding ends." ●

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Innovative Circuits and Systems for Nanoelectronic

7-8 July, Duisburg (Germany)

The Nano-El '99 workshop, supported by the Esprit programme, will address the following topics:

- architectures for nanoelectronic systems
- devices and circuits for nanoelectronics
- nanometre-scale technology.

Contact:

<http://www.cordis.lu/esprit/src/melari.htm>
or <ftp://ftp.cordis.lu/pub/esprit/docs/fetnaws4.pdf>

Intelligent manufacturing systems

22-24 September, Leuven (Belgium)

Supported by the Esprit programme, the second international workshop on intelligent manufacturing systems (IMS) aims to create a forum for discussing information technologies in manufacturing, in which criteria for excellence relate to the industrial need to tackle real-life complexity with advanced information technology.

Topics will include:

- manufacturing paradigms
- multi-agent systems in manufacturing
- manufacturing and shop floor control
- process and production planning
- product life-cycle modelling and simulation
- concurrent engineering
- environmentally benign design and manufacturing
- virtual and extended enterprises.

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Telework '99

22-24 September, Aarhus (Denmark)

Telework '99 will focus on new ways of working, quality of life, family and community and environmental sustainability, and on the applications of telework for the business community. It is aimed at decision-makers from the private and public sectors and representatives from regions and businesses, and is open to telework researchers, consultants and practitioners.

The event is intended to provide an occasion for exploring the opportunities offered by new technologies, and new and innovative ways of using them. It also offers a chance to

see how the newly launched Fifth Framework Programme can be of assistance.

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<http://www.telework99.dk/Conference.html>

27th European transport conference

27-29 September, Cambridge (UK)

This will focus on up-to date policy issues, research findings and best practice across a broad spectrum of transport modes and issues as a basis for co-operation and discussion at an international level within the transport sector. Seminar streams will cover: EU policy, legislation and research; inter-urban transport systems; transport planning, policy and practice; public transport, planning and management; traffic management, safety and intelligent transport systems; and transportation planning methods.

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Case histories on integrity and failures in industry

27 September - 1 October, Milan (Italy)

The conference is supported by the EU's Industrial and Materials Technologies research programme (Brite-Euram), and papers from its research projects — in particular the Plant Life Assessment Network (PLAN) — will be presented at the event.

Discussions will focus on actual damage and failure events from different industrial sectors, such as power, nuclear, petrochemical, transport, aerospace, construction, machinery and electronic materials, with the aim of encouraging the transfer of high-level scientific knowledge. Maintenance and materials ageing and repair, legal aspects of failures, and integrity codes and authorities will also be addressed.

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European citizens and electronic information

18-19 October, Brussels (Belgium)

DLM Forum '99, organised by the European Commission, DG XIII (Information Society),

will draw public administrations, archivists, industry suppliers and researchers from all over Europe to debate practical solutions for the future management, storage, conservation and retrieval of electronic records. The forum will consist of plenary sessions and parallel working party meetings addressing the three main areas of technologies, political and legal aspects, and accessibility and employment issues.

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Virtual enterprises

27-28 October, Oporto (Portugal)

The PRO-VE'99 conference, sponsored by the Esprit project Prodnnet II, and dealing with 'Infrastructures for industrial virtual enterprises', aims to increase awareness of this new paradigm among SMEs and to compare the experiences of different research projects.

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Regional futures – measuring success

18-19 November, Kortrijk (Belgium)

New models for sustainable development of the regional information society are the focus of an international conference supported by the Commission's Information Society Project Office (ISPO), which will present demonstrations of regional planning models, as well as project results, case studies and simulations.

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RTD info 21 – Fifth Framework Programme: 23 Key Actions

ISSN 1024-0802

In this supplement to its *RTD info* magazine, the Commission's DG XII (research) explains in simple terms the aims and benefits of European research, giving a brief overview of FP5 and a breakdown of its four-year budget of €15 billion. It then devotes a page to each of the 23 key actions within the specific programmes of FP5, setting out its budget, the implications for society, the economy and Europe, the targeted research fields and an illustrative project.

Annual Energy Review 98

CS-BR-98-001-EN-C; €25

There is optimism within the energy community that the EU pledge to stabilise carbon dioxide emissions by 2000 can be met, according to the Commission's DG XVII (energy). Its latest annual review reports that the energy intensity of transport seems to be stabilising for the first time, although improvements in industrial energy intensity are now slowing for the first time in two decades. The review includes a CD-ROM containing information about global energy balances and indicators.

Annual RTD Report for 1998

The Annual Report, giving an overview of Community research activities in 1997 and 1998, is aimed at researchers, research organisations, enterprises, research policy specialists and politicians. It covers the implementation of

each of the specific programmes of FP4, including statistical information about contracts signed, proposals, and funding. The Commission hopes that the Amsterdam Treaty will help to streamline decision-making by eliminating the requirement for unanimous voting on research matters in the Council.

Contact:
<http://europa.eu.int/comm/dg12/info/report98-en.html>

A user's guide for SMEs in the biotechnology field

The First Action Plan for Innovation in Europe emphasised the importance of innovation in the biotechnology sector — but recognised the difficulties faced by SMEs in obtaining finance, and underlined the problem of the lack of awareness of support programmes. This guide provides industry with comprehensive, easy to understand, practical information on European and national sources of funding — both public and commercial — in the field of biotechnology.

Contact:
E-m. biotech-users-guide@dg3.cec.be
<http://europa.eu.int/comm/dg03/publicat/bio/index0.htm>

The Impact of EU Regulation on Innovation of European Industry

EUR 18111 EN

There has been little previous analysis of the effects of regulation on the competitiveness of European industry. Now, the JRC's

Note

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

Institute of Prospective Technological Studies (IPTS) has published the papers of a January 1998 workshop dealing with methodological questions and, in particular, the impact of chemical and Single European Market regulations on innovation. The IPTS concludes that the development of a new framework is needed as the basis for further analysis of the impact of regulation on innovation.

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Glossario dell'Innovazione

ISBN 88 87333 08 4; LIT 20,000

This easy-to-use glossary explains in terms comprehensible to the lay person the many specialised and sometimes confusing terms used in discussions on innovation. It is intended as a tool for innovation practitioners, students, entrepreneurs and researchers.

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