

# Innovation & Technology Transfer

6/01

## ► Innovation projects

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# Experiment and evaluate

Two aspects of the European Commission's work in the area of innovation come together in this edition.

Its role as a 'clearing house' for information about innovation policies and behaviour is exemplified by the newly published 2001 Innovation Scoreboard (see page 3). The Scoreboard summarises detailed statistical data about actual innovation performance in each Member State to provide an easily understood overview of Europe's innovative capacity. It also provides a clear and reliable framework for policy development – the exchange of good practice and the refinement of existing measures to meet changing needs – both within the Union and with candidate countries (see page 17).

The Commission does not rely exclusively on Member States to develop good practice, however. It also provides a 'test bed' for innovative approaches – new ways of stimulating and supporting innovation, and of maximising its impact, which are not yet included in the range of available policy tools, but which have the potential to overcome common weaknesses and bottlenecks. The Innovation projects action line, the subject of our dossier article, has evolved from a simple programme of discrete 'one-off' technology transfer and demonstration projects to address the broader commercial, institutional and cultural barriers to innovation. In the key areas of supply-chain networks, virtual enterprises and integrated innovation systems, it is creating and testing the good practice mechanisms of the future.

These two functions are complementary and mutually dependent – and reflect the cycle of experimentation and evaluation which characterises the process of innovation itself. ≡

## Innovation & Technology Transfer

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# The learning curve

The second edition of the European Innovation Scoreboard shows, for the first time, the trend in each Member State's performance compared with the previous period, and relative to the European Union average. Successive editions will increasingly reveal the impact of policy measures on Europe's innovative capacity.



Mr Liikanen presents the 2001 Innovation Scoreboard.

The Innovation Scoreboard 2001<sup>(1)</sup>, released by the European Commission on 14 September, goes one step further than the first outline published last year as part of the Commission Communication *Innovation in a knowledge-driven economy*<sup>(2)</sup>.

Closely based on the structure of the outline scoreboard, the 2001 edition uses 17 indicators of innovation capacity and performance, covering four key areas – human resources, knowledge creation, the transmission and application of new knowledge, and innovation finance, outputs and markets. Now, changes over time are used to place Member States within four quadrants. For each indicator, each country is classified as:

- 'moving ahead' – positive trend, and above the EU average
- 'losing momentum' – declining trend, but still above the EU average
- 'catching up' – positive trend, but still below the EU average
- 'falling further behind' – below the EU average, and declining trend

## World leaders

On many of the indicators of innovation performance for which American and Japanese data is available, the 2001 scoreboard reveals that it is now neither of these competitor economies which leads world rankings, but an EU Member State.

The performance of the Union as a whole still lags significantly behind that of the US and Japan, however. Europe's relatively weak private sector investment in research and development and its low level of high-tech patenting activity are of particular concern.

All Member States have improved their overall innovation performance in the second half of the 1990s, according to the new Scoreboard. Greece and Spain are rapidly catching up with the average, albeit from a relatively low level. On the other hand, the large gap between the best- and worst-performing Member States actually grew. Countries such as Finland and Denmark, whose performance was already strong, are moving ahead, while Portugal is falling further behind. The four largest EU economies all improved at rates below the EU average.

## Mutual learning

Launching the Scoreboard at a press event on 1 October, Erkki Liikanen, European Commissioner for Enterprise, emphasised its potential as a platform for the exchange of good practice in innovation policy. "The Commission has for some time felt that benchmarking is an important tool – not only for comparison between one Member State and another, but for comparing approaches and processes to see what works and what does

not," he said. "You have to go beyond a simple 'ranking' of the Member States. This is the information that tends to grab the media headlines, but there will always be leaders and laggards and it is up to Member States and regional authorities to react to their overall position."

In the long term, "by focusing attention on the elements that contribute to innovation", the scoreboard will help reveal the causal links between policy and performance, Mr Liikanen concluded. ≡

(1) The full text of the European Commission's working paper '2001 Innovation Scoreboard' (SEC(2001) 1414) is available at <http://www.cordis.lu/scoreboard/> – and the main text was presented in the special edition of October 2001.

(2) COM(2000) 567 final, presented in the special edition of November 2000.

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Regularly updated information on the Innovation Scoreboard is available at <http://trendchart.cordis.lu/Scoreboard/scoreboard.htm>



➤ Mobility of Researchers

# What moves a scientist?



Experience working in another country is valuable. But will his wife receive residence and work permits?

**Obstacles to the mobility of research workers – between Member States, between industry and academia, and between the public and private sectors – restrict the European Research Area. New European Commission initiatives address the problem, on the advice of a high-level expert group.**

Freedom of research workers to move between institutions in the EU, to exchange expertise and develop a European dimension for both collaborations and individual careers, is key to the concept of a European Research Area (ERA). Europe needs to attract researchers from the rest of the world, to encourage the return of brain-drain academics, and to link scientific workers in the public and private sectors.

A high-level expert group (HLG) was convened by the Commission to analyse obstacles to the mobility of research workers. Reporting in April 2001, the HLG findings<sup>(1)</sup> form the basis of a Commission proposal<sup>(2)</sup> for a specific strategy for mobility within the ERA.

## Remaining obstacles

The HLG identified a range of persistent obstacles to movement to another European country, of which the most serious are legal, administrative, social and cultural. Problems with visas, residence and work permits for the family members of research workers are very common, particularly for workers from third countries. Differences between social security and taxation systems also cause difficulties – mobile workers often have to pay for social security benefits they cannot receive. Good practice is now found in some Member States, however. In France, research workers with scientific visas

need not hold work permits, for example. Another major problem identified by the HLG was the lack of co-ordinated information.

Research workers may also encounter difficulties in re-entering their home scientific community after an absence abroad, and in establishing the value of their foreign experiences. Finally, funding is a major problem, especially for promoting mobility in mid-career or at more senior levels, and for funding start-up companies.

## Finding answers

Jocelyne Gaudin of the Directorate-General for Research says that the Commission's strategy is twofold – to enhance the environment for researcher mobility, and to increase the financial support available. Plans to improve the general climate include an internet portal to link national and Commission information sites on regulations, procedures and work opportunities. Mobility centres will give advice and training. Statistics-gathering and co-operation between national agencies will be improved, leading later to benchmarking exercises and exchange of best practices. National ombudsmen will be appointed to handle complaints. Employers will be encouraged to improve the advertising for research posts. New EU legislative proposals should reduce the problems of access to employment, social security and taxation.

This improved environment must be complemented by better financing. The new Research Framework Programme (2002-2006) includes a significant increase and more diversification in funding to facilitate researcher mobility, including specific measures to help reintegration of workers returning from other countries. Other new financial incentives will promote European research teams, especially in emerging technologies, and also offer funding for researchers from third countries. ≡

(1) High-Level Expert Group on Improving Mobility of Researchers: Final Report.  
<http://europa.eu.int/comm/research/fp5/pdf/finalreport/mobilityhleg.pdf>

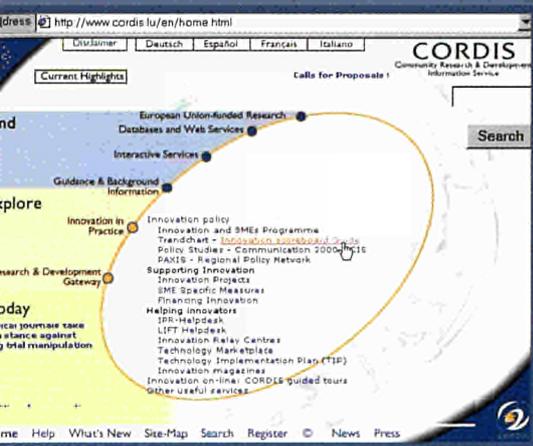
(2) Communication from the Commission to the Council and the European Parliament:  
A mobility strategy for the European Research Area.  
[http://europa.eu.int/eur-lex/en/com/cnc/2001/com2001\\_0331en01.pdf](http://europa.eu.int/eur-lex/en/com/cnc/2001/com2001_0331en01.pdf)

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Internet

# What's in a (domain) name?



The European Union is close to launching the new '.eu' top-level internet domain name for organisations operating in Europe. It should offer a guarantee of legal entity, new possibilities for demonstrating European identity, and a boost to innovation and e-commerce.

The European Commission has been working towards opening a new top-level domain name (TLD) which could strengthen the European identity of the EU's internet users and relieve congestion problems. The new TLD will be available for organisations operating in the EU, and possibly also the EEA and candidate countries. Complementing national TLDs such as .uk and .de as well as generic ones like .com and .org, it will remove the need for companies to register in each country where they have markets.

## Progress in lawmaking

A proposed EU regulation will provide the legal basis for the creation of a central .eu registry to run the system. After a tendering process, commercial organisations will be appointed to offer registration services. The Commission itself will not act as registry or registrar, so it cannot accept prior requests to reserve names under the .eu system. The regulation is expected to have its second reading before Parliament in the autumn, with possible adoption before the end of 2001.

A domain name which readily identifies a company or organisation as European or pan-European has strong appeal. It carries the support of EU law, which should boost consumer confidence and aid communication between research, innovation and financial sector partners. It will also add value by certifying that a .eu

domain name operator exists as a legal entity, and make 'who is' data about each more easily available.

The new TLD will relieve the current congestion in the generic .com domain, where only 10% of registered domains are actively used – 'cybersquatting' reserves rights to a name, so genuine potential users cannot use it. Many details for the new .eu domain name still need to be worked out. Among these is the possibility of sub-domains to represent specific economic or professional sectors – second-level domains such as .media.eu, .lex.eu and .ngo.eu.

## CORDIS as a .eu

As the Commission's first official internet server and the major EU information source on Community R&D and innovation, CORDIS has successfully offered a wide range of searchable databases about research projects, partners and financing. But Peter Finch, CORDIS project leader, says it would have been much more accessible with a TLD more obvious than .lu (for Luxembourg). Registering with .com or .org was not appropriate. If CORDIS were a .eu site, its URL could easily be guessed, and it would carry clear official EU endorsement.

However, Finch points to the technical untangling which will be needed to convert. "Once .eu is available we will have

to ensure access to our data by anyone with our old address (at .lu) stored in their web browser," he says. "CORDIS is well-known – a current search reveals over 41,000 references to CORDIS from other websites, which must be redirected."

CORDIS may reap another benefit from the new domain name. As so many European collaborative research projects within FP5 now have their own websites, they will need to register for a .eu domain name. CORDIS might be in the running to become a registrar itself, for a sub-domain on research projects. ☰

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# Action learning

The evolution of the 'Innovation projects' action line, like the individual projects, has involved 'learning by doing'. Lessons drawn from the technology-oriented projects of the Fourth Research Framework Programme have led to a progressively clearer focus on the process of innovation itself. By addressing commercial, organisational and social barriers to the transfer of new knowledge, the latest projects will help to create the conditions in which innovation's benefits to Europe as a whole can be maximised.

"It has been a learning process for policy-makers and innovation actors alike," says Thomas Liljemark, who has been Sweden's representative on the Innovation programme's management committee since 1993. "Innovation used to be thought of primarily in terms of invention and R&D. Then the crucial role of intellectual property rights, venture capital and marketing aspects was recognised. Now there is growing awareness that innovation is a complex system in which investors, research institutes, technology suppliers, manufacturers, end-users and other players interact – and that to realise its full potential as an engine of sustainable economic growth this system requires integrated support."

## 1. From the linear to the systemic

Successive calls for proposals for Innovation projects have placed an ever greater emphasis on generic, non-technical issues.

"In FP4, the distinction between technology transfer projects (TTP) and demonstration or technology validation projects (TVP) grew steadily less," Liljemark recalls. "With the programme committee's full support, the two strands were integrated in a single type of project oriented less to the 'push' of technological research results than to the 'pull' of companies' actual innovation needs."

Liljemark himself works for Vinnova, the Swedish Agency for Innovation Systems, established at the start of 2001 in a major restructuring of government support for innovation in Sweden. "From the beginning, Sweden has backed the parallel development in the thinking behind the European Union's Innovation projects," he says. "My own agency's mission reflects

the same emphasis on systemic preconditions and barriers."

### Homing in

In FP5, responsibility for the transfer and exploitation of the results of research projects was shifted to the thematic programmes themselves. The technological scope of Innovation projects was meanwhile adjusted to exclude the results of Framework Programme research.

"Their focus changed to address the generic barriers to innovation which were emerging from the experience of the FP4 TTP and TVP projects, and of the parallel innovation awareness and innovation networks actions," explains Francisco Fernandez of the European Commission's

## Innovation projects – third call for proposals

The third call for Innovation projects under FP5's Innovation and SMEs programme will be launched in December. As in previous calls, projects may address specific technology transfers or more general issue relating to improvement of the business environment.

The projects will develop and test broad innovation processes, and will involve a wide range of innovation actors. Projects will be encouraged either to join existing clusters addressing common non-technological innovation themes or to introduce their own clusters. Clusters, built around major innovation themes, will serve as pilot approaches to European-wide

innovation systems. They will mobilise critical masses of knowledge, skills and institutional competence to build lasting multidisciplinary platforms for transnational knowledge transfer.

In this way, themes such as sustainable development, knowledge management or business re-engineering can be addressed in relation to topics of wide relevance. These could include e-business for traditional sectors, virtual product development or innovative solutions for ageing populations.

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Directorate-General for Enterprise. "We have progressively homed in on a new approach which groups together projects with similar 'innovation profiles' as test-beds for new concepts of systemic innovation networking. Typically, these involve end-users, public authorities and trade unions alongside technology suppliers and manufacturers. For example, the TOP cluster integrates individual projects which deal with new processes or materials offering environmental or health advantages, but facing barriers to market acceptability."

### Virtual innovation structures

Accompanying measures launched in 2000 already provide three such clusters with additional support, co-ordinating the exchange of ideas and experience between the participating projects. With their help, the clusters will also extract lessons and establish mechanisms to broaden the impact of their joint work – exchanges of best practice are expected to produce significant spill-over effects and may provide input to innovation policy-making. In many cases, the resulting networks will outlive the projects themselves as permanent virtual support structures for innovation.

"Personally, I see it as an experimental programme," says Liljemark. "At first, the new emphasis on non-technical elements such as partnership mechanisms and supply-chain relationships was hard to explain to potential participants who were more used to conventional technology-specific projects. But the concept has now made real progress."

## 2. Back to the future

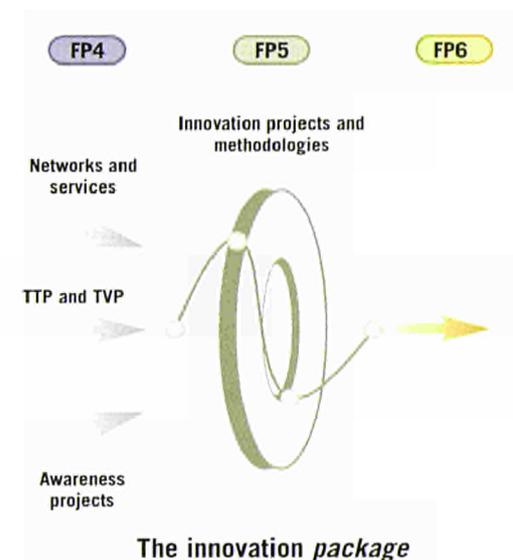
**FP4's Innovation projects have produced the strongest results in those areas which are now being explored under FP5.**

The evolution of FP5's Innovation projects has been driven by the hypothesis that specific technology or knowledge transfer processes present opportunities to address generic problems faced by many companies and groups of companies in all sectors throughout Europe.

Now, retrospective confirmation of this hypothesis is emerging from a study of

FP4's TTP/TVP projects. "The programme's knowledge transfer impacts are extremely unusual," says John Yates of the United Kingdom consultancy group SQW, which is conducting the study for the Enterprise DG. "Its successes differ in kind from the harder, technical results of conventional research projects. We found evidence of permanent shifts in culture resulting from the transfers of knowledge."

>>>



**Getting steadily closer to an approach which groups projects with similar 'innovation profiles' to create test beds for new forms of innovation networking.**



## Case Study

# Oil on polluted waters?

**Biodegradable alternatives to mineral oils already exist, but must overcome the non-technical barriers which prevent their take-up.**



**Leakage of non-biodegradable hydraulic lubricants from large-scale dredging equipment is a major threat to waterways in the Netherlands.**

The Lincwa Innovation project<sup>(1)</sup> brings together nine partners from five countries, with expertise from agro-chemistry to tribology. Their aim is to realise the potential of non-toxic, readily biodegradable alternatives to the oils which pollute many inland and coastal waters. "Oil spillage is a major environmental problem," says the project's co-ordinator, Pieter van Broekhuizen of Chemiewinkel at the University of Amsterdam. "Wider use of these products could make a huge difference."

As he explains, the barriers to wider acceptance of the current generation of alternative lubricants are not technical. Cost is a major issue, as bio-lubricants are around twice as expensive as their traditional equivalents. For some specialist formulations, the difference is even greater. Although the potential market is enormous, key players must be convinced of the commercial benefits.

"Growing demand for more environmentally friendly products has started

to shift petrochemical companies away from lubricants based on mineral oil towards the development of products based on vegetable oils," says van Broekhuizen. "Nearly all now offer excellent biodegradable, non-toxic lubricants based either on high-performance synthetic esters or on pure vegetable oils." With the agricultural industry across Europe being encouraged to grow non-food crops, he believes there is a real opportunity for a healthy vegetable oil industry to develop.

## Industry holds the key

The attitude of heavy industry will be crucial. There is considerable interest in bio-lubricants, but the machinery to be lubricated is extremely expensive, and down-time is costly. Operators are reluctant to try substitute oils, since few original equipment manufacturers (OEMs) are willing to guarantee their performance. Lincwa has stimulated discussion between users and manufacturers,

recognising the need to encourage a variety of OEMs to test and approve bio-lubricants.

A similar problem exists with inland shipping, where the large number of independent owner-operators makes spreading the word a slow process. To speed things up and take the message directly to them, the project's campaign ship will visit harbours and chandleries in the Netherlands, Germany, Belgium and France later this year.

Pilot studies in conjunction with water companies, shippers and recreational groups will investigate the environmental and technical performance of substitute lubricants. These will be of great importance to the project, as vegetable products are often wrongly viewed as inferior. First-hand results will be invaluable in overcoming this prejudice.

Obtaining information about sales of substitute oils has proved difficult as such data is seen as commercially sensitive. Without it, van Broekhuizen has difficulty in making an objective assessment of the project's impact as it reaches its halfway point. "But if the number of telephone enquiries is anything to go by," he comments, "then awareness of these products has definitely been raised, especially amongst the water companies."

*(1) IPS-1999-00005 - Loss lubrication in Inland and Coastal Water Activities.*

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“ ... permanent shifts in culture resulting from the transfers of knowledge.”

The Urban Pollution Management (UPM) project<sup>(1)</sup>, for example, has led to the acceptance of computer modelling as a valid way of approaching wastewater management problems in an influential network of local authorities spanning four countries. The potential European benefits, in terms of cost savings and improved environmental performance, are huge.”

### Network effects

Increased acceptance of new technology in previously resistant markets is a classic output of successful demonstration projects. But Yates stresses the significant ‘multiplication effects’ generated as a result of the Innovation projects’ very broad partnerships. “The links forged between the core technical partners and end-users by intermediaries such as consultants, local authorities, trade unions or consultants makes the programme unique in my experience,” he says.

“Involving a wider group of stakeholders, especially if this occurs at the project conception stage, produces a better understanding of market barriers and market potential. In the Sumovera project<sup>(2)</sup>, producers became involved, benefiting from industrial feedback even though they were not funded participants. And real-time dissemination of results by their ultimate end-users, as occurred in UPM Water Quality, gives projects a ‘second life’. In many cases, the ‘clubs’ of end-user observers established for communication and practical collaboration have remained in place to address other issues of common concern.”

Fernandez explains this type of project structure as a series of concentric rings. “At the centre, you still have a core of necessary technical competence, addressing a specific transfer of knowledge or technology,” he explains. “But this is surrounded by a cluster of end-users and observers who provide valuable feedback to the transfer process and are able to benefit from it opportunistically and sometimes indirectly. At a third level, lessons drawn from the specific cases may be generalised to create systemic models applicable to a wider community of potential innovators.”

### Mining for gold

As part of the study, SQW is building a ‘meta-database’ which will provide easy on-line access to such generic lessons for a wide audience of innovation actors, including those to whom the idea of Innovation projects is completely new.

“Users will be able to start with simple answers to basic questions such as ‘What

is the innovation process?’ or ‘What are the common barriers to innovation?’,” says Fernandez. “They will also be able to pursue specific interests to illustrative cases of different technologies or different consortium structures, mining right down to underlying details of individual projects if they wish.”

## 3. Platforms for European innovation

The potential for further development of the concept of broad ‘innovation schemes’ in FP6 seems clear.

The Commission finds evidence for the validity of the ‘innovation platform’ model not only in the SQW study, but in the recent event in Gothenburg, ‘Promoting innovation systems in an integrated Europe’<sup>(3)</sup>. “The conference publicly tested both the cluster profiling methodology and the methods and tools used by the latest Innovation and their accompanying measures to address non-technical issues,” declares Fernandez.

“Both were found to be acceptable, meaningful and useful to a wide variety of innovation players representative of the potential participants in projects selected following the third call for proposals (see panel). This call anticipates the mechanisms of FP6, and in particular the opportunities presented by the new ‘integrated project’ instrument<sup>(4)</sup>, which is especially suited to change management and the promotion of entrepreneurship as a valuable and productive life skill. A good response – which we are confident we will get – will demonstrate conclusively that complex innovation issues of a mixed commercial, political and social nature can be tackled in an efficient and constructive manner using this approach.”

### European capacity

Liljemark agrees. “I would strongly advocate further exploration of these ‘software’ aspects of innovation in the period 2002-2006,” he says. “It is essential that

we continue to develop our understanding of companies’ interactions with their clients, competitors, suppliers and investors. Companies are the products of their networks, rather than the reverse. But these networks are not always strong, and in the case of smaller companies they are rarely transnational. There is real potential to improve the innovation capacity of Europe as a whole by stimulating more cross-border clusters of this kind.”

(1) IN103401 – see ‘Cleaner water’, edition 1/99.

(2) IN101101 – see ‘Technology – the healthy alternative’, edition 2/98.

(3) See ‘Innovation systems, integrated Europe’, edition 5/01.

(4) See ‘A new framework for European research’, edition 3/01.

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## Case Study

# Better by design

**Most smaller firms give good design a lower priority than technological innovation. As a result, they may miss out on big opportunities.**

Design will play an increasingly important role in the competitiveness of European businesses. Acceptance of this trend is rising steadily, as the co-ordinator of the Made-It project<sup>(1)</sup>, João Mena de Matos of the European Design Centre (EDC), explains. "Big firms are very aware of design, but only 10-20% of small and medium-sized enterprises currently think this way," he says. "Our goal is to integrate design into their activities." The Innovation project tries to foster awareness of the value of good design among SMEs, and to develop support structures to help them benefit from it.

To provide a balanced picture and maximum transparency, a small number of the cases come from larger firms, but most are drawn from the experiences of other SMEs.

### Help on the web

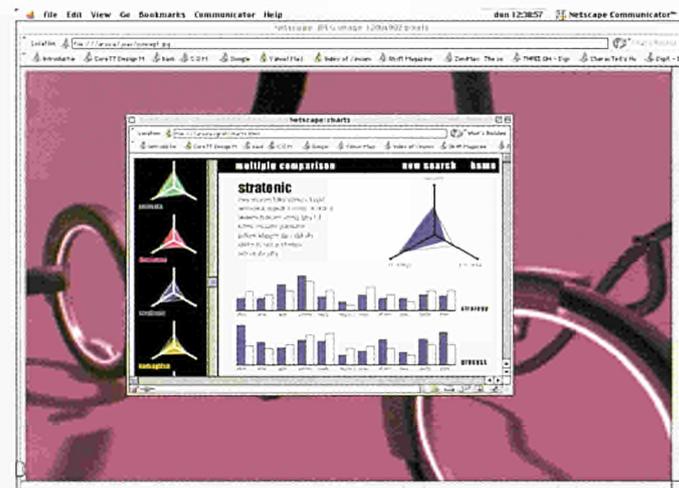
In addition, a web-based tool is currently under development, which is to be made generally available in time for November's European Design Management Awards. Designed for ease of use, it will provide information for initial queries, details of the European Design

ences. Since the partners were drawn from Design Centres and consultancies in seven countries, a variety of attitudes was anticipated, but the biggest differences turned out to be between disciplines rather than between countries. "It was amazing," says Mena de Matos. "No matter where they came from, all the engineers saw things in much the same way. And the same was true for the other specialities."

With so many disciplines involved in converting an initial concept into a marketable product, the design manager has a vitally important role as integrator, interfacing with many departments and job functions. As awareness of the value of product and corporate identity grows, this ability is likely to gain even greater significance. Indeed, Mena de Matos foresees the possibility of a skills shortfall as growing numbers of SMEs come to realise the pivotal contribution of design to their future competitiveness.

As he concludes, "SMEs' traditional technology bias has made it difficult to push the design side until very recently. Now, with Commission recognition and assistance, times are definitely changing."

(1) IPS-1999-00032 – Management of Design in Europe Using Innovative Tools.



**Made-It's web-based tool offers fast, easy self-assessment for SMEs interested in implementing design management in their business activities.**

Using the right language is critical, and Mena de Matos has found that appeals to 'design management' produce the best response. "Supporting companies through the early stages is critical," he says. The project will promote a strong network of key players in the field of design and create case studies of good practice covering the entire process, as a means of helping firms to see how design can benefit their own activities.

Centres network and the facility for on-line self-assessment of individual needs.

"There are so many websites – simply creating another one is not enough on its own. We will be linking ours up with live events and jointly promoting both, which should do a lot to get the message across to potential users," says Mena de Matos.

### Cultural barriers

The project has already confirmed the powerful influence of cultural differ-

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**Case Study**

## Increased spill-over effects

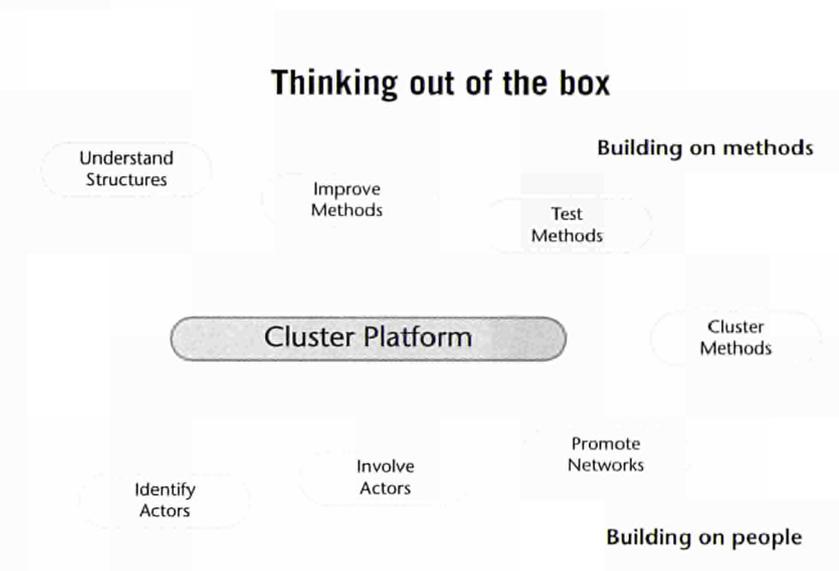
To contribute to the development of European enterprise, innovation must match wider social, environmental and economic needs.

"The acceptability of innovation is often a much bigger issue than the technology itself," explains Guido Haesen of the European Commission, who moderated one of three recent workshops on approaches with the potential to influence innovation behaviour. "This is a point which emerged very strongly from the recent conference in Gothenburg<sup>(1)</sup>."

The workshops were planned to explore in greater detail topics discussed in Sweden. "The Commission supports a number of projects designed to create conditions conducive to enterprise and organisation development," says Haesen. "Identifying key factors for the success of this process requires close contact with those directly engaged in it, and a willingness on their part to share knowledge and experience."

Partners from nine Innovation projects, of widely differing organisational and industrial profiles, were invited to take part. Each outlined the non-technical barriers to innovation that it faces, and what it expected to gain from participation in the group. With the help of accompanying measures, a platform was created to identify shared opinions derived from common experience.

The workshop formed a stepping stone towards a new, integrated approach to innovation. This encourages partners from a wide range of organisations to contribute to systems that allow specific problems to be solved using the collective experience of the whole group. "Seeing transfers of knowledge and technology in their full environmental, social and economic context is important for Europe's competitiveness," Haesen explains. "Such insights – awareness of environmentally acceptable technology, for example – can be a valuable component of marketing and image-building strategies. We expect companies to join Innovation projects for



The route to acceptance and the need for integration of the key elements within the cluster.

these reasons rather than as a way of gaining specific technical benefits."

### Becoming problem solvers

"If they are prepared to think outside the box, and to share ideas and abilities, companies can convert themselves from mere 'technology providers' into 'problem solvers'," Haesen continues. "We have experienced a step-change whose impact on innovation behaviour is only now beginning to take root. Self-regulation, initiated by business itself rather than by legislators, is now driving the uptake of novel solutions."

One of the challenges for European businesses is to find solutions to today's problems while remaining open to opportunities created by future technological development – and, more importantly, by evolving perceptions of what change is possible and permissible.

Trust between collaborating partners will remain essential if knowledge-sharing is to be successful, however. "This is the

only way to create a channel for unconventional approaches," says Haesen. "The foundations of mutual confidence laid by events like this make ongoing co-operation between organisations and across borders much easier." Creating the condition for flexible innovative collaboration will be a major step towards improved technology acceptance... and stronger competitive performance.

(1) See 'Innovation systems, integrated Europe', edition 5/01.

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PAXIS

# Towards a European innovation culture



The Highest team in June 2001, at a meeting with local entrepreneurs in Ronneby-Kalmar, Southern Sweden.

'Highest' is one of four regional networks which are setting the standard in Europe for the support of innovation and the creation of new high-tech companies at regional level.

Supported by the European Commission's Directorate-General for Enterprise under the Paxis pilot action<sup>(1)</sup>, the 'Highest' thematic network (Helping Innovative firms' Growth using Emerging Information Society Technologies) links the regions of Alpes-Maritimes, Helsinki, Southern Sweden and Turin. "This network's unique characteristic is that it groups together leading science parks and business incubators," comments Tomás Botella of the Commission.

Its co-ordinator is CICOM Organisation, a privately-owned business incubator located in Sophia Antipolis which, with 1,230 companies employing 24,200 people, is Europe's largest science park. "When Jean-Noël Durvy of Enterprise DG<sup>(2)</sup> first visited to present Paxis in 1999, I was immediately convinced that Sophia Antipolis had to be part of it," says project manager Gérard Bonnes. "Alain André, CICOM's Managing Director, agreed. We identified a number of suitable partners, including the Otaniemi Science Park in the Helsinki region and Southern Sweden, which has a network of 13 science parks. We already had links with them as, like us, both specialise in Information and Communication Technologies (ICTs) and mobile telephony. Together, we submitted a proposal under the first Paxis call." Turin joined the network following the initial Paxis match-making meeting in Luxembourg, in December 1999, at which synergies with the other partners became apparent.

## Setting the standards

In order to participate in the pilot action, each region had to qualify for the Paxis Award of Excellence, which is given for good practice in supporting the creation of new technology-based firms (NTBFs). The criteria include GDP per capita, research capacity, numbers of patent applications and, of course, number of successful NTBF start-ups. "The aim is to pinpoint regions which have been particularly effective in fostering 'home-grown' businesses as a source of economic growth," explains Botella. "We hope the thematic networks will help them to understand *why* they have been so successful. This will enable us to define common guidelines which can assist other European regions to do the same."

The Award of Excellence itself has given each of the regions a definite boost. "The 'quality mark' has provided important leverage by giving increased visibility and credibility to what we are doing," notes André. Lars Malmberg of SydSam, the regional development agency of Southern Sweden, agrees. "The award has moved the whole issue of innovation and support to NTBFs higher up the political agenda. Politicians are becoming more aware of the factors that influence high-tech start-ups – and of how these have changed in the past ten years."



## 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 (Innovation Directorate, Enterprise DG).

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## Where did we go right?

In the first phase, each partner identified the factors behind the success of its own regional innovation system, and shared this information across the network. "We think we know our environment. But understanding it in detail is like trying to unravel a plate of spaghetti," says Bonnes. "So many factors influence the development of a dynamic regional innovation culture. These range from the availability of research facilities, a world-class communications infrastructure, business support services and seed capital, to factors such as the cost of basic services like electricity and telecommunications and, above all, quality of life."

Each of the four Highest partners completed an initial identification process based on widespread consultation. In itself, this has helped to reinforce regional innovation networks by making regional actors more aware of their respective roles, and of their interconnections. Nicoletta Cardo of I3P, a recently established business incubator attached to the Polytechnic University of Turin, and the Italian co-ordinator for the network, confirms the impact on the dynamics of the Turin network. "Regional partners were aware of each other, but there was relatively little interaction," she says. "The systematic examination of our approach has led to the emergence of a more structured and effective network."

## Cross-fertilisation

The partners went on to define and exchange 'best practice models', and to examine ways in which elements from one regional system could be adapted to the advantage of another.

All agree that their regions have been positively influenced by this exchange of ideas. The Helsinki region's 'experienced incubator networking model' has been influenced by the Sophia Antipolis 'cross-fertilisation model' of creating spin-offs from large companies. Helsinki has been phenomenally successful in creating and cultivating a vibrant and innovative cluster of ICT research, entrepreneurship and commercialisation. But Pertti Vuorela of the Otaniemi Science Park recognises that



Senator Pierre Laffitte, founder of Sophia Antipolis, and President Ilpo Santala, founder of Otaniemi Science Park.

more attention could be paid to the role of large companies in generating new start-ups. "The potential is substantial as there are many large companies in the park, including Nokia, whose global headquarters are here," he says.

Paxis as a whole sets out to provide a 'showcase of innovation'. The longer-term aim of the thematic networks is to identify – and then to test – common best practice models for other European regions.

## Intelligent networks

Botella points out that the Paxis networks are neither studies nor projects. Situated somewhere between these two approaches, they include both analytical and practical goals. The development of European benchmarks for regional promotion of innovation will help other regions to improve their economic performance and thus enhance that of the European Union as a whole, while new links between regions will promote collaboration and solidarity.

André notes that attitudes to Europe among public authorities in the Alpes-Maritimes region have already changed since the beginning of the project, with a number of municipalities appointing European project officers for the first time. "Sophia is very international – over 50 countries are represented on the site, and we receive foreign delegations almost every day. But we are becoming more conscious of the need to improve our European links."

He is also well aware of the economic implications. "Highest has given new impetus and depth to the exchanges between our regions," he notes. "Co-operation agreements between universities are already being put in place, and more are expected. Our aim is to move towards concrete projects between companies as well – exchanges of products and services and the creation of joint ventures or subsidiaries. We are keen to get down to business!"

(1) For background information on PAXIS (the Pilot Action of Excellence for Innovative Start-ups) see 'The innovation connection', edition 6/00 and 'Achievement and optimism', edition 1/01.

(2) Head of Unit in the Innovation Directorate responsible for Paxis.

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## ► Biomedicine

# Second sight



Window of opportunity for a consortium of SMEs.

**A French-led CRAFT consortium has developed a synthetic cornea that could bring new hope to visually-impaired – and even totally blind – people. New materials, designs and surgical techniques offer the prospect of renewed sight for those whose vision has been damaged.**

Frequently, blindness or impaired sight is the result of damage to the cornea – the transparent ‘window’ at the front of the eye – caused by disease or accidents. Chemical burns from an accidental splash of an ordinary caustic cleaning product, for example, can produce corneal scarring which leaves the victim visually impaired or, at worst, totally blind.

### Long waiting list

Natural corneal transplants are one answer, but these encounter three problems. First, the corneal graft may fail. “In the case of severe chemical burns the rejection rate is very high,” says Dr Franck Villain, Cornéal<sup>(1)</sup> Industrie SA’s research director. Viral infection is a second danger. “Donated corneas are carefully screened for any sign of infection, but there are no guarantees,” says Villain. “This is particularly true in cases where grafts may have been infected with the mutant prion proteins caused by eating BSE-infected beef products, which are believed to be the cause of variant Creutzfeldt-Jakob disease.” The third, and overriding, factor is that there are simply not enough donors – in France alone, over 10,000 patients are waiting for operations.

“It was apparent to us that a prosthetic was required,” Villain recalls. “The idea of a synthetic cornea is not new, but those available in the past lacked both the performance and cosmetic characteristics

required. We felt that there was scope for a great deal of improvement over what was currently on offer.”

Cornéal’s solution was to assemble a consortium to carry out a CRAFT research project under the European Union’s Biomed 2 programme<sup>(2)</sup>. The company was joined by like-minded small and medium-sized enterprises (SMEs) from Germany, Italy and Sweden, and by university research groups from Belgium and Sweden.

### Different viewpoint

“We could not have done it alone,” says Villain. “We needed to share the costs of testing new designs.” The initiative has produced some remarkable results. “Together, we have come up with a completely new approach,” he explains. “Existing techniques were far too surgically invasive, cutting deep into the eye itself. Our aim has been to work as close as we can to the surface, causing the least possible trauma. The human cornea is an intricate, multi-layer organ. The less we interfere with it, the healthier our patients will be.”

The major problem with current surgical techniques is that, because of the deep cuts required, there is a risk of complications due to the onset of glaucoma or bacterial contamination. The new cornea – consisting of a central optical element and a ring-shaped ‘skirt’ – will fit into a

hollow cut into the damaged cornea by the surgeon. The skirt is specially treated to allow surrounding cells to grow into it.

### Innovation, not invention

The new prosthetic must be transparent, soft and flexible, as well as mimicking the optical properties of the natural cornea. In addition to this, it must shade the delicate retina from harmful ultra-violet light. This is a demanding specification.

The team developed acrylic polymer materials that inhibit possible bacterial growth in the implant and have the required mechanical, water absorption and optical properties to enable the prosthetic to function adequately. “Part of the project has been the design and construction of a completely new set of surgical instruments that allow the surgeon to carry out the procedure without cutting into the eye as they do now,” Villain explains. “Oddly, the chemistry of these implants is not new – we are innovating rather than inventing. The real breakthrough is the design of the cornea and the surgical techniques which allow surgeons to perform the implant without penetrating the cornea’s endothelium membrane.”

That, and a complete rethink of how synthetic corneas should be designed to ensure optimal performance, minimum rejection rates and a low risk of infection,

have combined to leave Villain optimistic about the technology's commercial potential.

"The results of the current programme of animal testing look promising," he says. "If they prove to be successful – and up to now the implants are working well and show no signs of rejection – we can progress further. We believe that in 2002, we will be able to start human trials. At the moment, we are designing implants to match the larger size of the human eye. We will have to be careful, of course. In the initial stages, only volunteers with no chance of sight restoration using existing means will be considered. In other words, they have nothing to lose, but I believe we can offer them some hope. If

all goes well, we will be able to offer corneal grafts that will initially last a period of years and, perhaps, ultimately offer permanent solutions." ≡

(1) *Cornéal* is a registered trademark.

(2) *BMH4-CT97-9507 – Design and development of a synthetic cornea.*

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#### Collective Research

# New opportunities for SMEs

The European Commission's proposals for the next Research Framework Programme (2002-2006) includes plans for projects of a new type, called collective research projects. In preparation, five or six such projects will be launched early next year in a limited pilot action.

The aim of the planned 'collective research projects' is to expand the knowledge base of large groups of small and medium-sized enterprises (SMEs) facing common challenges. The Commission envisages projects designed to strengthen the competitiveness of specific industrial sectors, as well as ones which respond to new legislative requirements or to generic issues such as environmental protection or public health.

Each project will be managed either by a European industrial association or by national associations in two or more Member States, in consultation with a core group of SMEs. But the emphasis of these projects – which are expected to be

"substantial" – will be on the very wide-spread dissemination of results of benefit to SMEs across entire sectors, or throughout Europe. The projects are expected to "contribute to structuring the landscape of collective research in line with the objectives of the European Research Area ... by interlinking industrial groupings in different countries".

#### Restricted call

To gain experience of the practical implementation of this new type of project, the Directorate-General for Research will fund a small number of pilot projects under the present Innovation and SMEs programme. A call for expressions of

interest closed on 19 September. Selected applicants will be invited to participate in a restricted call for complete Step 2 proposals scheduled to open this month, and to close on 20 February 2002. ≡

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➤ Alternative Energy

# Technology broker fuels fuel cells

**Fuel cells that run on hydrogen have tremendous potential as zero emission power sources. Encouragement from the Flemish Institute for the Promotion of Innovation through Science and Technology (IWT) helped a local developer to set up a deal with an Italian manufacturer of small vehicles.**

With concern rising about atmospheric pollution, global warming and volatile oil prices, the market for alternative energy sources is bound to grow. ZeTek Power, an international company with research facilities in Geel, Flanders and Moscow, has developed an alkaline fuel cell system with advantages that should enable it to exploit this market to the full. "Our alkaline fuel cell, which runs on hydrogen, is based on a unique chemical process that makes it a lot cheaper than competitive products," explains Nicholas Abson, ZeTek's Chairman and CEO. "It can be integrated into systems to supply cheap, reliable electric power for use in vehicles, watercraft and stationary applications."

Back in 1998, ZeTek's Jef Spaepen made contact at a trade fair with Celco Profil, an Italian manufacturer of battery-powered scooters and small cars, based near Venice. IWT, which also hosts the Innovation Relay Centre Flanders, became involved the following year when ZeTek needed help to firm up a potential deal with Celco. "Although we made the first

contact ourselves, IWT gave us a 50% travel grant and came back with us to Italy to support us in the negotiations," Spaepen recalls. "This helped us to reach a technical agreement for Celco to develop systems using our fuel cell."

## Modular system

Fuel cells for automotive use are being developed by most of the large motor manufacturers, but not all are zero emission. ZeTek, whose name is derived from Zero Emission Technology Company, has a 5kW system that can be fixed in a small van with a compact methane reformer to produce its hydrogen fuel. If the methane comes from renewable sources, this counts as a zero-emission vehicle (ZEV), whereas if the methane comes directly from hydrocarbon sources, it is merely a low-emission vehicle (LEV).

The company now believes that the greatest potential for its fuel cell is in the market for stationary power sources, where competition is less intensive than for vehicles. The modules can provide

power for anything from a few appliances to groups of houses, depending on the size of the bank. They are suitable for remote sites not linked to the grid, for back-up systems, and for any application where cost-efficient green power is preferred. In the longer term, fuel cells may replace fossil fuels altogether.

## Basis for growth

ZeTek Power now has similar technology-sharing agreements with a number of preferred system developers. Thirteen of these development agreements are already in place internationally. Since the initial help from IWT, the company has increased its staff by 150% and now has administrative headquarters in London and New York, R&D centres in Russia, the Netherlands and France, and manufacturing facilities in Cologne and Tennessee. It is on the brink of volume production of fuel cells, which should bring the unit price down even lower.

"This is a good example of a little seed corn at the right stage giving a fine harvest in a short space of time," comments François Stassijns of IWT. "It is just the kind of application we want to support." ≡

This zero emission London cab will reduce urban pollution.



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## ► Innovation in EU Candidate Countries

# Flight simulator for innovation pilots?

The Innovation Scoreboard 2001, launched in September<sup>(1)</sup>, highlights “strong disparities in innovation performance” between the European Union’s 15 Member States. A simulated scoreboard, based on available data, allows initial comparison of the position in six countries currently applying for membership of an enlarged EU.

Gaps in the innovation statistics collected in the six countries covered (see table) made a meaningful summary index of the kind produced for the EU15 impossible. Poland produces data for only ten of the 17 indicators used by the Innovation Scoreboard, and Slovenia for nine. For the Czech Republic and Hungary seven

and for Cyprus and Estonia five indicators are available.

“The statistical services in these countries are being modernised,” explains Dr Slavo Radosevic of University College London. “But the gaps reflect the low priority that their policy-makers still give to innova-

tion. The problem is that without reliable data they lack a solid basis for the development of effective innovation policy measures. Data is most scarce in the very area where performance is weakest – the transmission and application of new knowledge.”

&gt;&gt;&gt;

**Simulated Innovation Scoreboard 2001 for six candidate countries**  
(calculations based on available data)

No.	Indicator	Year	Cyprus	Czech Rep.	Estonia	Hungary	Poland	Slovenia	EU ave.
<b>Human resources</b>									
1.1	S&E graduates / 20-29 population								9.32
1.2	% econ. active pop with 3rd education	1999	22.60	11.30	40.80	15.60	14.80	15.90	23.25
1.3	participation in life-long learning								9.65
1.4	% emp. med/high-tech manufacturing	1999	1.85	10.63	5.71	8.49	7.54	10.18	6.29
1.5	% emp. high-tech services								3.27
<b>Knowledge creation</b>									
2.1	public R&D expenditure / GDP	1999	0.18	0.47	0.48	0.37	0.44	0.64	0.62
2.2	business R&D expenditure / GDP	1999	0.03	0.82	0.12	0.26	0.30	0.75	1.14
2.3	EPO high-tech patent applications / pop.								19.14
2.4	USPTO high-tech patent applications / pop.	1998	0	0	0	2.08	0	1.52	11.65
<b>Transmission and application of knowledge</b>									
3.1	% SMEs innovating in-house						4.1	16.9	41.01
3.2	% SMEs engaged in innovation co-operation								15.42
3.3	% innovation expenditure / total sales						4.1	3.9	3.41
<b>Innovation finance, output and markets</b>									
4.1	% high-tech venture capital / GDP	1999		0.021		0.016	0.045		0.09
4.2	% new capital / GDP	1999					0.24	0.15	1.53
4.3	% new-to-market products / all manuf. sales								5.40
4.4	home internet access / all households								33.40
4.5	% ICT markets / GDP	1999		8.49		6.42	4.9	4.31	5.86
4.6	% high-tech share / all manuf. value added								9.50
<b>Available Indicators</b>			5	7	5	7	10	9	
<b>Indicators above EU average</b>			0	2	1	2	2	3	

The figures for the EU given in the right-hand column are simple averages. They differ from the equivalent figures in the Innovation Scoreboard 2001 itself, which uses weighted averages that take into account the relative size of each country's economy.



## Innovation islands

Even partial data, grouped according to the four main categories tackled in the Innovation Scoreboard, suggest a number of clear conclusions. The six countries' strongest performance is in the areas of human resources and knowledge creation. All but Cyprus exceed the EU average for one specific indicator of the human resources available for innovation, while Slovenia's government research spending as a proportion of GDP is also just over the EU average.

"It is in the areas of transmission and application of new knowledge, and of innovation finance, output and markets that they fall a long way behind the EU," says Radosevic. "These economies face huge structural problems in relation to the diffusion of technology and know-how." In particular, they lack the community of innovative small and medium-sized enterprises (SMEs) which carry out much of this diffusion in the EU.

"Innovation activity is extremely localised within a small number of well-equipped modern plants, mostly foreign-

owned. Here, investment has driven tremendous productivity growth," he continues. "But the rest of the economy is made up of smaller domestic firms, technologically stagnant, unable to finance investment, and struggling at the threshold of profitability."

## The missing link

The simulated scoreboard forms part of a wider study of innovation policy in these six candidate countries carried out for the European Commission's Directorate-General for Enterprise by a transnational team which includes experts from the countries themselves(2). Its policy message is clear, says Radosevic. "Support has to be focused on creating internal linkages between domestic and foreign-owned firms, and external ones between them and investors, suppliers and customers in the EU. Since the main barriers to the creation of innovation networks are sector-specific, a sectoral approach is likely to be most effective."

In the car industry, he points out, large, profitable assemblers are forced to import

components from the EU because local supply bases lack the necessary innovative capacity. "Public support is essential. Market mechanisms alone would take decades to solve the problem."

Innovation policy issues in the remaining seven candidate countries – Bulgaria, Latvia, Lithuania, Malta, Romania, Slovakia and Turkey – will be examined in a parallel study to be conducted during 2002.

(1) See this edition, page 3.

(2) See also 'Eastern promise', edition 2/01.

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The study's final report is available in electronic format on request from [innovation@cec.eu.int](mailto:innovation@cec.eu.int) – a printed edition will be published shortly.

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## Specific Measures for SMEs

# New web-based help for SMEs

The *SME TechWeb* service is an easy-to-use, one-stop source of information and advice about EU research for small and medium-sized enterprises (SMEs).

The new service, which was launched in October, brings together in a dedicated site all the information resources that were previously available on the main CORDIS pages, related to the 'SME Specific Measure' of the Fifth Research Framework Programme. Much of the information has been rewritten especially for busy newcomers to European research, and is presented using a clear structure and a simple, fresh interface.

*SME TechWeb* offers a basic introduction to EU research and to the special measures

available to help SMEs participate, as well as all the forms and guidance notes needed to put together and submit a research proposal. A 'step-by-step' approach is used to guide would-be participants from the identification of a research need right through to the exploitation of results. A fully searchable database provides access to details of previous successful projects.

Latest news of calls, events and relevant regulatory developments is available from the home page, with older items



accessible from an archive database. A jargon-busting glossary has been created, and the site also offers comprehensive descriptions and contact details of additional sources of local and specialist support and advice.

### Contact

Visit the new *SME TechWeb* site at <http://www.cordis.lu/sme/>

# Innovation Relay Centre

## IRC Strategic Study

# “If the IRC network did not exist...

... we would have to invent it.” A recent strategic study finds that Innovation Relay Centres meet a real need. But creative development of the network could produce significant improvement in its performance, especially where ‘innovation dissemination deficits’ persist, the study concludes.

The study’s aim was to identify “solutions for enhancing the IRCs’ ability to provide cost-effective value-added transnational services pertinent to real regional needs”.<sup>(1)</sup>

As a basis for this analysis, the study team examined the IRC network’s achievements to date in meeting the needs of its main target client group, Europe’s technology-oriented small and medium-sized enterprises (SMEs), and in the context of practice elsewhere in the world. It found that the IRCs’ transnational technology transfer service addresses a need not met by private sector suppliers, and that the strongest IRCs deliver it very effectively. “The IRC network is mature and professional and is appreciated by its clientele,” says the report. But Community funding is still needed, as some IRCs remain weak and – although many transnational technology transfer agreements have been signed – the tangible economic benefits are generally yet to be felt.

### Performance-related funding

The report contains concrete recommendations for strengthening the network’s capacity to deliver transnational technology transfer (TTT), for measuring the long-term economic impacts of its service, and for making good innovation capability deficits through special support for its ‘TTT disadvantaged’ members.

Several of the possible solutions identified in the report would have a direct impact on IRC client companies. It recommends:

- strengthening the flow of potential technology transfer opportunities through

improved links with a wider range of European programmes such as Eureka and the European Space Agency

- creation of a fund which could be used by IRCs to ‘seed’ promising transnational technology transfer projects
- more targeted development of IRC clientele, and regular surveys of client satisfaction
- IRC funding based in part on performance

Other recommendations, designed to strengthen the network itself, include:

- partnership and subcontracting arrangements with qualified private sector technology brokers and consultants
- cross-border consortia combining ‘stronger’ and ‘weaker’ IRC regions within integrated management structures
- investigation of the option of developing reciprocal links with technology transfer networks in the US and the Far East
- proactive extension of the IRC service to universities, research centres and large firms

### Exciting options

“This was a ‘no holds barred’ exercise,” says Javier Hernández-Ros of the Commission’s Directorate-General for Enterprise. “There would have been little point in being told that the network was already



### The IRC network in brief

The Innovation and SMEs Programme’s network of 68 Innovation Relay Centres (IRCs) spans 30 countries, including the EU Member States and the newly associated countries (NAC).

Each IRC is its region’s window on European innovation, helping companies and research organisations transfer technologies to and from the rest of Europe. Further information about the IRC network is available on the IRC homepage:

<http://irc.cordis.lu/>

perfect. The study outlines some very exciting options, which should help the network to increase further its value to Europe and to European SMEs.”

(1) See ‘Building on solid foundations’, edition 2/00.

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➤ Technology Watch

# Keeping watch for new ideas



Knowledge management – RTC North's information manager, Teresa Ashforth (left) and European projects manager, Sarah Hart.

**How does a small company keep abreast of new technology? A 'technology watching' service from the Northern England and Nord Manche IRC is helping small and medium-sized enterprises (SMEs) to tap on-line resources – and is attracting attention from all over Europe.**

Many SMEs are unaware of technological developments which might affect their markets and lead to new or improved products. And even in a world awash with information, SMEs too often waste time and money solving problems that have been solved before, or inventing products that someone else has already patented.

'Technology watch' is an innovation tool designed to cut through the information jungle and deliver pertinent intelligence tailored to the needs of the company. "It is more cost-effective for a company to use existing technologies than to do it all themselves," explains Teresa Ashforth of RTC North, the lead partner in the Innovation Relay Centre that covers northern England and the Nord Manche region of France. RTC North has been offering a technology watch service to firms in north-east England for some time. "We help SMEs find processes, innovations and technologies that match their needs, so they can avoid reinventing the wheel."

## Expensive information

The need to make better use of available information is clear – the European Patent Office claims that \$20 billion a year is wasted rediscovering existing knowledge. But commercial information services tend to be used by big corporations rather than by SMEs.

"Recent consolidation in the information-provider industry has led to a dramatic increase in the cost of high-quality information," Ashforth notes. "One market-research database costs £6,000 a year, with charges for download in addition to that. That is just too expensive for many companies. So we subscribe to those services on behalf of SMEs and give them access at a subsidised rate."

RTC North's technology watch service ranges from free drop-in sessions to lengthy consultations resulting in a detailed assessment of a company's needs. "Once a client knows what they want we can put together a targeted search strategy to give them the information they are looking for. We offer market research services, implementation schemes, a technology searching service, patent searching, business efficiency services – a complete package."

## Internet resources

"We use the internet extensively," says Ashforth, whose professional background is in library and information work. "But we encourage companies to learn to use it themselves. We have run a number of internet awareness courses over the last six to eight months, teaching companies of all sizes and in all sectors what information is available and how to access it. Initially we set up four practical sessions

on searching skills, but had to increase this to nine to meet the demand."

Ashforth also plans to make more use of the IRC network to gather information about companies in other countries. Last summer RTC North hosted a 'good practice' event on technology watching in which delegates from IRCs all over Europe met to share experience. This autumn she is speaking at meetings in Spain and Portugal about RTC North's approach.

"Our IRC's philosophy is to tailor our services to our clients," Ashforth observes. "They get what they want and what they need. That is the basis of our success." ≡

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► IRC Benchmarking

# The quest for excellence

Industrial benchmarking means searching for best practices that produce superior performance. In the case of the publicly-funded IRC network, benchmarks will also create a platform for collaboration and a tool for marketing the transnational technology transfer service.

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"Benchmarking is ideally suited to the structure of the Innovation Relay Centre network," enthuses Aleardo Furlani of the IRC Central Unit. "In a competitive industrial environment, there is little incentive for a benchmark firm to share its good practice with its weaker rivals. But the IRCs are partners, not competitors. In fact, membership of a strong European network is each IRC's unique selling point. A benchmark IRC has a direct interest in sharing its knowledge with its partners, because an improvement in the performance of one automatically enhances the capacity of all."

### Continuous improvement

Between 1995 and 2000, considerable effort was devoted to drawing lessons from successful IRC experience, and to spreading them across the network. "The problem was that this knowledge-sharing was limited to one-off presentations of unquantified good practice," says Furlani. He leads a benchmarking exercise launched last year to introduce a more structured approach to network development.

"At the time, people were asking to what extent the IRCs should be expected to become self-financing over the long term. For this reason, in the first six-month pilot phase we have focused on promotion, marketing and service-pricing activities." In future phases, the exercise is likely to be extended to cover service delivery and management practice as well.

Based on information gathered from 27 IRCs, Furlani has defined the key steps and milestones in the marketing of the IRCs' transnational technology transfer

service – from first contact with a new client company, through assessment of its technology needs, negotiation of a contract to provide free or fee-based assistance, to 'after-sales' follow-up. "For each step, we have tried to identify a well-defined practice whose effectiveness is measurable," Furlani explains. "For example, one IRC employs a 'light' two-hour technology audit method. Of the companies that are offered this audit, 51% go on to take up the full transnational technology transfer service."

Benchmarking is part of a process of continuous improvement, Furlani emphasises. "We hope that other IRCs will come forward with even better technology audit methodologies, perhaps adapted to firms of a particular size, or in particular sectors. What is important is that we have a validated benchmark against which the

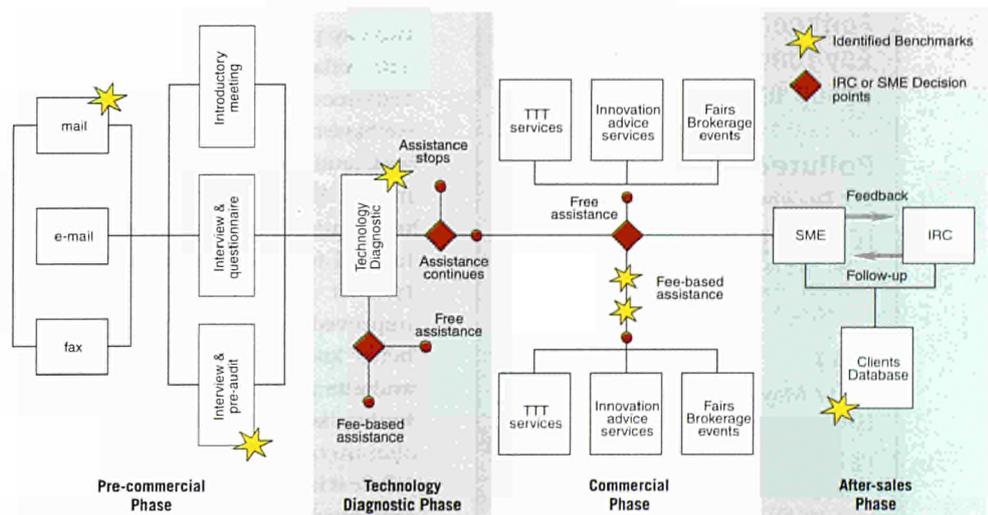
performance of other approaches can be measured. This provides a solid framework for network development."

### Commitment

Validation of new benchmarks will continue, but the initial set of benchmark practices will immediately be made available for transfer to other IRCs. To qualify as a benchmark, a practice not only has to produce excellent and quantifiable results. The methodology also needs to be documented in some form of manual, so that it can be shared by other IRCs, and supported by training if this is requested.

"Benchmarking offers a guarantee that the IRC network is committed to continuous improvement based on knowledge-sharing," Furlani says. "In itself, that creates a very powerful marketing message." ≡

IRCs Marketing Process Flow Streamlining

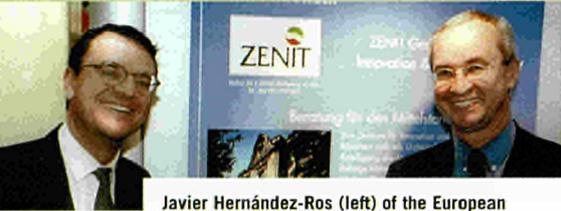


Benchmarks, indicated by stars, have already been identified for many of the methods used by IRCs to attract SMEs to the transnational technology transfer service.



Environmental Technologies

# Long-term relationships prove fruitful



Javier Hernández-Ros (left) of the European Commission's Enterprise DG with IRC North Rhine-Westphalia director Peter Wolfmeyer, on the IRC stand at Envitec.

The IRC Environment Thematic Group has hosted another successful technology brokerage event at the environmental technologies trade fair, Envitec. It brought together organisations from across Europe, encouraging several new transnational partnerships.

Throughout Europe, industries and technology developers alike are searching urgently for innovative and cost-effective solutions that will enable businesses to operate in ways that are more environmentally friendly.

To help those working in the field find suitable international partners, the Innovation Relay Centre network's Environment Thematic Group regularly organises brokerage events at relevant technology fairs. "Over the last three years, we have gathered information on over 2,000 European companies working in the environmental area," says Peter Wolfmeyer, chairman of the Environment Thematic Group and director of Zenit, which hosts the IRC North Rhine-West-

phalia. "Our objective is to interlink, mobilise and motivate partners and companies to get together and see the kinds of opportunities that exist."

'Technology transfer days at Envitec', staged in May this year, offered participants the chance to meet providers of the latest environmental technologies, to locate users for their technologies, processes and products, and to establish fruitful cross-border contacts.

## Communication + organisation = results

Twelve IRCs collaborated to organise the event. They contacted potential participants and put together a catalogue of 250 technology opportunities, which they distributed to organisations across Europe. The event itself brought together 180 organisations from 14 countries over a two-day period, during which more than 350 bilateral meetings took place. "Envitec was the most effective project we have organised since the IRC network was launched in 1995," claims Wolfmeyer. "Steady improvement of our communication and organisation methods has led to a more efficient technology transfer process." Wolfmeyer credits improved networking with other IRCs, better knowledge of regional businesses and the introduction of new software tools as key success factors.

While it is too early to provide a complete list of technologies transferred as a result of the meetings, so far at least five technology agreements have been signed and

26 negotiations are under way. For example, a rainwater infiltration system developed by a German firm is to be made available in the Czech Republic through a new Czech partner, which will receive systems as well as know-how and assistance.

## Secret of success

Ongoing relationships are often identified as the key ingredient of successful technology transfer. Wolfmeyer says that productive synergies were created when the IRCs and North Rhine-Westphalia's ministries and research institutes shared a 650m<sup>2</sup> stand at Envitec with 15 best practice projects from the region. "The working relationship we achieved through the stand was exceptional and enhanced the collaborative spirit of the brokerage event." When it comes to relationship-building between businesses, he adds, "While a signed agreement is important, what we are really after is the development of 'living co-operation', since it is continuing relationships which produce the most positive long-term effects." ☐

### Forthcoming IRC Environment Thematic Group brokerage events

#### Pollutec

6-7 December, Paris (France)

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#### IFAT

13-17 May 2002, Munich (Germany)

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The brokerage event catalogue is available on-line at  
 http://www.zenit.de/d/service/publikationen/envitec  
 2001.php

Information and Communication Technologies

# Contact! Lift off!

**Information technology is dominated by large companies, so small and medium-sized enterprises (SMEs) need help to make research and marketing arrangements with foreign collaborators. Six IRCs combined to support partnering meetings at CeBIT, the giant German trade fair.**

To keep up with the competition in the fast-moving area of information and communication technologies (ICT), research is vital. To help Innovation Relay Centres focus their promotional work in this sector, the IRC Thematic Group for ICT<sup>(1)</sup> was established in Stockholm in July 2000, evolving from the former Electronic and Multimedia Business Thematic Group.

It immediately adopted a plan to foster partnering meetings at the world's largest annual information technology trade fair, CeBIT, held in Hanover in March. A trial company contact point at the 1999 CeBIT led to an increased effort for the 2000 fair, which arranged 20 meetings between 54 participants. This year, the organisers felt they could do even better.

## Rapid growth

"CeBIT is a really huge event," explains project manager Heike Krapp of IRC Northern Germany, based in the technology transfer centre of Schleswig Holstein. "The 2001 fair had over 8,000 exhibitors and over 800,000 visitors. For SMEs in particular it would have been impossible to find useful partnering opportunities without help. After an extensive campaign of proactive marketing, we produced a catalogue of company profiles and arranged meetings between interested companies and research institutes in advance. They were held on the stands where IRCs were represented, and the IRCs supplied guides to lead people through the vast site. We offered them an oasis where they could sit down and talk,

away from the bustle of the fair. The companies that gave us space also appreciated the greater exposure to their products from all the extra visitors."

The website developed by IRC Central Sweden<sup>(2)</sup> was a vital tool in organising the company contact point. It enabled companies to search for suitable collaborators using its electronic matchmaking tool. This produced 143 participants, who booked 250 meetings on-line, of which 71% actually took place. They received a paper version of the catalogue on arrival and also had the chance to arrange *ad hoc* meetings. The feedback was extremely positive, with people valuing the opportunity to prepare for scheduled meetings with advance information about the companies concerned. By July, the meetings had led to further negotiations in 27 cases.

The IRCs of Central Sweden, Northern Germany and Lower Saxony/Saxony-Anhalt were the first organisers, soon joined by IRC Denmark, with other IRCs keen to get involved. "This is a good example of IRCs networking to provide partnering opportunities across much of Europe," adds Krapp.

## Building on success

"We have already started planning our efforts for CeBIT 2002," says Marion Laue of IRC Lower Saxony/Saxony-Anhalt. There are no plans to increase the number of profiles or meetings, but attention will be given to quality so that only serious applicants are included in next year's



IRC staff from Greece, Ireland, the Netherlands, Northern Germany, Lower Saxony/Saxony-Anhalt and Sweden at CeBIT.

catalogue. "It was a really great experience to have such a successful international event," adds Laue. "The team all worked well together and it has inspired us to try and do even better next time." CeBIT 2002 will take place in Hanover on 13-20 March. ≡

(1) For further information, visit <http://www.condis.lu/irc/src/thematic/18.htm>

(2) The electronic catalogue is available at <http://www.ircsweden.org/cebit2001/>

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► Business Process Re-engineering

# Going digital



Eckhard Behrendt of IRC Northern Germany (left) with Juliane Nilges (centre) celebrate Oktoberdruck's €0.5 million investment in its pre-press department.

Two Innovation Relay Centres have helped a German printing firm to benefit from software and process methodology developed by a small Greek software house. With this assistance, the German company has re-engineered and 'digitalised' its business – helping it to work faster, smarter and cheaper.

Commercial printing has traditionally been a high-investment, labour-intensive and time-sensitive business. The various stages of the printing process require a great deal of organisation, co-ordination and precision.

## Good advice

New applications of the latest information technology have created innovative ways to simplify, enhance and streamline the operations of conventional printers. Berlin-based Oktoberdruck AG was an associate partner in an Esprit project, D-Print 'Re-engineering for digital printing', which set out to facilitate re-engineering of the traditional printing process through the introduction of digital printing. A business process re-engineering methodology and IT platform was developed by a Greek partner, Zenon SA. When Oktoberdruck's management realised its potential benefits to their own business, they were unsure where to begin. "This was our first research project and we had no idea how to make use of its results," says the company's chairperson, Juliane Nilges. "We asked our Chamber of Commerce for advice and they referred us to IRC Northern Germany in Berlin."

The IRC, which soon enlisted the support of the Hellenic IRC in Greece, was keen to help. "We accompanied Oktoberdruck to their initial meetings with Zenon and supported the process of contract negotiation," explains Eckhard Behrendt, the German IRC's manager. "We also initi-

ated co-operation with the IPK Fraunhofer Institute of Production Systems and Design Technology in Berlin. The Institute carried out an on-site analysis of Oktoberdruck's printing process to determine the best way to reorganise the flow of information through the business." This analysis provided the framework for adapting Zenon's software and methodology to meet Oktoberdruck's specific needs. Throughout the process, the IRC in Greece kept in close contact with the German IRC and helped Zenon both with initial partnering assistance and with advice on intellectual property rights and contract issues.

## Bigger and better

Re-engineering has helped Oktoberdruck to make a successful transition from a conventional to a digital business process. In 1999, it invested €500,000 to integrate its pre-press department and is currently spending a further €2.85 million for new machinery and network technology to integrate the entire business. "We are harmonising our business process so that data flows easily through the company," explains Nilges. "We used to receive just 20% of customer data in digital format. Today, the figure is over 80%. Eventually, we want customers to be able to log on to our website and view the status of their projects," she adds.

Oktoberdruck's modernisation will enable it to reduce production time and costs, while increasing production capacity.

This will give it access to a range of new customers that it could not economically service before. "This example shows how positive collaboration between IRCs can help companies in different countries to co-operate, especially small businesses with little experience in transnational activities," says Behrendt. ≡

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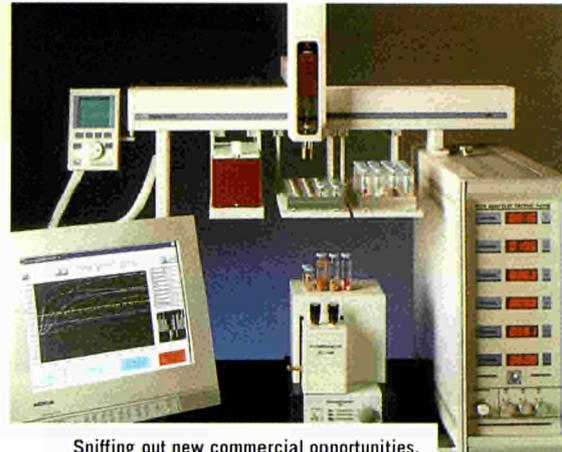
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➤ Sensor Technology

# On the scent of food quality

Assistance from the IRC network gave the Greek firm Biodynamics access to a cutting-edge sensor technology, and expanded the European market of Alpha MOS, its French creator. The partners' 'electronic nose' promises to revolutionise food quality control.



Sniffing out new commercial opportunities.

Quality control in food production is an issue of increasing concern to the public and policy-makers as well as to food producers. Alpha MOS developed its electronic nose in response to a new European Union directive on food odours and packaging.

The instrument uses multiple sensors and artificial intelligence to 'smell' specific molecules emitted by food. Its ability to identify impurities and processing defects, and to measure inconsistencies in food composition, can help manufacturers reduce waste – and gives them a valuable new weapon in the battle for verifiable food safety and authenticity.

## Industrial specialisation

The Hellenic Innovation Relay Centre in Greece was instrumental in bringing together the two small and medium-sized enterprises (SMEs). Through its partner ETAT (Food Industry Research and Technological Development Company), the IRC has extensive food sector expertise and maintains a constant 'technology watch' for new ideas which might benefit Greek companies. It immediately identified Alpha MOS' electronic nose as matching the interests of Biodynamics, which specialises in introducing novel products and analytical services into the Greek food industry.

The French company was approached through its local IRC, IRC South West France, CRCI/ARIST Midi Pyrenees, and

agreed to attend a 'Modern methods of quality control of food products' meeting staged in Greece by ETAT. When the two firms were introduced at the event they quickly identified a mutual interest in introducing the electronic nose to the Greek market. Biodynamics could offer the high level of technical skill and local food industry experience needed for Alpha to implement customised electronic nose technology. The initial contact, effected with support from the Hellenic and South West France IRCs, led to concrete negotiations between the two companies – and a commercial agreement which gives Biodynamics marketing and distribution rights in Greece and covers full technical assistance and support.

## Brokering mutual benefits

Joanna Pappa of the Hellenic IRC says the transnational transfer of technology and know-how perfectly demonstrates the effectiveness of the IRC network. "The electronic nose would not have been introduced to Greece so quickly, if at all, without our technology watch service." The case also illustrates the value of the specialised technical and industrial knowledge that many IRCs can offer – ETAT has acquired a demonstration model of the electronic nose that it uses to customise the tool for different applications.

In short, the IRC-brokered agreement has helped Biodynamics to strengthen its position as a leading source of innovative

technologies for the Greek food industry, and has enabled Alpha MOS to establish the electronic nose in a new European market. It also promises to expand the technology's application beyond the food industry into areas such as pharmaceutical and cosmetic production. ≡

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➤ Disability

# Workplace integration and efficiency



Transfer of specialised business process know-how has led to increased efficiency and improved self-esteem among workers.

Prima had already embarked on a development project with the Trondheim-based research institute, Sintef, when it first approached the Innovation Relay Centre Norway for help. "The company needed access to specialised expertise on production and quality control procedures adapted to the requirements of disabled workers," explains John Arne Bjørgen, the IRC manager. "From staff exchanges with other IRCs, we were already aware that such expertise existed in Spain, and our colleagues at IRC Southern Europe particularly recommended Promi."

## Go with the flow

Promi is a Spanish non-governmental organisation involved in training, education, research and employment for the disabled. Its research facility at the University of Cordoba, Centro de Investigacion en Minusvalías (CIM), has considerable experience of organising and managing disabled workers. Promi has worked extensively with the Spanish furniture industry and was involved in the manufacture of the 'Buomo' car, which is specially designed for drivers in wheelchairs.

Bjørgen's client was very enthusiastic about this potential partner. "In October 2000, we arranged a meeting in Cordoba between representatives from Prima Trondheim and Promi, as well as the pro-

ject manager from Sintef," he recalls. "The technical co-operation agreement was signed immediately."

Promi's involvement has been central to the success of the project. Prima has implemented new working methods based around self-managed groups of disabled workers. With appropriate training and encouragement, many are able to operate efficiently over a long period, almost entirely without external supervision. Among the techniques introduced by the Spanish organisation is lines drawn on the floor as an aid to visualisation of material flows. This has greatly helped Prima's workers to understand and manage the production process autonomously, resulting in a marked improvement in their self-esteem.

## Further collaboration

Encouraged by these positive results, Prima began to look for an additional partner for a new Eureka research project called Aquas (Available quality and internal control systems), which is scheduled to begin in January 2002. "When we were discussing funding for the new project, IRC Norway identified the Swedish company, Samhall, as a suitable partner, and it subsequently agreed to take part," explains Jimena Acedo of Sintef.

Norwegian manufacturer Prima Trondheim wanted to improve competitiveness by increasing the participation of disabled workers in production and quality management. Through the IRC network, it found a Spanish organisation with exactly the right know-how.

The partners hope to develop new graphical methods of presenting quality and internal control information that could eventually be used as a means of integrating not only the disabled, but also refugees and others who are unable to speak the language of the workplace. "This project promises to improve the working environment and quality of life of many workers, and could have a significant impact on the European economy," says Bjørgen. "Prima and its partners are testing new concepts about how information should be conveyed in an area where the need for improvement is most obvious. But if they succeed, these ideas may ultimately change working practices in general." ≡

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## Women in the life sciences, tools for successful research careers

3-4 December, Stockholm (Sweden)

Participants at this event will be given a background description of the situation of woman scientists in the EU and an introduction regarding the current situation in Europe. The ETAN report on the under-representation of women in senior positions in the life sciences will be presented, as well as the work of the Helsinki group. High-level researchers from four European universities will also speak of personal career development experiences.

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## Pollutec 2001 – technology transfer day

6-7 December, Paris (France)

Held in parallel with the international environmental fair, Pollutec 2001, the Innovation Relay Centre Paris-Île de France hopes to initiate transnational technology transfers and cross-border co-operation in the fields of air treatment, water, recycling and recovery. The IRC invites enterprises, universities and research institutes to participate, and will organise bilateral appointments between potential partners.

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

## Innovation Forum – Value chains in the processing of renewable raw materials

10-11 December, Gardelegen (Germany)

The objective of this forum, organised by the Innovation Relay Centre for Lower Saxony and Saxony-Anhalt, is the exchange of knowledge and experience, and the formation of regional and transregional partnerships, in the fields of:

- processing and utilisation of wood as a raw material
- fibrous and composite materials

- processing and utilisation of plant oils and starch
- utilisation of animal products

Participants will be able to take part in visits to companies and research institutions.

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## Creating and applying vision in the regions – towards agile and networked regions through foresight

13 December, Dublin (Ireland)

This one-day conference is organised by FOREN (Foresight for Regional Development), a 26-member network of regional development organisations and foresight specialists funded by the European Commission's STRATA action. It aims to present and discuss the output of the FOREN network with a wide audience of potential users – in particular, the draft of a Practitioner's Guide to Regional Foresight.

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## Stem cells: therapies for the future?

18-19 December, Brussels (Belgium)

With stem cell research and the spectre of human cloning regularly hitting the headlines throughout Europe, the European Commission and Research Commissioner Philippe Busquin's High Level Group on Life Sciences are to invite a forum of stakeholders to express their views on the ethical issues behind the use of stem cell research to find treatments for degenerative diseases such as Alzheimer's, Parkinson's and arthritis.

The aim of the forum is to encourage debate between scientists who are concerned with the feasibility and consequences of such research, and a wide range of people concerned with the opportunities and risks of such work, such as law experts, patients' associations, students and teachers, public authorities and the media.

### Contact

<http://europa.eu.int/comm/research/quality-of-life/stemcells.html>

## PRO-VE '02

1-3 May, Vilamoura (Portugal)

This conference on infrastructures for virtual enterprises, which is supported by the IST programme's 'Thinkcreative' project, will enable delegates to discuss the latest developments in dynamic virtual organisations, new business ecosystems, reference models and modelling and clusters. It will also cover the integration and sharing of information, virtual communities, mobility and virtual enterprises, virtual enterprise engineering and SMEs, and low-cost virtual enterprise infrastructures.

### Contact

<http://www.uninova.pt/~prove/>



## Genetics and the Future of Europe

ISBN 92-894-0862-6,  
KI-NB-19-442-EN-C; €14.00

This 20-page brochure, which is available in English, French and German editions, presents the main discussion points and principal conclusion of the forum 'Genetics and the future of Europe', which took place in Brussels in November 2000. Initiated by the Life Sciences High Level Group, the forum brought together politicians, academics, business people and representatives of the general public to discuss the themes of health, food, environmental issues and ethics. It represents the starting point for an ongoing dialogue.

## Guarantee mechanisms for financing innovative technology

ISBN 92-894-0787-5,  
NB-NA-17041-EN-C; €20.50

This survey of best practice in the use of guarantee mechanisms to support innovative technology is the latest in the series of Innovation Policy Studies produced by Enterprise DG's Innovation Policy unit. It examines 47 guarantee schemes in 13 EU countries, the Czech Republic, the United States and Canada. Schemes are classified according to the type of finance for which they provide guarantee, their sponsors, and their relevance to new technology-based firms (NTBFs). Unresolved issues such as inflexibility in financial markets and a weak ability to mobilise dormant capital are considered.

Outlining the main benefits of guarantee schemes, the study identifies best practice:

- in their use as part of integrated programmes of financial and advisory support measures
- in relationships between sponsors, finan-

cial intermediaries, entrepreneurs and research institutes

- in scheme design and management
- in awareness-raising, training, experimentation and evaluation

It aims to stimulate the adaptation and transfer of good practice to other countries or regions in order to introduce or improve guarantee schemes across Europe.

## United Nations Human Development Report 2001

Subtitled 'Making new technologies work for human development', this recent report compiled by the United Nations development programme (UNDP) identifies Finland as the world's most technologically advanced country, ahead of the United States.

The report compares 72 countries on the basis of a 'technological achievement index' which measures factors such as technological skill levels, internet usage and the capacity to apply technology in a network economy. Key criteria include patents granted, receipts of royalties and licence fees, number of internet hosts, share of high- and medium-technology exports, number of telephones, consumption of electricity, average number of school years and enrolment in tertiary scientific courses as a proportion of population.

At the top of the list behind Finland are the US, Sweden, Japan, South Korea, the Netherlands, and the United Kingdom. Germany, Ireland, Belgium, Austria and France are also named as 'leaders'.

The report's aim is to demonstrate that information technology can reduce poverty. But it concludes that, to date, most high-tech private sector initiatives have been geared towards high-income consumers rather than the poor.

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<http://www.undp.org/hdr2001/>

## 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 EU publications, on the WWW (<http://eur-op.eu.int/general/en/s-ad.htm>) and by contacting EUR-OP (fax: +352 2929 42759).

## Joint Research Centre Annual Report 2000

ISBN 92-894-1279-8,  
LB-NA-19-900-EN-C

The latest annual report from the European Commission's Joint Research Centre (JRC) describes 2000 as "a period of evaluation" in which it defined new strategies to fulfil its mission as a research centre supporting EU policies. The JRC devoted considerable effort in 2000 to "improving the interface with European policy-makers" and with its immediate users, the Commission services. The report emphasises the JRC's contribution to "the development of a common scientific and technical reference system for policy-making", and its role as a partner in international research networks, and a coordinator of scientific expertise.

As well as highlighting the major scientific achievements of its eight institutes, the JRC's annual report also describes and explains its various technology transfer activities. These include a new external seed capital fund and an incubation facility in Ispra for spin-off projects, both established during 2000.

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