Innovative Healthcare Solutions

Plus:

- Innovation Programme Projects
- Case Studies: Digital Cash • Rare-Earth Magnets
- More Innovation Programme Databases Reach WWW
- Regional Innovation Initiatives
- Conference: Innovation by Design

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Cover: Image Bank

Towards an Innovation Action Plan

The public debate on innovation policy, reported in these pages earlier this year, began in December 1995 with the publication of the European Commission's Green Paper on Innovation and reached a climax with a series of consultation conferences held around Europe in April and May (see July issue).

The summit of EU heads of state and government held in Florence in June invited the Commission to follow up the Green Paper by drafting an action plan of proposed measures.

What the Green Paper and the ensuing debate clearly demonstrated is that the climate for innovation depends on a rich variety of factors. Many relate to the world of business, research, finance and public administration. Others touch on society as a whole, bearing for example on education, on factors affecting personal mobility, and even on cultural attitudes.

Improving the European climate for innovation will mean taking action on many different fronts. As the Green Paper pointed out, and the debate confirmed, 'subsidiarity' is a key consideration. Different factors will be best tackled at different levels - in some cases this will be the local or regional level, in others the national level, and there will be measures which should be undertaken at EU level.

All these strands are currently being drawn together by the Commission in the drafting of the action plan. At present the action plan is on the agenda of the next summit of heads of state and government, to be held under the Irish Presidency of the European Council in Dublin in mid-December. ■

Demonstrable Innovation

As the Innovation Programme prepares to select potential Innovation Projects from its latest Call for Proposals[1], around 40 projects selected after last year's Call are about to enter their demonstration phases.

The first Call for Proposals for technology validation and technology transfer projects (collectively known as 'Innovation Projects') was published in March 1995. A year ago around one fifth of the 500 resulting proposals were selected to go ahead with their definition phases, where work programmes are refined, market studies performed, the European Patent Office makes a QuickScan[1] of the project's novelty, and so on.

As *Innovation & Technology Transfer* went to press the Innovation Programme was negotiating the contracts for the main, demonstration phases of 57 of these projects. They cover a wide range of industries and technologies, including industrial automation, new materials and image processing.

Combining Technologies Together

The **LASEROBOT project (IN 10236)**, for example, is led by an Italian research institute and involves the EC's Joint Research Centre Institute for System Informatics and Safety, other robotic system suppliers and industrial end users. Together, they hope to combine two technologies which have until now been developed separately - heavy robotic welding and high powered laser welding.

The project aims to demonstrate the power of automated laser welding on 'heavy section' (10-25mm thickness) components, which are found in industries such as energy, construction and shipbuilding. It focuses on studying the feasibility of laser welding in these indus-tries, exploiting the advantages of this innovative technology, developing procedures for integrating it into the production environment, and demonstrating results and the use of 'friendly' automation standards.

Another project - **VIP TED (IN 10395)** - is being led by the Institute of Mechanics of Materials and Geostructures in Greece, which developed and patented innovative material-testing technology from three BRITE-EURAM projects involving companies such as Ifremer and CNIM (France), Eurocopter (Germany), Agusta and Intermarine (Italy), as well as six research institutes.

The equipment is particularly useful for companies and research institutes developing automobile, aerospace and marine structures out of composite materials - a key technology for the future of all of these industries. The Innovation Project aims to assist IMMG and UK partner TNC Electronics develop industrial prototypes of two testing machines for commercialisation. Three other partners from both the public and private sector will contribute to the prototypes' validation.

A third project - **Vein Biometrics (IN 10217)** - aims to develop a new, more acceptable 'person-identification' system for applications as varied as office access control, time/attendance recording and the use of credit cards.

As the project's title suggests, the technology is based on recognising people by the patterns of veins in their hands through the use of an infra-red scanner. This solution has many advantages - image capture is easy,
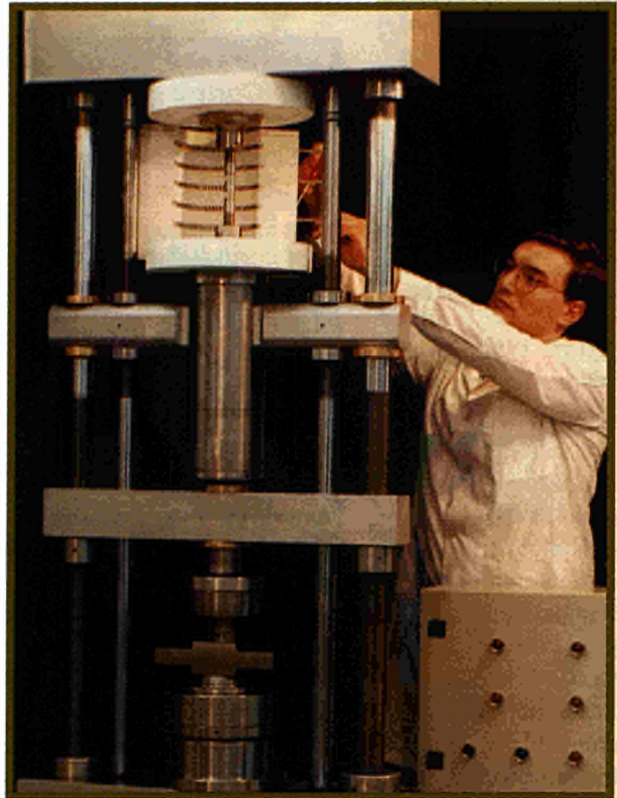
complex pattern recognition is unnecessary, it is less intrusive than many alternatives (eye scans) and vein patterns are unique, stable and virtually impossible to copy or damage.

The project, which involves three Dutch, German and UK partners, will initially focus on developing and testing prototypes for access control applications - a market estimated to be worth over $3 billion by 1997. The results will then be assessed against the needs of more complex application areas such as financial transactions. ▭

The Compression-Tension Internal Pressurisation Machine is one of two innovative materials testing machines developed by the Greek research institute IMMG and their partners in two BRITE-EURAM projects. Prototypes of both will be developed in a recently launched Innovation Project.

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(1) See edition 4/96.

► CASE STUDY: RELAY CENTRE

Improving Training Through Multimedia

A conference organised by the Dutch Innovation Relay Centre (IRC) last June on the role of "Multimedia in Training" presented the results of some 16 European projects.

With an audience consisting mainly of 120 training managers, entrepreneurs, publishers and producers of courseware, the conference focused on overcoming the barriers preventing people benefiting from multimedia training material. It was dominated by presentations of projects from the EC's ESPRIT and DELTA (distance learning) programmes, which tackle these problems on a pan-European scale.

One popular presentation, for example, resulted from the Logos project, which brought together 26 organisations from twelve European countries, including multimedia publishers, technology integrators, private researchers, telematics service providers and trainers.

According to project leader Gérard Courtieux of Silogia Consultants in Paris, "Logos addresses the linguistic and cultural barriers preventing SMEs in many countries from receiving the multimedia training they need. The main problems are that the material is either not available in their language or does not address their sector."

The challenge is to alter mass-produced software to meet the individualised needs of small numbers of SMEs. "Even the best products are rarely designed to be adaptable because publishers con-sider this risky," Mr Courtieux adds. "We aim to minimise the risks by making it easier."

Theory and Practice

The Logos project had several phases. Its primary aim was to study the process of adapting multimedia training software from one language to another. Guidelines for producers followed on ways of developing their products to be easily adapted by local trainers.

These guidelines were then tested in a large number of applications. To date some 1,000 users at 43 experimental sites have tried out Logos software. Six CDs, six more videos, nine internal course documents and over a dozen diskettes were produced. The portfolio ranges from British quality management courses to an SME-focused introduction to the Internet in most European languages from Sweden.

According to its partners, Logos could open the floodgates for multimedia training material in Europe. "Think how much software there is which is only produced in English," Mr Courtieux pointed out. "Now consider how many people there are who are not native English speakers. This is a big market, and we have combined the benefits of mass production with individualised training to meet it."

New Approaches to 'Learningware'

Coincidentally, another project presented at the conference may also be adapted to new languages and applications. When Dr Soraya Ali-Pasterny of Cambridge Training and Development (CTAD) presented the findings of the IRDIC project, she also demonstrated one of its results - CTAD's New Reading Disc, a multimedia training tool for people with reading difficulties.

"IRDIC analysed how multimedia technology could best be utilised for training purposes by formulating a new design approach," she explained. "This approach overturns many classical assumptions regarding courseware. The software, for example, must not be seen as the sole repository of everything the pupils need to learn. It must be one of many, and has a very specific role - empowerment."

This new approach was developed and tested in the creation of the New Reading Disc. Adult literacy tutors were approached and a specific methodology - conscientization - adopted. Developed by Paolo Freire as part of his approach to teaching and raising political awareness, conscientization is well suited to teaching adults because it stimulates pupil engagement, link-

ing the acquisition of literary skills to their application.

It involves using everyday words as a basis for discussion and wordgames. Paolo Freire would have used 'favela' (slum), and used this to explore all words beginning with fav. The New Reading Disc takes words supplied by the pupils and helps them create multimedia documents from them using ready-made sentences, sound and even video. It then generates new exercises based on these documents. In this way it overcomes a common problem faced by adult literacy teachers - the material they use isn't 'adult' because they have to keep the language level low.

While many attendees were interested in the results of IR-DIC, several more were interested in the New Reading Disc itself. Two publishers plan to produce French, Dutch and German language versions, while a doctor from Kings College, London, aims to adapt it for teaching trainee psychiatrists.

Networking Europe

The conference was such a success that Joaquim de Witte, the IRC manager, was asked to repeat the conference at regular intervals. According to Mr de Witte the conference was particularly timely because training will become the subject of a focus group within MAGNET, the European network of national multimedia special interest groups which started in October 1995.

"These sorts of networks are very useful in attracting the right audience," he noted. "We focus our attention on national and European sector-based organisations to reach SMEs more effectively. The IRC network helps us promote events like this to SMEs on the other side of Europe. We hope to repeat this success with two more events in the first two months of next year, focusing on intermodal transport and the plastics processing sector."
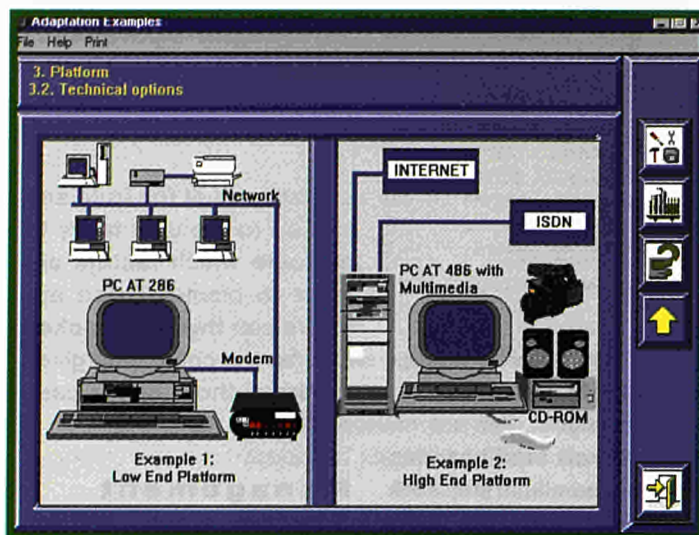
The LOGOS project developed methodologies to help educational software publishers design their multimedia training material so as to ease their translation into other languages and different industrial contexts.

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► INNOVATION MANAGEMENT

First Projects Launched

Around 30 projects have resulted from the Innovation Programme's Call for Proposals for 'Promotion of Innovation Management Techniques'.

There are a number of structured techniques - quality management, design, value analysis, innovation marketing, etc. - which can help companies better manage innovation and establish a vision of their future. Last December, the Innovation Programme launched a Call for Proposals for projects aimed at promoting these techniques and incorporating them into strategic business development.

Over 100 proposals for projects and accompanying measures were received. Contracts for 31 projects were under negotiation as *Innovation & Technology Transfer* went to press, so the first projects should get under way by early next year.

In general, the projects aim to strengthen the know-how of national and regional organisations in promoting innovation management techniques among SMEs. One project, for example, will establish a network between organisations in the field from nine countries ranging from Ireland to Israel. The network will help these organisations exchange experience on promoting innovation management techniques via a newsletter and regular seminars and workshops.

There is a strong practical emphasis - between them, the project partners will carry out innovation consultancy assignments to over 1,000 SMEs around Europe. At the end of these assignments, the businesses will draw up an action plan to help them integrate the appropriate innovation management techniques into their overall strategies. The projects also involve a dissemination phase to share the lessons learnt.

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▶ PROJECT MANAGEMENT

Cultural Differences

The Innovation Programme's new combined brochure and software package - 'Innovation Across Cultural Borders' - is designed to create better awareness of the intercultural communication and management issues which are so important to the success of transnational projects.

Its launch coincides usefully with the latest Call for Proposals for Innovation Projects in September. As reported in the previous edition of *Innovation & Technology Transfer*, teams involved in such projects have been invited to try the tool for themselves.

Over 300 copies of the package had already been distributed by early October. It is likely to follow an evolutionary process with comments from the first users being incorporated in later versions. Follow-up activities such as workshops may build on the awareness raised by the tool.

Nevertheless, the current version is complete and fully functional. The software is supplied on one 3.5-inch diskette which runs under the Windows operating system. In general, the software provides illustrative examples of issues for which more detailed reference material can be found in the brochure.

To produce the tool, specialists in intercultural management and training interviewed project participants and analysed communication at project meetings. Advice on how to cope with the issues raised as well as a reading list on the topics in question are also included.

Case Histories

There are six case histories designed to illustrate both problems and solutions. While they are all fictional, the core problem in each is not invented but constructed from the results of an empirical study carried out under the former SPRINT Programme, one of the predecessors of the Innovation Programme.

Each case describes a 'critical incident' which could happen in any project and illustrates a situation where, for one reason or another, communication has broken down in some way. The case histories are designed to help project leaders and their partners to avoid similar situations and are a useful starting point to get a broader picture of some of the potential pitfalls.

All case histories are described in the same way: the situation is described briefly and four possible explanations are suggested. Most

> **"**
> *... I especially liked the case studies. We used these cases in discussions with our clients.*
> **"**
>
> Kastner International Consulting
> (Austria)

contain part of the truth and it is up to the user to try to evaluate which factors are most to blame. These answers can then be checked against the comments given by the authors of the case histories.

Management Styles and Dilemmas

The tool makes it clear that in transnational project management, as in most other complex situations, a 'single best way' often does not exist. Various strategies are possible and different people or groups may advocate solutions which, although they may appear contradictory, are often different parts of the whole truth. Such strategies have much to do with the underlying cultural background of the individuals or groups that formulate them.

The tool characterises each management style in terms of its own pattern of preference and rejection for certain important management issues. Twelve of these so-called 'dilemmas' are recognised by the tool. Examples include:

- reliance on general rules as opposed to flexible, ad-hoc management;
- encouraging individual freedom as opposed to group consensus;
- orientation towards traditional company strengths as opposed to future trends.

The tool explains that style is an integral part of personal, corporate and national identity and hence decisions regarding management style cannot be treated in the same way as technical questions. Indeed, it argues that "our capability to deal 'rationally' with these questions is limited".

Profiling Individuals and Teams

Nevertheless, by way of the twelve 'dilemmas' it introduces, the tool attempts to provide rational illustrations. By charting a person or a group's reaction to each of the twelve dilemmas, it is possible to build up a graphical 'profile' of a management style. Four typical profiles are described in the tool:

- the 'system of tasks' style or 'management by objectives';
- the 'power hierarchy' style or 'management by subjectives';
- the 'hierarchy of relationships' style or 'management by job description';
- the 'market enterprise' style or 'management by enthusiasm'.

Furthermore, based on answers to 30 multiple choice questions, the software can generate a user's personal management profile. This part of the tool provides the possibility of learning more about one's own management style and of comparing it with the management profiles of one's team members.

The tool encourages the individual user to become more conscious of personal work aspirations, to discuss similarities and differences between team members' profiles and to discover which 'organisational cultures' are present in the project. It would then be useful to discuss the results with team colleagues who have worked with the tool in the same way.

Project teams can therefore use the tool to identify cultural differences in the team members' management styles, develop the teams' capability to deal with these differences, and improve mutual understanding between partners from different backgrounds.

In this way, it should be possible to identify points of divergence and convergence of the various management styles present within the project - a vital first step to developing a successful compromise.
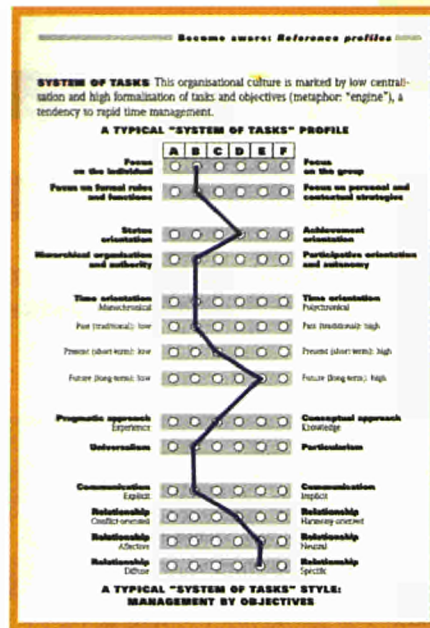
The 'system of tasks' profile: this organisational culture is marked by low centralisation and high formalisation of tasks and objectives. There is a tendency for rapid time management.

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► CALL FOR TENDER

Proposal Evaluation Services

Late last July the Innovation Programme published a call for expressions of interest for providing services in evaluating Innovation Project proposals and reviewing ongoing Innovation Projects. Applications may be submitted until 30 September 1998.

Innovation Projects work to transfer innovative technologies across sectoral and national borders (see page 3). With the Programme always receiving many more proposals than it can fund, the expert evaluation of both the proposals and the definition phases of the resulting projects is essential.

The new call will result in a list of contractors able to:

■ **judge Innovation Programme project proposals** on the basis of the evaluation criteria specified in the calls and the accompanying information documents. Evaluations are carried out in the strictest confidence and the Commission does not provide applicants with any information as to the identity of the evaluators judging proposals.

■ **review or evaluate the definition phase of Innovation Programme projects.** The evaluators will also be called upon to examine the reports submitted by each project participant, judge their project's viability and recommend whether the project should be continued, discontinued, or modified.

The Innovation Programme has already begun examining the several hundred responses received by the end of September, and will decide on the first list of successful contractors before the end of this year. This list will be updated every six months until 30 September 1998. The validity of the list resulting from this call will expire on 30 June 1999.

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► CORDIS UPDATE

New Information Services

A new wave of information services has appeared on the CORDIS World Wide Web site, including all nine CORDIS database services.

When the CORDIS R&D News Service appeared on the CORDIS WWW site (http://www.cordis/lu) earlier this year (see last edition) it was an instant success, soon receiving an average of over 700 'hits' every working day.

This success is now likely to be repeated with the other eight CORDIS database services[1], which were scheduled to appear on the WWW last month as *Innovation & Technology Transfer* went to press. Between them, the databases contain tens of thousands of entries covering scientific results awaiting exploitation from around Europe, organisations interested in finding partners, EC research programmes and their individual projects, EC research publications, contact details, acronyms and more.

Up to now, this information has only been accessible via a CD-ROM subscription service and a 'dial-up' database service. Just as for the R&D News Service, visitors can now search these databases on the WWW in various ways: by entering their own keywords (e.g. "genetic engineering"), selecting items from lists (e.g., SIC technical codes, programme acronyms) and checking 'tick-boxes' for each database field.
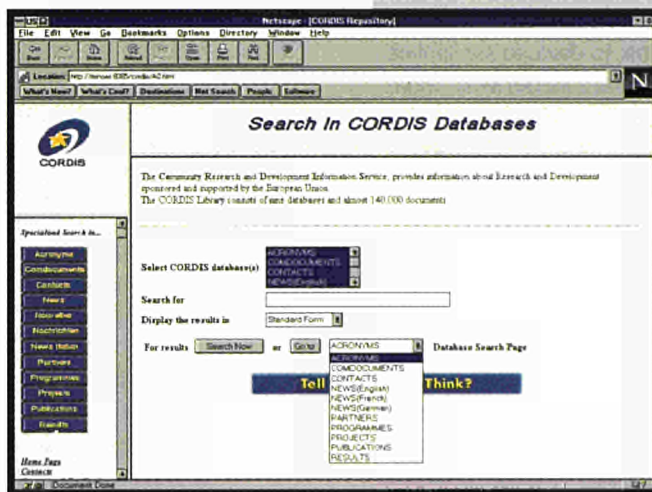
Most importantly, users will also be able to search any or all of the databases for one keyword simultaneously, producing one single list of all the relevant entries from all of the selected databases. A search for 'wind energy', for example, may produce links to records providing details on the Non-Nuclear Energy Programme, relevant projects and research results, and abstracts of several publications, all called up from the CORDIS Programmes, Projects, Results and Publications services, respectively.

Fifth Framework Focus

The last month or so has also seen the appearance of two other new services on the CORDIS WWW server. The first is a new R&D information service for the current six-month Irish Presidency of the European Council of Ministers. Following the Irish Presidency's objectives of transparency and openness, it provides a calendar of research and research-related activities and events, a news update service to keep interested parties informed of Presidency developments, information on progress in drawing up the EU's next (fifth) Framework RTD Programme during the course of the Irish Presidency, an interactive "Bulletin Board Service" on the 5th Framework Programme and more.

The second new service also reflects this spirit of transparency regarding the future of RTD in Europe. The 'Fifth Framework Focus' service is designed to keep the Community up-to-date on all developments and issues which arise during the process of adopting the Fifth Framework Programme (1999-2003) and stand to influence its final form and content.

It gathers all information on the preparation of the Fifth Framework Programme into one location, including a series of summaries and full documents, links to other relevant WWW sites and contact details for further information.

The service was launched with documents detailing the preliminary developments which have taken place within the EC, perspectives from some Member States, and the initial positions of a number of advisory bodies and representative organisations. A guide explaining how a Framework Programme is adopted is also included.

As the process of adopting the new programme intensifies, the content will be considerably expanded, focusing on Community institutions, specialised committees, pan-European bodies and organisations. The service will also provide details of the positions and opinions of those interested in Europe-an RTD and, in conjunction with the CORDIS R&D News Service, regular round-ups of major events and issues. ▢

The new CORDIS service allows all nine database services to be searched simultaneously, producing a single list from which all records are one click away.

(1) See the Quick Reference Guide (issue 1/96) for details on all CORDIS databases.

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► REGIONAL INNOVATION

70 Regions Develop Strategies

Forty European regions are starting work on a new set of regional innovation exercises supported by the Innovation Programme and the European Regional Development Fund (ERDF).

Last year saw a joint Call for Proposals between the Innovation Programme and DG XVI (Regional Policy), which administers the ERDF. Forty regions, ranging from Crete to Iceland, applied successfully for two types of project: Regional Innovation and Technology Transfer Strategies and Infrastructure (RITTS) and Regional Innovation Strategies (RIS)[1]. Another 28 regions have been working on similar initiatives since they were launched in 1994, so around one region in four across Europe is now carrying out this sort of activity.

These initiatives aim to encourage and promote the definition of coherent strategies for supporting and developing technology transfer and innovation at the regional level. The resulting strategies should provide each region with a framework for optimising its innovation policies and infrastructure, particularly with regard to their relevance to small and medium sized enterprises (SMEs).

Both types of exercise are based on certain common basic principles:

■ **demand-led** - they are based on analysing and meeting the expressed and latent requirements of regional firms, particularly SMEs. These requirements need not be purely technological - financial, managerial and training issues should also be considered;

■ **action-oriented** - priority action recommendations should be undertaken within the
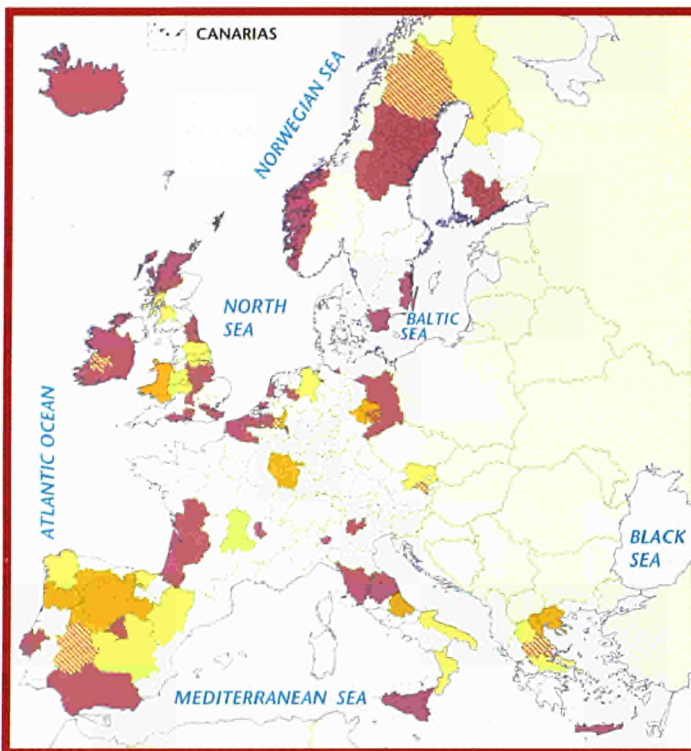
RIS pre-selected projects 1996-98

RTP (regional technology plan) pre-pilot projects 1994-96

RITTS pre-selected projects 1995-98

RIS & RITTS

RTP & RITTS

Other regions

Around one in four European regions are involved in an EC regional innovation initiative.

framework of the exercise. Examples include launching 'financier networks', setting up collaborative ventures between innovation centres and encouraging technical colleges to become more involved in innovative projects with SMEs;

■ **building a regional consensus** between the various public and private regional stockholders to induce concrete actions is vital to the exercise's success.

Representatives from the 40 regions, which met in Luxem-bourg in late September for a 'kick-off' meeting, have 18 months to carry out the work. They will receive funding of up to 50% of the total cost, with upper limits of 250,000 ECU for ERDF-assisted areas and 175,000 ECU for non-assisted areas.

Early Examples

The earlier batch of 28 projects have already produced interesting results:

■ both Wales and the Dutch Limburg region, for example, have produced technology

plans which will provide a framework for innovation in their regions for the years to come;

■ a RITTS project in Northern Sweden has eased the transition to the structural funds support system following Sweden's entry into the EU;

■ better links between further education institutes and companies have been established in the French Poitou Charents region;

■ the city of Hamburg will set up a foundation for innovation in order to provide seed capital to young firms.

In order to maximise and promote linkages between these projects and facilitate exchanges between regions, a network was launched at the meeting last September to intensify the learning effect and act as a form of broker to the regions, matching supply with demand. Proposed regular inter-regional activities include thematic workshops, exchange programmes and training seminars for project managers. □

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► CONFERENCE

Patinnova '97

The fourth in the European Commission's series of bi-annual conferences focusing on intellectual property rights will be held in Vienna on May 5-7.

Every patent office contains a huge amount of information on advanced technology. However, with the patent owners often lacking the resources to exploit their discovery, and other organisations often finding that access to the information is costly and time-consuming, much of this potentially useful information never sees the light of day. European competitiveness suffers as a result.

The EC organises the 'Patinnova' series of conferences to raise awareness of patent issues and identify solutions to these problems. Each conference attracts around 400 participants, including senior decision-makers from both government and industry across Europe.

Economic Value

Patinnova '97 will focus on the economic value of patents, addressing their role as both protection mechanisms and sources of revenue through licensing. For this reason the conference is targeted at industrialists, consultants, research and innovation agencies.

It will also be the first conference in the series to be accompanied by an exhibition consisting of information stands from national patent offices from across Europe.

For further information on the conference, contact the Innovation Programme.

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► PUBLICATION

Management Consultancy Guide

The European Handbook of Management Consultancy was recently published, providing an overview of management consultancy across Europe.

The Handbook summarises the lessons learnt by the eleven management consulting organisations involved in a nine-country Innovation Programme project[1].

The 750-page volume (ISBN 1-86076-010-4) is published by Oak Tree Press (Dublin) for 90 ECU. According to the authors, "the guide will be indispensable to Europe's management consultants in helping SMEs develop a coherent innovation strategy for the global economy ... it provides a standardised approach to the process of management consultancy for SMEs in the EU, offering a complete source of practical information on all aspects of management consultancy."

The book's central theme is the concept of 'strategic innovation' - the use of consultants by SMEs to assist them to innovate and to change on an ongoing basis. Topics covered include:

- an overview of strategic management;
- conducting diagnostic analyses;
- key success factors in developing a coherent strategy;
- self-appraisal of company strengths and weaknesses;
- practical project implementation measures;
- concise descriptions of the core functional areas, including finance, marketing, operations, human resource management, information technology and product development;
- key lessons on management consultancy, such as helping companies transform themselves into learning organisations, and how to become the driving force behind strategic project implementation.

(1) While the project was supported by the Innovation Programme, the book itself reflects the views of the authors alone, not necessarily those of the European Commission.

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The EUROPEAN HANDBOOK of MANAGEMENT CONSULTANCY

Innovation

▶ DESIGN

Innovation by Design

How do Europe's most interesting SMEs use design to innovate?

This question lies at the heart of the European Design Prize (EDP), a year-long project financed by the Innovation Programme. It aims to stimulate awareness and use of design in the innovation process, and is awarded to companies that have successfully strengthened their competitiveness through the use of design as an instrument of innovation and quality.

National competitions first attracted entries from several hundred small companies around Europe. In September an independent jury considered a shortlist of 64 SMEs from 16 countries and sectors as diverse as waste disposal, optical instrumentation and on-line publishing.

Discussing Design

On January 30 these SMEs will attend the two-day European Design Industry Summit (EDIS) in Paris, where they and other design experts will discuss design and innovation in 8-10 discussion groups focusing on a range of themes, collectively entitled 'The Drivers of Innovation'.

One discussion group, for example, will look at the transition from mass production to the 'customisation' paradigm of the Information Society. "Linking customers directly to manufacturers will return us to almost pre-industrial patterns of production and distribution," explains John Thackara, director of the Netherlands Design Institute and EDIS organiser. "Cus-

tomers say 'make me one of *these* like *this*' - a car with specific accessories, or a personalised insurance policy. Relationships, not products, become important, and designs move away from standardisation."

EDIS is open to the public and will be followed on January 31 by the European Design Prize award ceremony, which will be introduced by Mme Edith Cresson, European Commissioner responsible for research and innovation. A management textbook - '**Winners! Innovating by Design in Europe's New Economy**' - will also be published in parallel with the conference and on the EDP WWW site.

"It's not a theoretical book - while it's full of data, lists, advice and so on, for every statistic there's a story about a real company, how it used design to innovate and why it worked," Mr Thackara continues. "All 64 EDP nominees are covered. They are, quite simply, inspirational companies." ▢

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Designing Friendlier Materials

EDP finalists ITG - "organising the convergence of technologies, natural materials and people's needs."

Innovative Technologies Group (ITG) is a representative example of the 64 EDP nominees. A British firm started five years ago by six scientists working out of a garage, ITG now employs 129 people, supplies products to Europe, North America and Japan and has an annual turnover of over 6 million ECU.

Their secret is to use design to organise the convergence of technologies, natural materials and people's needs. The result is a long string of innovative products, mainly for the healthcare market, which are simultaneously more effective and less environmentally hazardous.

"Our intelligent wound dressings and wound-care products, for example, are made from natural materials such as seaweed and chitin, a sugar extracted from prawns and seashells" explains Diane Mitchell, one of ITG's directors. "These biodegradable materials absorb wound secretions better than ordinary dressings, and because they come away from the wound as a gel they don't pull off any tissue which is still healing."

Other products include sticking plasters which promote healing, synthetic heart valves and other artificial body parts, gloves for medical and recreational use, condoms and more. "Living systems function by design," Diane Mitchell adds. "We've taken that principle and translated it into all facets of our business, which is probably the secret of our success."

Innovative Heal
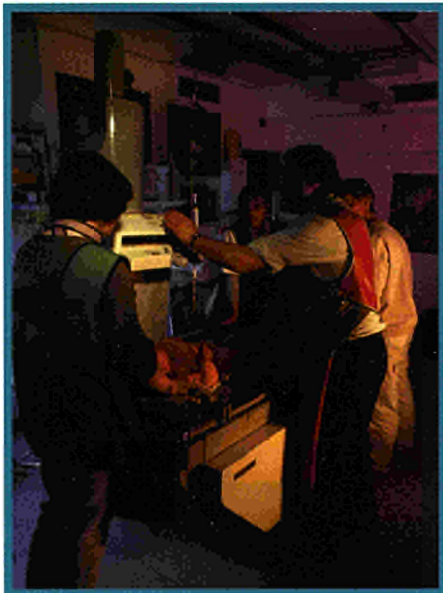
Research into improving public health lends itself naturally to Europe-wide collaboration, whether it involves pooling resources to develop a new diagnostic technique or comparing its results in 15 different countries. With health systems around the developed world under increasing strain, EC programmes and initiatives aim to ensure that Europe's healthcare industry is able to meet the challenge - to the benefit of all Europeans.

The enormous progress in medicine made this century has provided people throughout much of the world with a level of health that could only be dreamed of in centuries gone by. It is ironic, therefore, that some of the greatest challenges facing developed societies in the coming decades are the direct result of advanced medicine and good health.
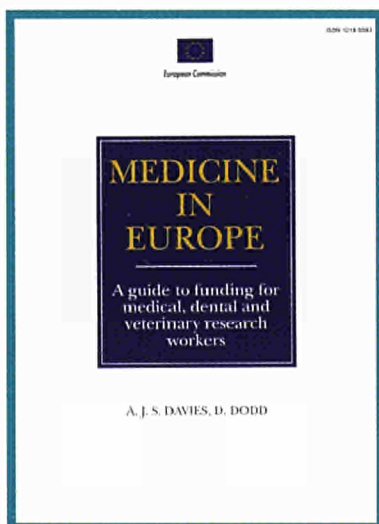
The average life expectancy in the developed world continues to increase, while population growth has dropped to its lowest level since the end of the second world war. New technologies are raising expectations - and costs. The traditional, publicly-funded health care systems developed under the economic boom times of decades ago are being reconsidered as a result.

"By 1990 there were almost 49 million Europeans over the age of 65, and their number is growing every year," explains Professor Tony Davies, author of the reference book, 'Medicine in Europe'[1]. "The challenge is to establish more efficient health care systems without turning good health into a luxury item for sale to the highest bidder."

Both new technologies and reformed health care systems, it is generally agreed, are necessary to meet this challenge. Further research is necessary in fields as diverse as microbiology, socioeconomic policy, information technology and ethics.

The EC's research and development programmes tackle all of these problems, often shedding new light on them thanks to their Europe-wide perspective. In fact, the European research community feels that the pan-European approach is more accurately poised to exploit innovative potential. There are many reasons for this: it creates an 'even playing field' in research funding, for example, and focuses clearly on society's needs rather than just on what scientists see as good, innovative and enjoyable work.

I. Biomedicine and Health

The major EC research initiative in this field today is the 363 MECU Biomedicine and Health Programme for 1994-1998 (BIOMED II). It targets its research towards projects of interest to the Community and consumers, and promotes the transfer of fundamental research into clinical practice. Compared with the original BIOMED I Programme (1990-1994), it has also seen an increase in industrial, as opposed to academic, participation.

This is a direct result of the Programme's emphasis on activities involving both the development of new techniques and technologies and their clinical testing. Because no innovation is ever adopted by the medical community without extensive clinical trials, companies get a tremendous boost by developing their technologies in partnership with those who will actually carry the trials out.

These partnerships also focus developments on user needs, accelerate the uptake of results and involve, by their very nature, trials performed across all of Europe, providing a much larger patient base.

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MEDICINE IN EUROPE
A guide to funding for medical, dental and veterinary research workers

A. J. S. DAVIES, D. DODD

thcare Solutions

A Challenging Market

**The share of total private and public expenditure devoted
to health in Western Europe rose from 3.7 % in 1960 to 8.1 % in 1991.
Further growth and private sector involvement seems inevitable.**

In 1956 the British National Health Service estimated that demographic change would increase the organisation's costs between 1950 and 1970 by around 8%. In fact, costs nearly doubled over this period. Similar cost rises were seen around Europe.

Since then, of course, all EU countries have introduced universal provision of health services, a significant cause of this spectacular rise which cannot be repeated. Nevertheless, while spending growth has slowed since the mid-1980s, it still grows faster than GDP. By 1991, total expenditure on healthcare services by the (then) EU 12 had reached 405 billion ECU.

The Panorama of EU Industry[1] predicts that healthcare costs will continue to grow faster than GDP. As over three quarters of total spending on health in Europe is covered by public insurance systems (compared with 35% in the US), this will continue to squeeze public sector budgets across the continent.
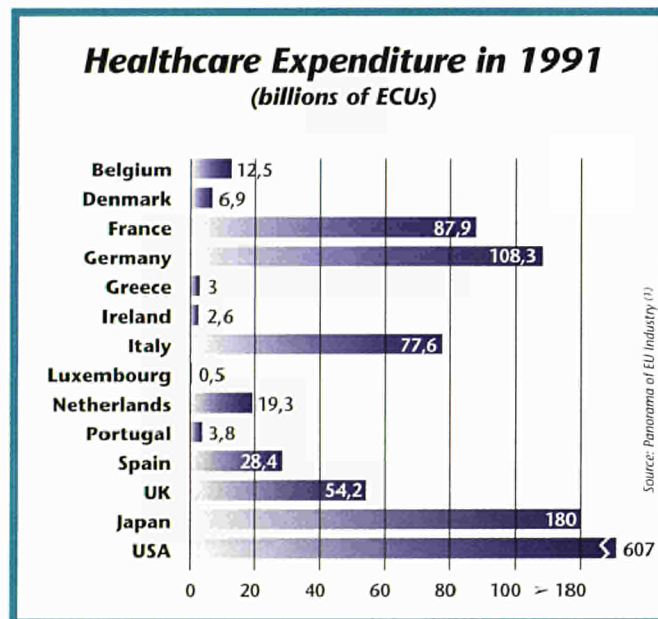
National governments have responded with measures ranging from increasing private sector participation to investing in advanced technologies. According to the Panorama, this will result in total expenditures stabilising at around 7.5% of GDP in the long run. However, less of this finance will come from the public purse. A massive market is therefore emerging for innovative companies.

Expensive Technologies

How will national governments reduce their share of expenditure, and what will the market look like in the future? Many worry about Europe's low birth rate and ageing population. However, while these demographic changes will certainly boost nursing expendi-

Healthcare Expenditure in 1991
(billions of ECUs)

Belgium	12,5
Denmark	6,9
France	87,9
Germany	108,3
Greece	3
Ireland	2,6
Italy	77,6
Luxembourg	0,5
Netherlands	19,3
Portugal	3,8
Spain	28,4
UK	54,2
Japan	180
USA	607

Source: Panorama of EU Industry[1]

The EU 12 of 1991 spent a total of 405 billion ECU on health care services. Expenditure per inhabitant ranged from 1,536 to 289 ECU, compared to 1,449 ECU in Japan and 2,379 ECU in the US.

ture, the link between ageing and health care costs is not simple.

"The costs of those who die aged 80 or over are only about 80% of the costs for those who die aged 65 to 79," says Brian Abel-Smith of the London School of Economics[2]. "New technologies,

not demographics, are increasingly regarded as the main reason health costs have risen so sharply. Part of the problem is the introduction of new, expensive equipment which can be used without improving the outcome. It is not enough to know that a technology is safe ... the vital question is whether it improves outcomes and on which patients."

Comprehensive assessments of new technologies, covering efficacy, safety, ethical consequences, economic efficiency and more, have therefore begun to be recognised as important. The future would appear not to lie, therefore, in advanced medical technology for its own sake, but in technologies which can be proven to work.

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Adding Value

In addition, BIOMED explicitly aims to 'add value' to national research activities. Research projects are supported only where the Member States' research activities can be made more effective by working together. Typically, the Programme only contributes around 5% of the total national medical research costs. Although the funding amounts are small they are effective, providing a significant 'multiplier effect' and helping Europe's researchers establish the critical mass necessary for world-class research.

A project launched early this year to develop an anti-cancer vaccine illustrates this well. Initiated by the Ludwig Institute, which put forward 6 MECU, and supported by BIOMED to the tune of 2 MECU, it attracted the interest of SmithKline Beecham, which joined the consortium near the end of the project proposal phase. SmithKline Beecham's contribution, under negotiation as *Innovation & Technology Transfer* went to press, will be several times larger than the other two contributions combined.

Apart from research projects and concerted actions, BIOMED can also establish centralised facilities ('Eurofacilities') to help projects coordinate standardisation, joint experiments, comparable data collection, quality control and so on. There are also demonstration projects, which aim to prove the technical viability and (if appropriate) the economic/efficiency advantages of a new technology, methodology or medical practice.

Multiple Problems, Innovative Solutions

The philosophy running through most individual BIOMED projects is that both patient care and cost-effectiveness can be simultaneously improved by innovation - a term which in a medical context encompasses new methods as well as new technologies. This is illustrated by a second cancer project, which aims to develop ways of analysing tumour samples so that the subsequent chemotherapy course can be

precisely 'patient-targeted'.

By itself this will reduce side-effects significantly. It will also use 'needle-based' biopsy procedures, a much less traumatic way of extracting tumour samples. The result should be better for patients and cost health services up to 75% less.

Cancer research, however, is just one (albeit important) action line within one of the BIOMED Programme's eight research areas. The two areas of most interest to small companies in the healthcare sector are probably Research on Biomedical Technology and Engineering (Area 2) and the Human Genome (Area 5).

Technology and Engineering

Research on Biomedical Technology and Engineering is an important part of the drive to ensure that the most up-to-

BIOMED'S First Call for Proposals

Projects Selected — EC Funding (MECU)

BIOMED's first Call for Proposal closed on March 31, 1995, and resulted in over 1,700 proposals from some 6,000 organisations. 307 projects received funding totalling almost 190 MECU. The second Call, which closed last June, resulted in approximately 800 proposals. A third Call was published on September 17, and will close this December.

date devices, instruments and techniques are brought into European clinical practice. Dealing as it does with technologies for the healthcare market, this is a particularly rich source of knowledge, techniques and technologies for the private sector. It is a highly innovative programme able to fund on a small scale the research and development of what in time could be devices with enormous global markets.

The first Call resulted in a large number of excellent proposals. Around a dozen projects, for example, have been clustered together to create two major

research efforts into magnetic resonance techniques for brain scanning and minimal invasive surgical techniques. Other topics include sensor systems, tools for rehabilitating, replacing and restoring human function (from biomaterials and artificial organs to information technology), and cellular engineering.
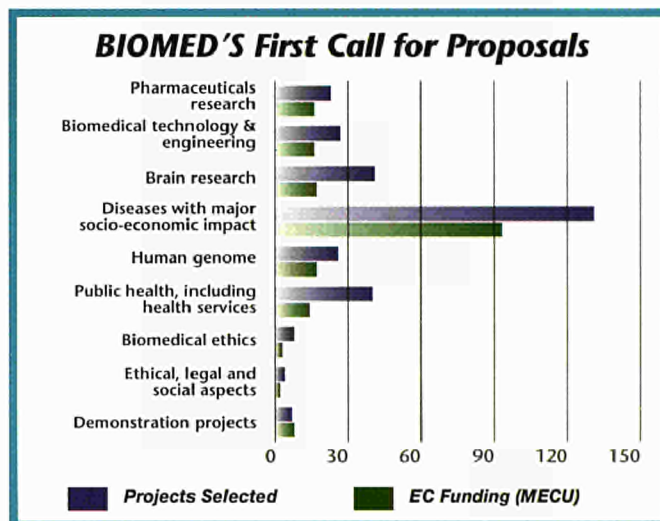
Human Genome Analysis

Understanding the human genome has the potential to revolutionise both treatments and the way human society understands and manages health. It may well define 21st century medicine.

The sheer quantity of work associated with just mapping and eventually sequencing the human genome makes pan-European and international research efforts essential. The EC joined this global endeavour when it launched the 16 MECU Human Genome Analysis Programme (HGAP) during the Second Framework Programme (1990-1992). This was followed by a specific action line under BIOMED I, and the current Human Genome Research area under BIOMED II.

The first two initiatives initially focused on the technologies and infrastructure necessary for mapping the human genome, and then moved into sequencing. The BIOMED II initiative both reinforces this process and looks beyond it, funding research into the search for specific genes, understanding how they function and their role in multifactorial disease. The result should be technologies and applications such as gene therapy.

While the potential is enormous, so are the fears. Like the previous initiatives, BIOMED II supports studies of the ethical problems associated with this new technology. It also demands ethical statements from the researchers, with 'ad hoc' ethical reviews also possible by the EC itself in very sensitive areas. The EC has also established a Group of Advisors on the Ethical Implications of Biotechnology. Finally, EU Member States will certainly be signatories to the Bioethics Convention of the Council of Europe, which was being debated by the 40 or so countries of the ●●●

Case Study: BIOMED Demonstration

Walking Towards 2000

After more than eight years, two Concerted Actions, a EUREKA project and a BIOMED demonstration project, clinical trials will soon get under way of a new technology to help paraplegics stand up and walk.

While in most paralysed people the muscles of their lower body are disconnected from their brain by injuries to the spinal cord, the muscles themselves are alive and well. They can still work, but their owners cannot get through to them.

One of the most promising technique developed to bypass the spinal injuries and help these people walk again is Functional Electrical Stimulation (FES), where the muscles are artificially stimulated with electrical current. Early versions, however, involved transmitting the current through the skin - a highly uncomfortable experience.

A solution is now being finalised by the consortium in SUAW (Stand Up And Walk), a recently launched BIOMED II demonstration project. The roots of the technology go back much further, however, and first acquired a pan-European flavour in 1988 when the EC's Medical and Health Programme, which preceded BIOMED I, launched a Concerted Action to coordinate national research in the field. A EUREKA project was launched by the French medical research institute INSERM in 1989, followed by a BIOMED I Concerted Action in 1992.

14 Years of Development

The fundamental idea was to implant part of the FES hardware inside the body. The partners' system involves placing a 4cm diameter implant just under the skin in the hip region and connecting it via a set of ten electrodes to five muscles in each leg. The implant also has a radio antenna which lies just below the skin's surface, allowing it to receive commands from an external control system.

Being about the size of a portable cassette player, this control unit can be easily carried by the user. It transmits radio signal sequences to the implant, which translates them into electrical impulses and sends them along the electrodes to the muscles. Different se-
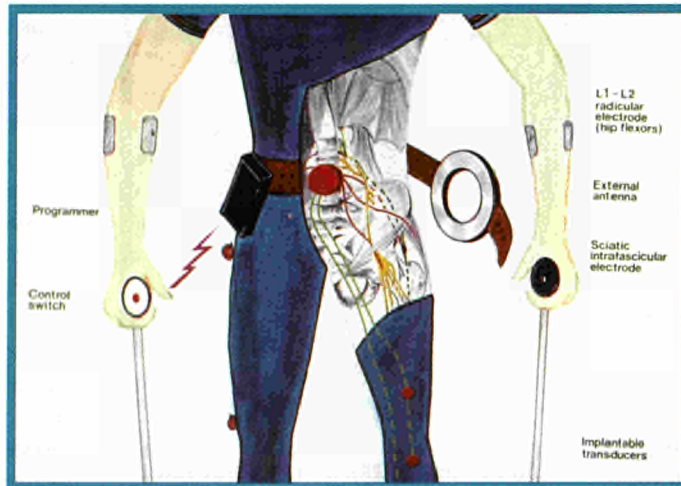
A new BIOMED II demonstration project is setting up pan-European clinical trials of technology to help the paralysed walk.

quences have been defined which approximate the body's own commands for standing, walking, climbing stairs, and so on.

The list of organisations which have collaborated during the past 12 years to get the technology this far is very long indeed. Of the eleven organisations in today's BIOMED demonstration project, however, one is new - Neuromedics, a company specifically formed by INSERM to coordinate the project and market its results. Other industrial partners in today's consortium include Thomson and IBM of France, BTS (Italy) and Roessingh (the Netherlands).

Clinical Trials

The next phase - clinical trials - is vital to demonstrating the technology's effectiveness. Either late next year or in early 1998, the SAUW project partners will implant FES systems in six paralysed patients in Denmark, France, Germany, Italy, Netherlands and the UK.

Carrying out these trials in six different countries will make a significant difference when it comes to having the technology approved by the 15 different health ministries around Europe. It will also require certain administrative skill to organise, as the operations must all take place in the same week to ensure that the same protocols - surgical implantation, patient assessment and training, follow-up, etc. - are followed by all.

Provided the trials are successful and the technology is approved, private funding must be found to take this innovative technology to the market. After a decade of pan-European development, some of today's paraplegics could therefore be celebrating New Year's Day of the year 2000 on their feet.

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Council as *Innovation & Technology Transfer* went to press.

Other BIOMED Areas

These are not the only areas of BIOMED relevant to the healthcare industry, of course. Area 1 - **Pharmaceuticals Research**, focuses on improving assessments of drug safety and predictions of the effects of specific chemicals, and will therefore reduce both cost and time delays in drug development.

This work will also reinforce two new organisations recently established by the EU: the European Medicines Evaluation Agency (EMEA), a new 'one stop shop' for approving drugs for the Single Market; and the European Centre for the Validation of Alternative Methods at the Joint Research Centre in Italy, which focuses on alternatives to animal testing, a priority of this action line.

Another area - **Diseases with Major Socio-Economic Impact** - covers basic research up to clinical practice for diseases such as AIDS, tuberculosis, cancer, cardiovascular disease, diabetes, arthritis, asthma, various age-related problems and rare diseases.

Other areas include:
■ **Brain Research**, which looks in particular at cell growth and degeneration;
■ **Public Health Research**, which examines issues relevant to health policy (education, economics, assessing health needs and technologies, etc.);
■ **Research on Biomedical Ethics**, covers a wide range of ethical and socio-economic aspects related to healthcare;
■ **Horizontal Activities**, including demonstration projects to transfer results from technology producers to users.

II. Other Programmes

BIOMED is one of three related research programmes under the 'Life Sciences' heading of the Fourth Framework Programme, the other two being Biotechnology and Agriculture and Fisheries (FAIR).

Like BIOMED, the 684 MECU **Agriculture and Fisheries Programme** promotes biotechnology applications within its specific sector. Of particular interest to the healthcare industry is an action line devoted to nutrition, which focuses on the role of food in general health, diseases and disorders, nutrient delivery and so on.

The 552 MECU **Biotechnology Programme**, on the other hand, funds research to reinforce basic biological knowledge for all applications. Its eight research areas focus on Cell Factories, Genome Analysis of Organisms Other than Humans, Plant and Animal Biotechnology, Cell Communication in Neurosciences, Immunology and Transdisease Vaccinology, Structural Biology, Infrastructures, and Pre-normative Research, Biodiversity and Social Acceptance.

As its full title implies, Biotechnology's Genome Analysis projects focus on simpler organisms than the BIOMED Programme. A recently concluded project, for example, resulted in the complete sequencing of the yeast genome - by far the most complex living organism to have been fully sequenced. Like BIOMED, Biotechnology also funds horizontal activities in areas essential to the exploitation of the life sciences, including demonstration projects.

So far the BIOMED II Programme and its predecessors have produced a series of twelve volumes covering the various projects and other issues, such as the coordination of medical research in Europe. All have been published by IOS Press. A quarterly newsletter is also available directly from the Programme.

Telematics and Risk Assessment

Research programmes outside the 'Life Science' heading also fund research in this field. Two subprogrammes of the Telematics Applications Programme[1], for example, focus on applying information and communications technologies to the healthcare sector:
■ **Telematics for Healthcare** aims to enable the entire health sector to benefit from access to telematics services at European level. Projects are funded in areas such as Multimedia Medical Records, Telemedicine, Information Services for Citizens and Healthcare Workers, Improving Health Service Management and more.
■ **Telematics for the Integration of Disabled or Elderly People** (TIDE - see case study, page 17) focuses specifically on improving the autonomy and quality of life of disabled and elderly people through these new technologies. Activities aim to improve these groups' access to the technologies and to develop systems (manipulation and control technologies) that can restore function.

Finally, two other Programmes have action lines dedicated to developing methods for evaluating health risks from the environment in general and pollution in particular (**Environment and Climate**[2]) and a wide variety of hazardous substances (**Standards, Measurements and Testing**[3]). The latter Programme can also develop reference methods and materials for assessing medical devices, pharmaceutical and cosmetic products, diagnosis and therapeutic measurements, food safety, drug monitoring and allergy identification, and so on.

(1) See edition 2/96.
(2) See edition 5/96.
(3) See edition 1/95.

Case Study: TIDE

Smarter Cards for All Users

The SATURN project is helping ensure that tomorrow's multifunctional smart cards are designed with the disabled and elderly in mind.

Self-service terminals are becoming more and more widespread, replacing the traditional 'person behind the counter' in sectors such as banking, telecommunications and public transport. This can cause problems for some users, especially Europe's 60 million elderly and 40 million disabled people.

Blind people, for instance, sometimes find the different layouts of keypads on cash dispensers and public telephones difficult to navigate. Many elderly and disabled users would also like clearer instructions (audio, visual or pictorial) on how to use a terminal, or improved physical access.

Ongoing developments in smart card technology offer many solutions. While current smart cards only hold up to 8kb of data, researchers plan to replace the chips with a more powerful 32-bit microcontroller. This opens up enormous possibilities for a wide range of new services.

The SATURN project, funded by the Telematics for the Integration of Disabled or Elderly People Programme, is studying the needs of disabled and elderly people to ensure that the new smart card systems are developed with their requirements in mind. Apart from studying user needs they are exploring technical possibilities, economic constraints, legal issues and standardisation.

More Power On Way

The new cards offer these users a number of intriguing possibilities. They could select their preferred interface during operations, for example, modifying character size and colour. Audio instructions - a likely innovation in many new smart card machines - could also be amplified or pitched at different frequencies for people with hearing difficulties.

Biometric technology is another possibility, allowing elderly and disabled

SATURN: ensuring that tomorrow's smartcards are designed for the needs of the elderly and disabled.

people to use their signature, voice or fingerprints to ensure card security, rather than a personal identification number (see the Innovation Project on page 3).

Contactless cards, which can communicate with other devices from a distance, are a third example. The first contactless cards were the pre-paid cards used by drivers to pay motorway tolls without slowing down as they pass through the toll-gates. Because users do not have to make actual physical contact, they would be a boon to people who have difficulty in inserting cards in machines.

Setting the Standards

SATURN's eight partners, led by the UK's Royal National Institute for the Blind (RNIB), found that if the design specifications for these new smart cards include the needs of the disabled and elderly then the additional costs of providing these services should be modest. Many services, in fact, should be economically viable, given that they could benefit all customers and the population is ageing.

Despite the existence of ten-year-old ISO standards, however, card standardisation and interoperability problems still remain - many smart cards today,

for example, are limited to specific machines. The successful launch of multifunctional, go-anywhere cards will require the close collaboration of organisations as diverse as financial institutions, telecommunications companies and transport operators.

SATURN is ensuring that these organisations do not lose sight of the blind, the elderly and other disabled groups. The project is designing prototypes and terminals and having them tested by a cross-section of users. The eventual aim is to propose new European standards for smart card encoding and legislation.

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▶ INFORMATION SOCIETY

Copyright in the Information Society

The Information Society poses new challenges in defining and managing intellectual property rights. Moves to improve and clarify these rights are accelerating at both European and international levels.

"Strong and effective rights must be created and balanced against the legitimate interests of users." - John F. Mogg, Director-General of DG XV.

The first national copyright law, enacted in England in 1710, served as the basis for much international law in the field. Despite the fact that national and international laws have been revised constantly since then, they do not reflect a world where information can be transmitted around the world at the speed of light, copied in limitless quantities with 100% fidelity, combined with other works of art to produce new products, and distributed for almost no cost.

Therefore the successful and equitable development of the Information Society, both in Europe and globally, requires a rethink of copyright and other related rights. This will help unlock the development of new products and services, which will in turn stimulate investment in infrastructure. It is also vital to protecting Europe's cultural heritage - a massive source of material for information society products.

EC Green Paper

In July 1995 the EC published a Green Paper on these issues (see edition 6/95), launching a Europe-wide consultation process. This consultation culminated in a two-day conference last June in Florence, Italy, opened and chaired by John F. Mogg, Director-General of DG XV (Internal Market and Finan-

cial Services).

"The conference brought together all the players who will be at the centre of future developments of copyright, including authors, performers, phonogram and film producers, broadcasters, publishers, collecting societies and academics, as well as representatives of governments and relevant international organisations," said Heinz Zourek, Deputy Director-General of DG XV. "It provided a unique opportunity to debate the issues, and proved that considerable progress has been made in analysing the effects of the new technologies on copyright."

The Commission aims to facilitate and protect the activities of those creating, producing and disseminating works and other protected material in the framework of the Single Market. Most at the conference agreed that no new concepts in copyright law are needed - "the environment has changed, but the basic copyright concepts and principles remain adequate".

Adaptations to their scope and limitations, however, will be necessary. This must both create strong and effective rights, and balance these rights with the legitimate interests of users, creating a Single Market for Information Society goods and services.

While several points of con-

troversy remain, a number of agreements were reached by the participants in the conference's four main panels, which dealt with 'Digital delivery and protected rights', 'Broadcasting in the Information Society', 'The future of the reproduction right' and 'Management of rights and control over works'.

The EC will issue a Communication shortly, setting out its Single Market policy in the area of copyright and related rights in the Information Society and the Commission's reasoning in the field, notably with respect to priorities and methods chosen.

With minimum standards of intellectual property protection required at an international level, the EC is also actively pursuing the current negotiations under the auspices of the World Intellectual Property Organisation (WIPO), the UN agency promoting the protection of intellectual property throughout the world. International agreement on some key issues is hoped for in the context of the WIPO Diplomatic Conference, to be held this December in Geneva. ▫

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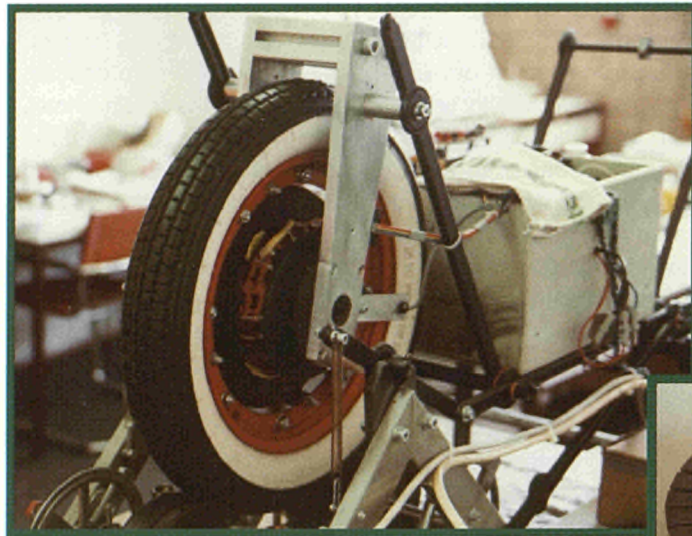
► THEMATIC NETWORKS

A Magnetic Network

*The Concerted European Action on Magnets (CEAM) coordinated
industrial magnet research across Europe for over 10 years.
A prize-winning electric motor is one of the results.*

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With applications as varied as public transport, consumer electronics and industrial motors, the new generation of rare-earth permanent magnets developed in the laboratories of the 1980s promised to deliver both miniaturisation and unprecedented power. While European companies and institutions possessed world-class expertise in the field, their activities were poorly co-ordinated and no country possessed the complete range of skills and resources needed to exploit these new magnets fully.

The EC launched CEAM[1] in 1985 to fill this gap. CEAM is not a 'shared cost' project. Instead, it networks Europe's researchers together through newsletters, short-term researcher exchanges and regular meetings, pooling the resources and expertise of nearly 100 universities, research institutions and industrial partners from 13 countries.

The Austrian/German consortium behind POWERMAG, a recently completed EUREKA project[2], has successfully used CEAM's work to build a revolutionary new electric motor that is simultaneously exceptionally powerful, light, compact, efficient and cool-running. This offers enormous possibilities to a wide range of industries, particularly electric cars, as the new motors are compact enough to be fitted inside vehicle wheels.

Combining CEAM's rare earth permanent magnets with the 'axial flux' design produces electric motors powerful and compact enough to be placed inside vehicle wheels, opening up new horizons in electric vehicle technology.

From CEAM to POWERMAG

How was the link from EC network to EUREKA project made? It started in the late 1980s, when Philips' plant in Vienna came across a local firm which had developed and patented an inexpensive way of producing 'axial flux' electric motors. This 'flat' motor design had been known for thirty years, but had proved too difficult to make for mass-production, despite its many advantages of power and size.

Seeing the potential, Philips sought EUREKA status for a development project. The EUREKA network then put the partners of this nascent EUREKA project in touch with Professor Kirchmayr of the Technical University of Vienna.

Professor Kirchmayr, an internationally recognised researcher in the field of rare earth intermetallics, was among the first scientists invited to take part in CEAM, although Austria was not at the time an EU Member State. The Institute's work in the preparation of magnetic alloys and characterising their physical, magnetic and electrical properties has been a mainstream part of CEAM's materials programme.
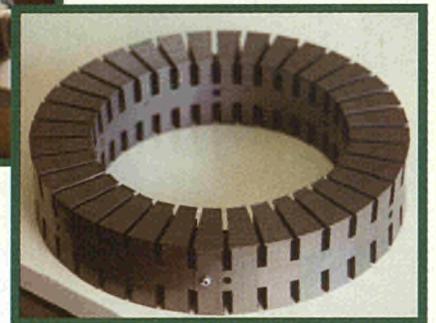
Tenfold Power Increase

Through this link the POWERMAG partners could access CEAM's mature and vibrant network of European know-how in cutting edge magnetism. The result was dramatic - by replacing conventional magnets with those created using CEAM's new rare earth formulations, the new motor's power was increased tenfold.

POWERMAG recently received the 1996 EUREKA Lillehammer Award as an innovative and marketable technology with outstanding environmental benefits. The partners now hope to find industrial partners to turn their industrial prototypes into products ranging from electric vehicle drive systems to washing machine motors. ■

(1) See edition 5/94 for more details on how CEAM operated. Similar activities are now funded by many of the research programmes within the current Fourth Framework Programme (see, for example, page 22).

(2) Edition 5/94 also features a Dossier on EUREKA.

▶ ESPRIT

Cashless Commerce

DigiCash's 'Ecash' technology carried off one of the Grand Prizes in last year's European IT Prize Awards. Small, nimble, and intensely focused, the Dutch company exemplifies the new generation of European enterprise which is leading the way into the digital age.

Dr David Chaum, DigiCash

Founded in 1990, DigiCash has pioneered the development of mechanisms for secure and private electronic payment using smart cards and electronic wallets. And Ecash, its system for payment via the Internet, is currently being introduced by banks in Finland, Germany and the United States.

DigiCash provides the enabling technologies at the heart of all these initiatives. Based on advances in cryptography patented by the company's chairman, Dr David Chaum, their implementation within the framework of six EC-funded projects will speed their take-up worldwide. They also give Europe a crucial lead in the global race to provide secure means for cashless commerce.

Cash on a Card

DigiCash has been behind some of the world's first cash replacement systems. Its road toll payment technology, originally developed for the Dutch government and now undergoing tests in Japan, is being further developed in collaboration with Amtech, the world market leader in the field.

The company has also produced a complete system for cashless transactions within closed environments such as companies, hospitals, and universities. Employees or students can 'feed' a smart card with conventional coins or notes, then use it to pay for phone

calls, photocopying, drinks, meals and other purchases, anywhere on the site. In a hotel, guests can even claim a refund of any cash left on their card when they check out.

The system is now in widespread operation in the Netherlands, where it is the largest multi-purpose smart card application. DigiCash, which developed the reload and refund machines and the interfaces to phones, cash registers and other equipment, as well as the cards themselves, has now started to license the technology to others.

Secure Internet Trade

More recently, DigiCash turned its attention to electronic trade. "For centuries, people have authorised payments and agreements by signing them," says company spokesman Paul Dinnissen. "A signature on a cheque or a contract has been accepted as legally binding proof of authorisation. But today, companies and individuals want to conduct business globally without the risks and delays inherent in the transfer of paper documents.

"The Internet offers the necessary infrastructure for electronic commerce. But its use is held back by concerns about security and privacy. Without our signature, how can a trading partner be certain that he will be able to enforce a contract? And if we send him a sig-

nature by fax, how can we be sure that he will not copy and misuse it?"

Digicash's system employs advanced cryptography to generate a digital signature whose source is verifiable, but which cannot be copied. Ecash's unique additional feature is the 'blind signature' technology, which ensures the privacy of transactions conducted using electronic money. This is what won DigiCash its European Information Technology Prize.

Digital Money

"For digital money to work," Paul Dinnissen explains, "you need three things. You need a message, stating the value of the 'coin'. You need a signature, guaranteeing its value. And you need a way to stop counterfeiting without filling large databases with pay or spending patterns. To prevent unauthorised copying of digital coins, Ecash allows money to be circulated only once.

"Just like a regular banknote, each digital coin has a unique serial number. Unlike a banknote, however, a digital coin is returned to the bank as soon as it has been used. But this poses a threat to privacy. Using the serial numbers, a bank could match payer to payee. Payments in electronic cash would be no more private than payments by cheque."

Blind signature technology enables the bank to 'sign' each

digital coin without being able to read its serial number. The customer chooses the value of the electronic coins he needs, and sends the request to the bank. The bank withdraws the appropriate amount from his account, validates the digital coins, and sends them back to the customer, who stores them in his computer.

When an electronic coin is used to make a payment, the payee returns it to the bank. But though the bank can recognise its own signature, and must accept the coin as a valid deposit, it cannot recognise the coin's serial number, and is therefore unable to tell who made the payment.

"Rival systems depend entirely on the bank's assurance that it will not use serial numbers to trace payments to a particular account," says Paul Dinnissen. "We think that the majority of people will demand a higher level of security than that before they are willing to adopt this new technology."

An Ecash system is already in operation in Finland and the United States. Deutsche Bank, Europe's largest, has also licensed the technology.

A European Strategy

DigiCash really is a small company. With just 35 staff, three-quarters of whom are technicians, it has remained tightly focused on what it does best - developing systems and technologies which it licenses to the much larger companies with the commercial resources to bring them to market. Its participation in European projects is central to this strategy.
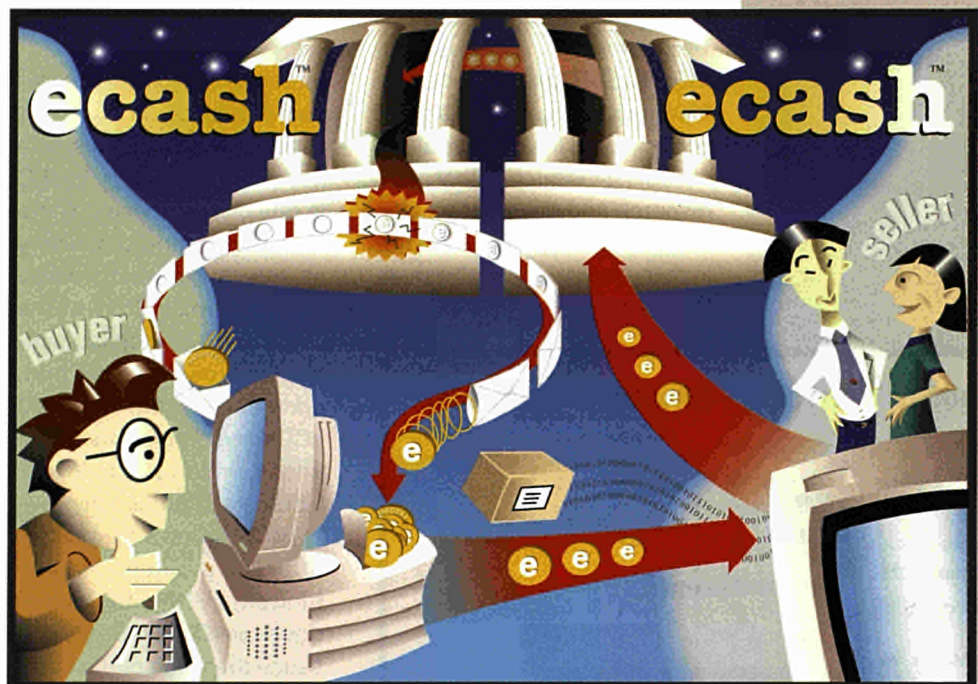
DigiCash is part of the consortium developing the electronic wallet in the ESPRIT(1) project CAFE. SOSCARD and CRISP are linked ESPRIT projects using state-of-the-art cryptography and the latest RISC processor techniques to design a low cost smart card with a standard operating system and advanced security features.

In another ESPRIT project, IMPRIMATUR, DigiCash and its partners are developing standards and tools to enforce copyright and secure payments for intellectual property rights in a digital environment. And the MILLION project aims to develop a system to speed the flow of information between a city's municipal authorities and its residents and visitors.

Finally, SEMPER, led by IBM and funded under the EC's ACTS programme(1), is an umbrella project which will specify, design and prototype all the elements needed to make fully electronic commerce a reality. Ecash provides the mechanism for electronic payments.

According to Dr David Chaum, what DigiCash gains from its involvement in all six EC projects is access to companies with the market presence to exploit its technologies. "For a small research and development company like ours," he says, "licensing is the sensible approach. European projects allow us to collaborate with companies which are able to realise our technologies rapidly and on a large-scale. That is invaluable."

Though it does not expect conventional money to disappear altogether in the next ten years, DigiCash is confident that progress towards the information society will continue. More and more aspects of everyday life will be handled digitally, and digital money will be used for an increasingly wide range of transactions.

Its involvement in European projects has helped it to win a world-wide reputation. And its 1995 European IT Prize recognises DigiCash's own contribution to efforts which have secured a European lead in a global industry of increasingly vital strategic and social importance. ◻

(1) For Dossiers on ESPRIT (Information Technology) and ACTS (Advanced Communication Technology and Services), see the Dossiers of edition 6/95 and 2/96 respectively.

E-cash, one of the first forms of digital money for the Information Society, was developed by EITC '95 award winners DigiCash through their involvement in several EC projects.

► BRITE-EURAM

Creating Industrial Synergy

BRITE-EURAM's Thematic Networks are designed to realise potential synergies between related research projects by supporting co-ordination and the exchange of expertise.

Launched in 1995 as part of the Industrial and Materials Technologies Programme (BRITE-EURAM) for 1994-1998[1], thematic networks support and fund the co-ordination of existing research, rather than research and development itself. Similar initiatives are found in many research programmes for this period.

Thematics Networks - funding breakdown

Legend:
■ Production Technologies
■ Materials and Technologies for Product Innovation
■ Technologies for Transport Means
■ Cumulative Total

This year saw a sharp rise in the number and value of Thematic Networks funded under the current BRITE-EURAM Programme.

They are funded to add value to the work of their component projects by extending their industrial or scientific outcomes and by broadening the transfer of technology and expertise among industrial, scientific and academic players. Funded activities in the implementation phase include workshops, the exchange of information through electronic or printed newsletters and bulletins, the exchange and training of personnel, meetings, and the production of regular progress reports.

Two Network Types

There are two different categories of networks:

■ **Type 1** networks link partners not already funded by the EC in one or two phases. There is an initial, non-compulsory six-month exploratory phase - during which 75% of the costs of travel, communication and meetings are met, up to a maximum of 45,000 ECU - and an implementation phase, which can follow or be entered into directly.

■ **Type 2** networks are clusters of RTD projects already funded by the EC, often under BRITE-EURAM. Because the value of the component projects has already been positively assessed, the evaluation of network potential is more straightforward and there is no exploratory phase.

For both types, the costs of co-ordination are funded in full during an implementation phase of up to 4 years, after which it is intended to be self-sustaining. In the case of Type 1 networks, there is an upper limit of 20,000 ECU per partner per year. For Type 2 networks this limit applies to component projects, regardless of the number of partners involved in each. The division between Type 1 and Type 2 networks is artificial, however - proposals for 'hybrid' networks linking research funded by the EC and by other means will be welcomed in the future.
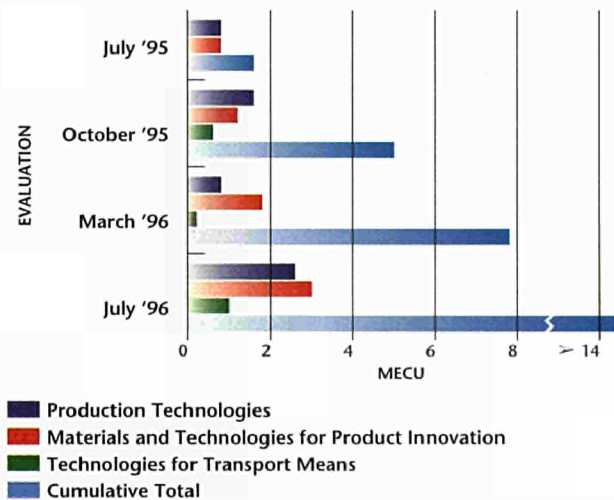
Building on Experience

Building on the experience of the earlier Targeted Research Actions. the initiative has clarified the goals of network co-ordination and refined the mechanisms for its delivery. The initiative imposes considerable rigour in the preparation of a co-ordinated workplan, but is able to offer extensive support in its development by drawing on the Commission's own expertise in the organisation of large transnational collaborations. Records of previously funded research can be used to identify additional partners.

The Commission is also more pro-active, identifying complementary projects and initiating many of the proposals for linkage itself, and has tightened the focus on defined objectives. Support is tied to progress against an agreed workplan with clearly stated milestones and deliverables.

The action line under BRITE-EURAM has a budget of 80 MECU. The call for proposals is continuous, and selections are made three or four times a year. To date, over 100 proposals have been assessed, and 37 networks are already operational across all BRITE-EURAM target areas. Four 'waves' of proposals have been evaluated to date, resulting in EC funding to date worth 15 MECU.

Contact
M. Brusati, XII/C-4
Fx. +32 2 296 70 23
E-m. marco.brusati@dg12.cec.be

(1) See the Dossier of edition 1/95.

▶ **CONFERENCES**

(Meta)Modelling Information Systems
20-22 November, Paris

Supported by the Training and Mobility of Researchers Programme (TMR), this seminar on "Methods of modelling and metamodelling for the development of information systems" will offer participants training in the use of metamodelling techniques and tools and on the different areas and problems of metamodelling.

The processes and state-of-the-art in metamodelling will be presented, with four teams who have developed metamodelling systems demonstrating their systems with a common application.

Contact: EC2 & Développement
Tl. +33 1 457 832 84
Fx. +33 1 457 587 27

Lifelong Learning in Europe
28-30 November, Dresden (Germany)

Within the context of the European Year of Lifelong Learning (1996), an international conference entitled "Lifelong Learning in Europe - New options for the integration of living, learning and working" is being organised by EGRIS (Europäische Gesellschaft für Regionale und Internationale Sozialforschung). It is aimed at researchers and scientists, as well as practitioners and multipliers, in the fields of education, social work and social policy, youth, gender relationships and economy. Specific topic areas include:

■ Unemployment and lifelong learning, changes of work/ changes of learning, participation in lifelong learning according to gender;
■ Pedagogical consequences of changed learning, formal/informal learning contexts, places of learning, local/regional networks of learning;
■ Combinations of family, learning and working, integration of social and educational policies;
■ Ethical dimensions of decisions in the educational process, leisure and learning.

Because it is supported by the Training and Mobility of Researchers (TMR) Programme, special conditions are offered for researchers under 35 years of age. Languages: English and German.
Contact: EGRIS
Tl. +49 7071 551 696
Fx. +49 7071 551 697
E-m. iris.tue@t-online.de

TELEMATICS Concertation
2-3 December, Brussels

The first annual concertation meeting for participants in the TELEMATICS programme(1) will discuss horizontal issues of interest to all sectors of the programme and enable participants to exchange experiences on technical questions of common interest.

Among the issues to be discussed are:
■ Human-machine interfaces;
■ Multimedia;
■ User-centred design and usability;
■ World Wide Web and the Internet;
■ Global services;
■ Satellites;
■ Information extraction and information overload;
■ Intellectual property rights, copyright and confidentiality.

The keynote address will be given by Robert Verrue, Director-General of DG XIII. Other speakers will include Commission officials responsible for the different sectors of the Telematics Applications programme, representatives of the hardware and software industries and users of telematics services.
Contact:
C. P. Maestro, DG XIII
Fx. +32 2 295 23 54
E-m. Carlos.Perez-maestro@ bxl.dg13.cec.be
Http:// www.concord.dcbru.be/

(1) See the 'Information Society' Dossier in edition 2/96 for more information on concertation.

Information Days

A number of RTD programme-oriented information days are being held in the coming weeks, some in preparation for the upcoming Calls for Proposals many programmes are planning for December.

Although they focus on different programmes they have similar aims - to explain the research areas of the programme concerned, how and why projects are selected, and to help participants find suitable partners for research projects. They are aimed at representatives from industrial enterprises, relevant public organisations, SMEs and research organisations.

Telematics for LIBRARIES
25-26 November, Stuttgart (Germany)

Organised by Deutsches Bibliotheksinstitut, the British Council and the Federal Ministry for Science, Transport and Art (Vienna), this event concerns the LIBRARIES activity of the Telematics Applications programme, which supports the development and use of innovative, user-oriented telematics applications in libraries. An overview of ongoing German projects in this sector will also be included. Conference language: German.
Contact: D. Herrmann, Deutsches Bibliotheksinstitut
Tl. +49 30 2311 9425/23119464
Fx. +49 30 2311 9410

BRITE-EURAM
3-4 December, Vienna

Organised jointly by the BIT International Office for Research and Technology Cooperation and the Austrian Innovation Relay Centre (IRC), the meeting will focus on the BRITE-EURAM III (Industrial and Materials Technologies) Programme, which is due to publish its third Call for Proposals in December. Language: German.
Contact: BIT
Tl. +43 1 5811 616
Fx. +43 1 5811 616 16

Transport
11 December, Brussels

Introduced by Mr. Wim Blonk, the Director responsible for research in DG VII (Transport), the day will include sessions on the Transport Programme itself as well as presentations on Commission Task Forces in the area of transport, and on COST activities.

There will be individual workshops on the seven sub-programmes. A catalogue of participants will be circulated before the meeting in order to help participants arrange meetings with potential partners. Conference language: English.
Contact: Joint Interpreting and Conference Service (SCIC B/3)
Tl. +32 2 295 90 51
Fx. +32 2 295 37 36

▶ **PUBLICATIONS**

■ THE ROLE OF TECHNOLOGY TRANSFER PROJECTS IN THE INNOVATION PROCESS
EUR 17010, 36.5 ECU

Proceedings of a conference of the same name organised by the Innovation Programme in February 1995, (see edition 1/95), this 300+ page volume examines technology transfer and innovation from a wide range of angles.

The lessons learnt from the technology transfer projects funded by the EC's SPRINT Programme (an Innovation Programme predecessor) form the introduction, while plenary sessions covered innovation and competitiveness, public policies to support technology transfer and diffusion, factors favourable to technology transfer and more.

The parallel sessions addressed a wide range of topics, including:
- global perspectives: presentations include 'Technology Transfer and Evangelism' and 'The Culture of Learning from Others';
- the different roles of technology providers and end-users (particularly SMEs), technology audits, etc;
- the public good sector: sharing technology, improving the urban environment, technology for the handicapped, and more;
- technology transfer in the supply chain, with an analysis of European automotive industry weaknesses;
- industrial exploitation of research;
- financing technology and innovation;
- improving project management;
- cultural barriers;
- sustaining technology transfer projects;
- improving project diffusion.

■ IPTS SPECIAL REPORT ON INNOVATION

The first special thematic issue of the "IPTS Report", produced by the Institute for Prospective Technological Studies (IPTS) of the Joint Research Centre, is dedicated to the theme of "innovation".

The report, available in English, French, German and Spanish, features five separate articles:
- The challenges of innovation;
- Networks of small firms confronting the challenge of globalisation;
- Electronic commerce and the new forms of industrial organisation;
- Innovation in services: the example of multimedia;
- Foresight and innovation: the role of initiatives at European level.

Contact: IPTS
Tl. +34 5 4488 284
Fx. +34 5 4488 235
E-m. ipts_secr@jrc.es
Http:// www.jrc.es/

■ EC RESEARCH FUNDING: A GUIDE FOR APPLICANTS
EUR 16729, 20 ECU

This fourth edition has been completely revised and is now almost 200 A5 pages long. It will be available in all EU languages. It first sets the context, introducing the means of research cooperation, the Fourth Framework Programme and other relevant programmes and initiatives such as the education and training programmes, EUREKA, COST, the structural funds, etc.

Part 2 - 'From the idea to the project' - focuses on the Fourth Framework Programme, covering issues such as rules of participation, Third Countries, general selection criteria, special support for SMEs, information sources, planning project costs, the '10 Golden Rules for applicants', the selection process and making contract negotiations easier.

Part 3 introduces the new model contract and covers contract management, payment schedules, and the use and dissemination of project results. This is followed (Part 4) by details of the individual research programmes. Finally, Part 5 covers related EC programmes outside the Fourth Framework Programme, including the education and training programmes, the structural funds and related Community initiatives, coal and steel research, information services (IMPACT) and international cooperation.

■ THE ENVIRONMENT AND REGIONS - TOWARDS SUSTAINABILITY

The EU Treaty requires that environmental considerations be taken into account in all Community policies, based on the overall objective of sustainable development. Published in English, French and German by DG XVI (Regional Policy), this report outlines Community policies in the environmental field (see Dossier, previous issue).

It stresses the importance of the interaction between environmental and regional policy and emphasises that the success of the Community's new environmental policy will depend above all on the quality of the actions carried out at national, regional and local level.
Contact: C. Sophie, DG XVI
Fx. +32 2 296 60 03

N O T E

If specific contact information for obtaining a publication is not supplied, refer to the 'Quick Reference Guide' (1/96). Publications are free unless otherwise stated.

New Information Brochures

Two EC research programmes have recently published new information brochures on their research activities:
- **TELEMATICS:** English (French and German editions in preparation).
Contact:
TELEMATICS Helpdesk
Fx. +32 2 295 23 54
E-m. telematics@dg13.cec.be

- **AGRICULTURE AND FISHERIES (FAIR):** English, French, German, Italian and Spanish.
Contact: M. Claessens, DG XII
Fx. +32 2 295 82 20

SUBSCRIPTION FORM

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