

SCIENCE
RESEARCH
DEVELOPMENT

RTD INFO

*News Roundup on EC Research and Technological Development Programmes***CONTENTS**

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TO OUR READERS

Information on Community research must be more transparent if it is to reach beyond the scientists, industrialists and politicians and penetrate to the wider public of Europe's citizens as a whole. Contrary to what is widely believed, people are in fact very interested in progress in science and technology. It is in response to this concern, as expressed by our readers in a recent survey, that RTD Info has changed its format. In addition to a central section listing all the usual practical information (calls for proposals, events, publications, etc.), in future RTD Info will be presenting articles providing a fuller explanation of RTD activities supported by the European Union, together with the results of Community projects. RTD Info seeks to provide its 200,000 readers with information which reflects the lively and dynamic nature of Community research today.

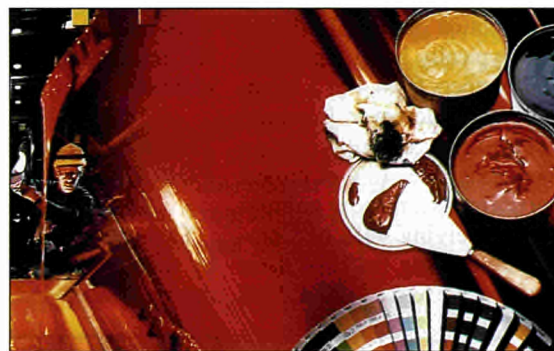
DG XII Communication Unit

IN FOCUS: BRITE EURAM

RTD in the service of European industry

For the past decade, BRITE-EURAM has been devoted to increasing European competitiveness by promoting RTD activities which concentrate on priority industrial objectives. Over the years, this specific Community RTD programme to encourage a multidisciplinary and multisectoral approach to Industrial and materials technologies has been expanded and adapted in order to meet the new challenges of global markets and to raise the technological level of the European industrial fabric. It has incorporated the Union objectives laid down in the Maastricht Treaty in terms of competitiveness and the innovative capacity of companies, growth and employment, the quality of life and respect for the environment.

European companies are the privileged partners and beneficiaries of research and development conducted under the aegis of BRITE-EURAM. This programme played a groundbreaking role in promoting the partici-



New industrial technologies in the paint manufacturing sector. BRITE-EURAM seeks to revitalise all the traditional industrial activities.

pation of SMEs by launching the "CRAFT" formula which is now applied in several other RTD programmes. BRITE-EURAM also initiated other original support experiments, such as the setting up of "thematic networks" of projects with common goals, accompanying measures designed to optimise the use of results, and the training of young researchers.

In the course of the following pages, we will be looking at these innovative initiatives of BRITE-EURAM.

(See p. 3)

An initial assessment for 1995

Community funding of ECU 2 billion and 2,660 new projects involving 12,185 participants, or the equivalent of 20,000 research posts. These are, in figures, the results of European RTD in 1995, as they appear in the Commission's annual report, published in September. The 4th Framework Programme is now in full swing.

The report on the activities of European RTD provides us with the model profile of shared-cost projects in 1995: with an average Community contribution of ECU 1 million, they typically bring together 6 or 7 partners from 4 or 5 Member States. Moreover, European companies are playing an increasing role: 40% of project participants are now companies, receiving 44% of Community funding (in 1994 these figures were 26% and 38% respectively).

INCREASED SME REPRESENTATION

Thanks in particular to technology stimulation measures specifically designed to facilitate their access to RTD programmes, SMEs accounted for 20% of participants, compared to just 17% in 1994. No fewer than 1,782 SMEs participated in shared-cost projects under the 4th Framework Programme in 1995.

This increased participation by SMEs is most evident in the Telematics, ESPRIT, Standards, Measurement and Testing, Environment and Climate,

Biotechnology, Biomedicine and Health, Agriculture and Fisheries, and Non-Nuclear Energy programmes.

LESS-FAVOURED REGIONS

Shared-cost projects involve 1,356 partners from what are considered to be less-favoured regions ("Objective 1" regions). These were involved in 46% of projects and received 17% of the total funding. This participation by zones lagging behind in development is all the more impressive when you consider that EUROSTAT surveys indicate that just 6% of EU researchers are employed in these regions.

THE CREATION OF TASK FORCES

The year 1995 was marked by the launch of Research/Industry Task Forces, the aim of

which is to forge closer links between industrialists and researchers, better co-ordinate their efforts, and concentrate RTD resources on the major needs of industry and society. In focusing on targeted priorities, the Task Forces also help European RTD to produce more visible results by highlighting the tangible benefits to citizens.

Eight themes were adopted: new generation aircraft, educational software and multimedia, the car of the future, transport intermodality, the environment and water, vaccines and viral diseases, the train of the future, and maritime systems of the future. Starting in 1995 and involving all the Commission's units interested in these areas⁽¹⁾, the Task Forces consulted widely with industry, the persons responsible for research policy in the individual Member States, and users, in order to identify problem areas, decide what must be done, and

draw up action plans for implementation during 1996.

THE INNOVATION DEBATE

Published at the end of 1995, the Green Paper on Innovation in Europe also initiated wide-ranging consultation. The analysis and proposals contained in this document gave rise to an in-depth debate in all the relevant professional circles throughout the first half of 1996. On the basis of this consultation, the Commission has submitted an action plan for innovation (see p. 9) to the Council of Ministers and the European Parliament. ■

(1) In addition to the RTD programme managers, the Task Forces also involve - depending on the specific themes - the units responsible for industrial policy, the development of the information society, the environment, education and training, transport, health, and regional development.

Projects launched in 1995 by RTD area⁽¹⁾

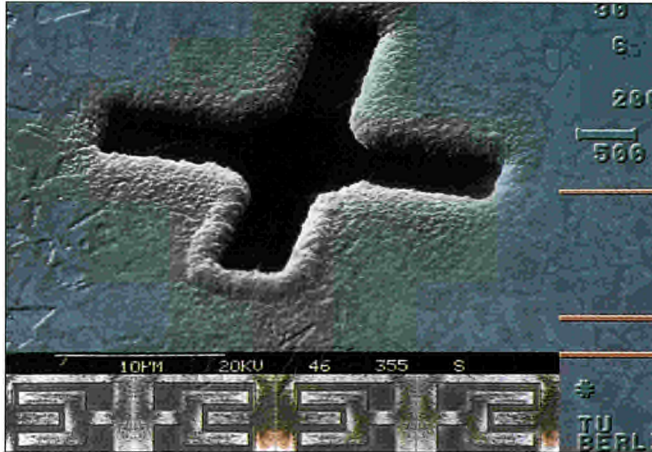
AREAS	NUMBER OF PROJECTS	NUMBER OF PARTICIPANTS	EC CONTRIBUTION (MILLION ECU)
Information and Communications Technologies	690	5766	880
Industrial Technologies	291	1187	209
Environment	84	118	31
Life Sciences	308	1368	210
Non-Nuclear Energy	172	1029	173
Thermonuclear Fusion	181	199	251
Others	934	2518	278
TOTAL	2660	12185	2032

(1) Contracts signed in 1995. All actions combined: out of a total financing of ECU 2,032 million, 1,911 million - or 94% - went to shared-cost actions.



A multisectoral innovation strategy

Over the past 10 years BRITE-EURAM has invested more than ECU 2 billion in some 1,600 RTD projects of direct benefit to improving the competitiveness of European industry. Thanks to this programme, almost 3,800 companies, research centres and laboratories are now working together throughout Europe. Their aim: to develop environmentally sound industrial and materials technologies which will be essential to growth and employment in the years to come.



The BRITE-EURAM BE-3404 project - A new technology for semiconductor manufacture allows the production of sensors used in applications such as chemical engineering, automobile manufacture, the aerospace industry, etc.

A SYSTEMATIC APPROACH TO TOTAL QUALITY

Based on the long experience of earlier programmes, the strategy of BRITE-EURAM III (1994-1998) - which is still running - is to adopt an approach to RTD which concentrates on innovation in products, processes and organisational systems with a view to obtaining *total quality*, incorporating technological, economic and environmental considerations in the innovation process. The aim is to include these new technologies and processes in both traditional

sectors and new industrial activities.

With a considerably increased (ECU 1.6 billion) budget under the 4th Framework Programme, BRITE EURAM III is focusing on three principal areas of RTD:

- the development and integration of new production technologies to be incorporated in the "factory of the future";
- traditional and advanced materials engineering and an increased technological capacity for European industry in order to develop innovative products with a high added value as a means of re-launching growth and employment;
- new technologies to be used in means of transport which are both competitive and respect the environment.

In these fields, BRITE-EURAM III is seeking to promote multisectoral and multidisciplinary technologies which promise wide-ranging applications, by promoting increased co-operation and integration between European industry, research organisations, and universities. ■

In the early 1980s, the European Community received the mandate to widen the field of European RTD support programmes, previously essentially limited to nuclear energy and iron and steel. The first step was the ESPRIT initiative, devoted to the field of information technologies. Then, in 1985, the European Commission proposed the launch of BRITE (*Basic Research in Industrial Technologies for Europe*), a programme designed to revitalise the traditional sectors of industry by introducing new processes. The following year this was followed by EURAM (*European Research in Advanced Materials*), an initiative based on the development of new materials.

Three years later these two initiatives - which permitted the implementation of almost 300 projects - came together to form BRITE-EURAM (1989-1992) which integrated and further developed the work to date, adopting a strategy which was closer to market demands. During this initial period, the new programme devoted to *Industrial and Materials Technologies* funded 368 new projects totalling of ECU 330 million.

A 700% MULTIPLIER

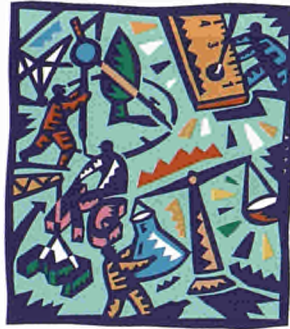
From 1991, the strategic positioning of BRITE-EURAM II (1991-1994) became progressively clearer. In particular, the aim was to encourage horizontal co-operation between multidisciplinary teams and vertical co-operation between suppliers, producers and users. With a budget of ECU 760 million, this second programme supported 450 projects. Special attention was paid to the effects of industrial innovation on job creation, improved working conditions and sustainable development. The first scheme to support the participation of SMEs - the CRAFT programme (see below) - was launched at this time. BRITE-EURAM also developed innovative impact indicators. A 1994 report presented an in-depth study of the direct and indirect economic effects of a representative sample of 50 projects. The results proved positive with an average economic return during the five-year period following the research activities of ECU 7 for every ECU 1 invested.



The range of BRITE-EURAM interventions



Perspectives on Industrial Technology



Standards, Measurements and Testing



Advancing Future Technologies



Technology for Transport Means

Posters produced to promote BRITE-EURAM

SHARED-COST ACTIONS

As is the case for most European RTD programmes, the principal form of financing granted by BRITE-EURAM III is the system of **shared-cost actions** where the Commission provides 50% of the costs of RTD projects selected following a call for proposals. 75% of the available funds are allocated in this way.

To date, two BRITE-EURAM III calls for proposals have made it possible to fund 479 projects (see the results of the 2nd call for proposals on p. 14). The next and final call for proposals, covering all areas of the programme, was published on 17 December 1996 (see details in the table on p.11) and could result in funding for almost 200 additional projects.

"CUSTOMIZED" ACTIONS FOR SMES

The remaining quarter of the BRITE-EURAM budget is allocated to specific initiatives designed to boost the programme's effectiveness and impact. The most important among them, the **technology stimulation action for SMEs**, receives 15% of the available financing. These measures may take one of two forms ⁽¹⁾:

- exploratory phase awards for project definition, partner search, establishment of the work programme, etc.;
- support for co-operative research pro-

jects (CRAFT actions). This formula allows groups of SMEs with insufficient resources of their own to commission university laboratories or research centres to carry out RTD activities for them.

THEMATIC NETWORKS

First tried out during BRITE-EURAM II⁽²⁾, the **"thematic networks"** - with a budget of ECU 80 million - are now a fast-developing strand of the current programme. The aim is to bring together various individually-run RTD projects which share similar technological or industrial objectives (see box below). These networks can give greater coherence to research activities and encourage the exchange of know-how and technologies. There are two kinds of networks, thereby ensuring maximum access:

■ **Type 1 networks** bring together projects which do not yet receive Commission funding and include two stages in order to encourage network creation:

- In the exploratory phase, the support is designed to bring together the potential partners around a network project and to draw up its work programme.
- In the implementation phase, the support concerns network co-ordination and integration costs once it is up and running.

■ **Type 2 networks** bring together projects already financed by BRITE-EURAM and in this case the support is for the **implementation phase only**.

These networks are selected by means of a continuous call for proposals. The selection - based on the merits of the project's objectives, the suitability of the partners and the quality of the co-ordination plan ⁽³⁾ - is made at regular

An example of a thematic network

In 1994, ten BRITE-EURAM II research projects, based on technologies for the reduction of vehicle emissions, came together within a thematic network. Each one of them approached the subject from a different angle in pursuit of a common goal: to speed up development of a clean, environmentally sound vehicle. The partners defined four strategic objectives: to meet the ultra-low emission standards as laid down in Horizon 2000; to comply with noise standards; to maintain these low emissions throughout a vehicle's life cycle; and to improve fuel consumption. The participants have co-ordinated and compared their work with the ultimate aim of increasing and widening the impact of the expected results of each of these projects. This example (TRA1-Cluster 4: "Emission Reduction Technologies") is one of the pilot initiatives which served as a test pad for the launch of the "thematic networks" action.

intervals, three or four times a year. Community funding covers co-ordination costs, including the exchange of information and personnel, seminars, etc. 100 proposals have been submitted to date, most of them requesting support during the "exploratory phase". Almost 40 networks are now up and running with a total budget of ECU 15 million.

ACCOMPANYING MEASURES

Finally, preparatory, accompanying and support measures ⁽⁴⁾ are also a fundamental aspect of BRITE-EURAM III. These complete the RTD strategy by:

- upstream, facilitating access for European RTD players to the programme benefits; in the case of current projects, providing logistical support to help projects achieve further progress;
- downstream, making optimal use of the results of RTD projects, principally by helping in their dissemination.

These accompanying measures - with a budget of ECU 51 million for the pro-



gramme duration - take one of the following forms: the organisation of conferences or workshops, the carrying out of studies, the use of external experts, campaigns to stimulate expressions of interest, the financing of training courses for young people within these projects (these training grants are described in more detail in the box below). ■

The BRITE-EURAM - BE-3152 project - Development of control systems and software to improve product quality and reduce costs in the cement industry.

The BRITE-EURAM training grants

Training is one of the accompanying measures offered under BRITE-EURAM III. Grants are awarded to young graduates seeking to build further on their knowledge by means of a training placement with an industrial partner involved in a current BRITE-EURAM project. This brings benefits to both parties. The training placement provides the young graduate with his first professional experience, thereby increasing his ability to embark on an industrial career. At the same time, the host company benefits from the up-to-date knowledge of the newly qualified trainee. These placements can last from 6 to 24 months. Preference is given to young people who have not yet worked in industry and whose qualifications are likely to lend an added value to the RTD project.

The **BRITE-EURAM training grants** are fully financed by the Commission and cover all the trainee's travel, accommodation and training costs. From a list of projects selected by the Commission, candidate trainees must themselves locate companies likely to accept them. An application is then submitted to the Commission for evaluation.

This measure is implemented in association with the "Training and Mobility of Researchers" programme. The call for proposals is continuously open with selection at regular intervals during the year. To date, ECU 3 million has already been allocated out of a total budget of ECU 10 million for the period 1994-1998.

- (1) See the statistics on these measures for SMEs in the last issue of RTD-Info (n°13).
- (2) These pilot networks were originally called "Targeted research actions".
- (3) On the basis of their experience in organising intra-European co-operation, the staff of the BRITE-EURAM programme can also help to set up proposed networks.
- (4) These also exist in the majority of the specific RTD programmes.

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BRITE-EURAM success stories

1. Tyres which are more resistant and more economical

The know-how of a tyre manufacturer combined with the scientific expertise of three research laboratories is going to make it possible to develop a new generation of tyres for light and heavy goods vehicles.

For this BRITE-EURAM project, known as "Improved Tyre Safety", the Italian manufacturer Pirelli joined forces with three partners in 1991: the University of Nottingham (United Kingdom), Rhône Poulenc Chimie (France) and Consorzio INMF (a group of Italian laboratories). The team developed a new coating technique for the fabric of ultra-fine steel filaments inserted under the surface of the tyre tread in order to increase resistance ⁽¹⁾.

The traditional method is for the filaments to be first treated with a fine layer brass coating to ensure good adhesion between the steel and the rubber. However, this method does not provide guaranteed protection against rust and the filaments must therefore be intertwined in order to ensure improved impermeability. The drawback is that this reduces the mechanical resistance of the metal structure. During the 1980s, Pirelli developed a new adhesion technique based on a double coating method (an inner zinc/cobalt layer and an outer nickel/zinc layer). This solution provided much better performance in terms of protection against rust and resistance, but it was neither technically nor economically feasible on an industrial scale. The BRITE-EURAM project, nevertheless, sought to build on the work undertaken by the Italian company.

Four years of research made it possible to show that nickel coating - which posed problems when drawing the filaments - was not essential and that a technique using exclusively a zinc/cobalt layer could produce the required properties. Prototype tyres were subject-



Comparative wear testing: on the right, the very pronounced wear of a traditional tyre with a brass-coated steel structure; on the left, the clearly superior result obtained on a prototype with a zinc/cobalt-coated steel structure.

ed to almost 110,000 km of tests on lorries driving under the conditions of extreme heat and poor road surfaces found in eastern Turkey. Patented by Pirelli, this innovation provides increased resistance and safety, together with a production cost 30% lower than the previous method and a 20% energy saving. This technology is set to become commercially available within the next few years as part of a new range of car tyres which will also incorporate other technological advances. The technology

could be available sooner for heavy goods vehicles where lower costs provide an even greater competitive advantage. ■

Reference: project BE-4215 - Improved tyre safety

(1) In the case of lorry tyres, the side walls are also reinforced and steel accounts for almost one quarter of their weight.

2. The detection of rare micro-organisms

A team of microbiology researchers has developed a new operational method for detecting rare cells and bacteria. The applications of this technology lie in three main areas: the rapid biological analysis of foodstuffs, early screening for cancerous micro-metastases, and genetic diagnosis on the basis of foetal cells circulating in the maternal bloodstream.

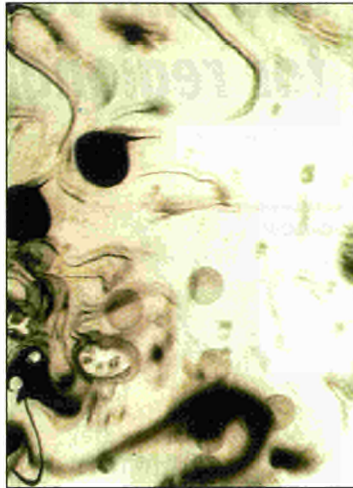
Each of these three areas represents a market of several billion ECU and is the subject of intense industrial competition

which is almost exclusively concentrated in the United States. The BRITE-EURAM "MEBIOCE" project started up in 1993 on the initiative of BIO-COM, the French leader in bioseparation and image analysis. This company was responsible for co-ordinating the research and developing the preparative and analytical instruments. It was assisted by seven partners: DYNAL (a Norwegian company), and six universities (Louvain-la-Neuve in Belgium; Nantes, Marseilles, Nice, Compiègne and Lyon, in France). Their aim was to develop bio-

selective polymers for ultra-sensitive cellular and bacterial detection for the purposes of diagnosis in the fields of biotechnology and medicine. These materials are to be included in specialised filtering and analysis systems.

In June 1996 the partners submitted the results of their activities. Compared with existing techniques, the detection method developed by MEBIOCE is both simpler and more accessible for the majority of laboratories. The method at present offers a sensitivity in the region of one cell per million and this could be significantly increased in the future. The identification of rare micro-organisms was confirmed by fluorescent immunological markers. This approach is 10 to 100 times more sensitive than present "direct" methods.

Special mention should be made of the



The detection of rare micro-organisms permits considerable progress in detecting cancer, the genetic diagnosis of foetal cells and food analysis.

results obtained by the University of Nantes research team in detecting micrometastases, which are present in the blood in minute quantities. This technique opens the way for a new method of screening and monitoring for cancerous diseases.

There is scope for immediate application in the area of industrial microbiology and in the medium term for medical applications where a more thorough assessment and official approval are required first. ■

Reference: project BE-7899/BRE2-0998 - Ultra high sensitivity integrated detection technology for cellular and bacteriological identification and control with bioselective polymers

3. A more environmentally friendly concrete

A new type of "sprayed concrete", combined with an improved application method, can make tunnel construction less polluting for the environment and more economical. The product, which is now commercially available, was jointly developed by three cement manufacturers, one additives producer and one materials research institute.

In 1991, the German authorities responsible for water protection opposed a project for the construction of two major tunnels on the Stuttgart-Ulm high-speed rail link. They took issue with the application of concrete by means of the spray method, widely used all over the world in order to provisionally stabilise the newly-excavated rock walls. It is a method which causes a great deal of pollution. The rail companies consequently turned their attention to Heidelberg Zement, the world's fifth largest cement producer, in search of an alternative. Supported by an Italian and an Austrian cement manufacturer, a German additives producer and the Univer-



A new technology for spraying concrete onto rock when building tunnels considerably reduces the pollution of water resources and the harmfulness of working conditions.

sity of Innsbruck materials research institute, Heidelberg Zement co-ordinated this BRITE-EURAM research project known as "Eco-friendly sprayed concrete".

The traditional method has a number of disadvantages, linked in particular to the simultaneous spraying of additives (necessary in order to increase fixation):

the caustic dust which is given off is very harmful to the health of any workers exposed to it and using water from the rock to wash the additives causes serious pollution of neighbouring water resources. After 30 months of work, researchers succeeded in developing a new formula which not only offers an alternative to the use of alkaline additives but also permits a concrete spraying technique which is much more efficient in terms of cost and logistics. The replacement additive can be pre-mixed with the cement rather than being separately sprayed. This technique provides a much more compact and less porous coating with 50% greater resistance.

Now patented, the method is already being successfully used in tunnel construction in Austria and Germany, in particular on the high-speed rail link between Frankfurt and Cologne. Market prospects in Europe and the rest of the world are very good. ■

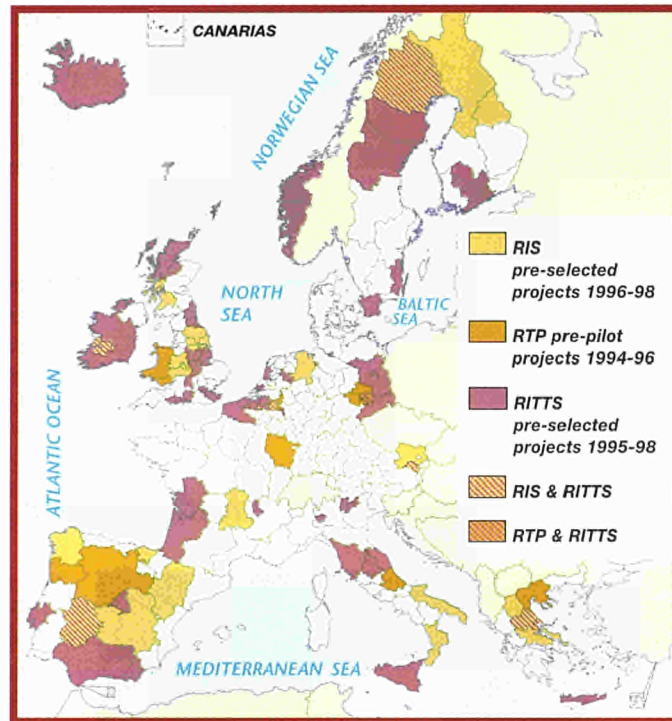
Reference: project BE-5189 - Eco-friendly sprayed concrete

RTD and innovation, key factors for regional prosperity

What role do RTD strategies play in regional development and economic and social cohesion in Europe and how do they help reduce disparities? Conversely, has not the strengthening of regional RTD policy become one of the essential keys for European development as a whole insofar as the regional level is the one most suitable for spreading innovation as it is closest to SMEs? These were the central questions for the third RESTPOR (Regional Science and Technology Policy Research) International Conference organised by the European Commission in Brussels in September 1996.

The three-day RESTPOR Conference allowed European experts to compare Europe's efforts in this area with the strategy applied in the United States, Canada, Japan, Australia and Asia. Workshop topics included regional policy for innovation, the role of industry in regional RTD strategy, ways of evaluating regional RTD potential and its socio-economic impact, technology transfer networks, strategies for RTD co-operation with non-EU countries, and the role of the regions in the information society.

Along with the rest of the world, the European Union presents considerable differences in living standards from one region to another.



The per capita GDP of the less-favoured regions is just one quarter of that of the most wealthy regions. But if you compare differences in terms of research and technological development infrastructure, you find they can be as much tenfold. It is for this reason, stressed Professor Jorma Routti, Director General of DG XII, that the implementation of regional RTD policy to reinforce the technological and industrial fabric of the less-favoured regions is now a priority objective for the EU's economic and social cohesion.

Until 1987, the amount allocated to regional RTD actions out of the Structural Funds - which are specifical-

ly intended to ensure this general policy of cohesion - had not exceeded ECU 180 million. Since then, progress has been made in redressing the balance. Between 1988 and 1992, allocations reached ECU 3 billion and, during the 1991-1994 3rd Framework programme, 70% of Europe's less-favoured regions improved their participation in Community research programmes, especially in Greece, Northern Ireland and the Republic of Ireland. Between 1994 and 1999, Structural Fund allocations for RTD actions could be as much as ECU 6 billion.

The most notable initiative in this direction was taken jointly by the ERDF (Euro-

pean Regional Development Fund) and the Innovation programme⁽¹⁾ (part of the Framework Programme). In 1994 they launched a triple Community financing programme for Europe's regions. These three parts concern: the realisation of regional technology transfer projects (RTT); the development of regional innovation and technology transfer infrastructures and strategies (RITTS); the setting up of regional innovation strategies (RIS).

Almost 70 European regions - or one in four - have to date declared themselves candidates for this kind of financing (see map). But, as was stressed by Mr Eneko Landaburu, Director General of DG XVI and ERDF manager, the options in terms of actions to promote regional RTD policy are a matter for the Member States when they draw up the list of proposed investments for ERDF contributions. ■

(1) See information accessible on site http://www.cordis.lu/innovation/src13bar_int.htm

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European RTD Policy

6th ESTA plenary meeting

ASSESSING RTD PRIORITIES FOR THE 5TH FRAMEWORK PROGRAMME

On 8 and 9 October 1996, the European Science and Technology Assembly (ESTA) was joined for its 6th plenary meeting by European Commissioner Edith Cresson. Founded in 1994, ESTA brings together around a hundred scientists from universities and industries in what is one of the Commission's principal advisory bodies on RTD policy. It has provided the Commission with several opinions on questions such as the role to be awarded to fundamental re-

search, the setting up of the research-industry Task Forces, and Europe's competitive position in worldwide research.

In September 1996, ESTA initiated a study of "Inventing Tomorrow" (see box below), the Commission's document which sets out the new guidelines proposed for the 5th Framework Programme. During discussions at last October's meeting, the Commissioner invited ESTA to pursue this analysis further and asked for its opinion on other subjects, particularly international scientific co-operation and the co-ordination of Europe's research policies and activities. On the second day, par-

allel working sessions studied the three priority research topics identified in "Inventing Tomorrow" in more depth.

INFO

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New action plan launched by the Commission

MOBILISING THE VITAL FORCES FOR INNOVATION IN EUROPE

Compared with its principal competitors, Europe is sorely lacking in innovation. But how are we to make up for this deficiency which is so worrying for the future of European competitiveness? Last year the Commission launched a wide-ranging debate on the "Green Paper on Innovation". Almost 5,000 people - business managers, heads of research centres, Members of the European Parliament, and representatives of professional organisations, trade unions, financial institutions, and public services - participated in these open discussions conducted throughout Europe. This unprecedented level of participation resulted in the drawing up of an "Action Plan for Innovation". At the time of going to press, the Commission was planning to submit this document to the Dublin European Council in December 1996.

The plan's proposals concern three fundamental aspects: the development of a genuine innovation culture; the adaptation of the administrative, legal, and financial environment; the reinforcement of research and the ability to draw practical benefit from knowledge and new technologies.

A special issue of the DG XIII magazine Innovation and Technology Transfer will be devoted to the Action Plan once it is published. ■

INFO

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Inventing Tomorrow

- To satisfy the hopes and expectations of citizens in terms of health, the environment and quality of life.

- To ensure that research has a positive impact on competitiveness and employment.

- To push back the frontiers of knowledge in a number of key areas for the future, by ensuring that Europe remains a focal point of scientific excellence.

- To create a climate which is more favourable to research and innovation in Europe.

These are the four fundamental objectives presented by the European Commission in "Inventing Tomorrow" which is its initial proposal to the Council of Ministers and European Parliament in defining the architecture of the next framework programme. The key areas identified in the area of science and technology are as follows:

- unlocking the resources of the living world and the ecosystem, two areas which should have an immediate impact on the quality of



life of citizens:

- creating a user-friendly information society, at the interfaces of information technologies, telecommunications and telematics, at the point where technological, economic, social and cultural considerations meet;

- promoting competitive and sustainable growth, by developing technologies adapted to the energy, transport and agro-industry sectors.

This important document has been published in the form of a brochure by DG XII and has already been widely circulated in French, English and German.

Inventing Tomorrow: Europe's research at the service of its people - Guidelines for the 5th Framework programme - EUR 16961 - ISBN 92-827-7913-0

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EUROPEAN WEEK FOR SCIENTIFIC AND TECHNOLOGICAL CULTURE

European week for scientific and technological culture

SCIENCE MEETS THE MAN IN THE STREET

From 25 to 29 November 1996, the European Commission held the 4th European Week for Scientific and Technological Culture. As in previous years, museums, specialised event centres, European and national research bodies, and the specialised media joined forces to present the European dimension of science and technology to the general public simultaneously across the continent. Sixteen projects bringing together some 125 partner organisations participated in this event.

Meetings and debates with scientists and researchers, visits, competitions, telematic forums, Internet experiences, and televised events attracted people all over Europe - especially young people. The topics covered included: the car and transport systems of the future, European commitment to space, the future of agri-foodstuffs, tomorrow's energy challenges, the role of mathematics in everyday life, contemporary research into astrophysics, the study of sleep, and the impact of the new technologies on employment. All these projects are described in a catalogue which is available from DG XII.

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"Life Sciences" Programmes

"MAD COW DISEASE": AN EMERGENCY EUROPEAN RESEARCH PLAN IS LAUNCHED

Faced with the serious risks posed to human health by the development of bovine spongiform encephalopathy (BSE), there is an urgent need for a determined research effort bringing together Europe's very best research teams. This is why the European Commission has agreed to the proposal made at the end of 1996 by Research and Agriculture Commissioners, Edith Cresson and Franz Fischler, to launch a research action plan on all the various forms of transmissible spongiform encephalopathies (TSE) such as BSE and other prion diseases, including Creutzfeldt-Jakob disease. Adopting the research priorities identified by the Weissmann group, this plan looks set to be allocated a budget of ECU 50 million, including ECU 35 million from the financial supplement to the 4th Framework Programme for European Research which is expected to be approved by the Council

of Ministers and European Parliament.

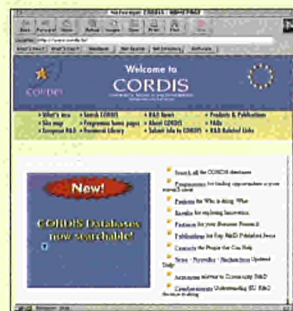
The research activities will be conducted in the framework of three of the specific programmes which make up the 4th Framework programme for RTD:

- The Biomedicine and Health programme: ECU 19.9 million (financial supplement of ECU 16 million to be approved).
- The Biotechnology programme: ECU 8.5 million (supplement of ECU 7.5 million).
- The FAIR programme (agriculture & fisheries), "animal health" area: ECU 22.3 million (supplement of ECU 11.5 million).

A specific call for proposals was launched in December in connection with the ECU 10.8 million available for animal health under the FAIR programme. As soon as the Parliament and Council reach a decision on the financial supplement, the Commission will be in a position to launch a joint call for proposals between the three programmes, probably early in 1997.

INFO
Bruno Hansen, DG XII-E
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Finding out about RTD via Internet



More detailed information on all the news contained in RTD-Info can easily be found on Internet.

- The DG XII Home Page presents all the basic information on the framework programme and a wide range of news on current or future RTD activities (press releases, calls for proposals, events, publications, etc.).
- Internet: <http://europa.eu.int/en/comm/dg12/dg12tst2.html>

- The CORDIS (Community Research & Development Information Service) site offers a wide range of information - on RTD programmes, projects, results, partnership searches, contact addresses, publications, conferences, etc. A search tool using key words permits access to nine data bases containing this information. CORDIS is also the host server for several specific programmes of Community RTD.
- Internet: <http://www.cordis.lu/>

EUROPEAN RTD UPDATE

Ongoing/Upcoming calls

(from January 1997)

PROGRAMME (+ CONTACTS)	PUBLICATION	DEADLINES	AREAS (AND SPECIFIC CONTACTS)
INFORMATION TECHNOLOGIES (ESPRIT) INFO Gerda Colling Fx. +32-2-296.83.88	15.12.94	15.3.97	Continuous submission: long-term research; technology transfer actions; exploratory awards for SMEs.
	15.6.95	15.3.97	Continuous submission: training grants.
	15.3.96	15.3.97	Continuous submission: preparatory, support and transfer activities (software technology; technological components and subsystems; multimedia systems; long-term research; open microprocessor systems; high performance computing and networking; technology for business procedures; integration in manufacturing).
TELEMATICS APPLICATIONS INFO Fx. +32-2-295.23.54 E-m. telematics@dg13.ccc.be	17.12.96	15.04.97	4th call for proposals covering all the programme's main areas, except for Telematics Engineering.
	17.12.96	3.3.97* 2.6.97**	Two-stage call for proposals covering support actions, sub-sector 7: Integration Applications for Digital Sites (IADS). <i>Stage 1*(3.3.97): submission of pre-proposals;</i> <i>Stage 2**(2.6.97): submission of final proposals.</i>
	17.12.96	14.3.97* 16.6.97**	Joint call for proposals in 2 stages on educational multimedia software. <i>Stage 1*(14.3.97): submission of pre-proposals;</i> <i>Stage 2**(16.6.97): submission of final proposals.</i>
	15.9.95	15.4.97	Open call: support actions (awareness-boosting; dissemination of results and promotion of telematics; international co-operation; training).
INDUSTRIAL AND MATERIALS TECHNOLOGIES (BRITE-EURAM III) INFO Fx. +32-2-295.80.46 / 296.70.23 E-m. imt-helpdesk@dg12.ccc.be	17.12.96	see column 4*	3rd call for proposals: production technologies (area 1); materials and technologies for product innovation (area 2); transport technologies (area 3). • Area 3 (Transport): closing date 30.4.97; • Basic research linked to areas 1,2 and 3: closing date 30.4.97; • Industrial research in areas 1 and 2: closing date 15.9.97.
	Beginning of 97	31.3.98	Intelligent Manufacturing Systems: call open continuously (jointly with the ESPRIT programme).
	15.12.94	8.4.98	Open call for CRAFT (exploratory awards and cooperative research projects for SMEs).
	15.12.94	17.12.97	Open call for thematic network projects.
	15.12.95	20.5.98	Open call for support and accompanying measures.
STANDARDS, MEASUREMENTS AND TESTING INFO Pierre Mériguet Fx. +32-2-295.80.72	15.12.94	17.12.97	Call open for thematic network projects.
	15.6.97	27.11.97	Call for proposals for research linked to written standards and technical support for commerce; measurements in the service of society.
ENVIRONMENT & CLIMATE INFO See column 4 Fx. +32-2-296.30.24 E-m. environ-infodesk@dg12.ccc.be	17.9.96	15.1.97	Calls for proposals: environment technology (INFO: Goffredo Del Bino); research into the natural environment, environment quality and global change (Anver Ghazi); space technology applied to environment monitoring and research (Michel Paillon); human dimensions of environment change (Andrew Sors).
	15.12.95	20.3.97 20.8.97 20.3.98 20.8.98	Grants: research into the natural environment, environment quality and global change; environment technology; space technology applied to Earth observation and environment research; human dimensions of environment change. <i>INFO: Angel Arribas San Martin / E-m. angel.arribas@dg12.ccc.be</i>
	17.1.95	1.4.98	Technology stimulation measures for SMEs (cooperative research).
	15.6.95		<i>INFO: Jürgen Büsing / E-m. juergen.busing@dg12.ccc.be</i>

ONGOING / UPCOMING CALLS

PROGRAMME (+ CONTACTS)	PUBLICATION	DEADLINES	AREAS (AND SPECIFIC CONTACTS)
MARINE SCIENCE & TECHNOLOGIES INFO - R&D: Jean Boissonnas - Training: Elisabeth Lipiatou Fx. +32-2-296.30.24 E-m. mast-info@dg12.cec.be	15.3.96	27.6.97 12.6.98	Concerted actions (27.6.97) / Preparatory accompanying and support measures (12.6.98): standards for training and work; modelling; ocean data management and quality control for research and operational applications; use of heavy experimental equipment, research vessels and their modular equipment, large computing facilities and other technical resources in the European Economic Area; design of components and systems for heavy advanced equipment; calibration techniques and standards for marine instrumentation and observational equipment.
	16.4.96	15.1.97	Structure and dynamics of coastal ecosystems.
	20.3.97* 20.8.97* 3.4.97**	dates to be determined	Research training grants (20.3.97 and 20.8.97) and advanced training courses(3.4.97): marine science; strategic marine research; marine technologies.
BIOTECHNOLOGY INFO: R&D: Alfredo Aguilar / Demonstration: Alejandro Herrero Fx. +32-2-299.18.60 ELSA: José Elizalde Fx. +32-2-295.53.65 E-m. life-biotech@dg12.cec.be	15.6.97	September 97	Calls for proposals: cell factories; genome sequencing; animal biotechnology; cell communications in neurosciences; transdisease vaccinology; structure/function relationships; biosafety; biodiversity; infrastructures; horizontal activities. Demonstration projects in all areas.
BIOMEDICINE & HEALTH INFO: Alain Vanvassel Fx. +32-2-295.53.65	15.3.96 and 17.9.96	31.12.97	Open call: Training grants in all programme areas.
AGRICULTURE & FISHING INFO R&D: Xabier Goenaga / Agriculture, forestry and rural development; Arnaud Brochart / Fisheries & fish farming; Willem Brugge / Demonstration: Alejandro Herrero / ELSA: José Elizalde Fx. +32-2-296.43.22	December 96	March 97	Call for proposals: integrated production and processing chains; agriculture; forestry; rural development; fisheries and fish farming; co-operative activities; ethical, legal and social aspects (ELSA). Demonstration: all areas.
	June 97	September 97	Call for proposals: generic science and advanced technology for nutritious foods; agriculture; forestry; rural development; fishing and fish farming.
NON-NUCLEAR ENERGY (JOULE COMPONENT) INFO. See column 4	17.9.96	31.1.97	Shared-cost actions: energy RTD strategy; rational use of energy; renewable energies; fossil fuels. <i>INFO.: Michel Poireau - Fx. +32-2-296.68.82</i>
	15.1.97	15.05.97	Shared-cost actions: the areas of research will be defined later. <i>INFO: Michel Poireau - Fx. +32-2-296.68.82</i>
	15.12.94	17.12.97	Open call: preparatory, accompanying and support measures. <i>INFO: Priscila Fernandez-Canadas - Fx. +32-2-296.42.88</i>
	2.6.95	1.6.98	Call for expressions of interest for expert services. <i>INFO: Priscila Fernandez-Canadas - Fx. +32-2-296.42.88</i>
	15.12.94	17.12.97	Technology stimulation measures for SMEs (cooperative research projects and exploratory awards). <i>INFO: Ingrid Tenten - Fx. +32-2-295.06.56.</i>
	15.6.96	1.7.98	Training grants for young researchers (young graduates & post-graduates) in the area of non-nuclear energy. <i>INFO: Ingrid Tenten - Fx. +32-2-295.06.56</i>
NON-NUCLEAR ENERGY (THERMIE COMPONENT - DEMONSTRATION PROJECTS) INFO Wiepke Folkertsma Fx. +32-2-295.05.77	15.12.94	17.12.97	Calls for proposals: energy RTD strategy (rational use of energy, renewable energies, fossil fuels); dissemination of energy technologies (international co-operation, information & communication tools); preparatory, accompanying and support measures (financial instruments, environmental impact of energy technologies); technology stimulation measures for SMEs; exploratory phase of demonstration projects demonstrative projects for SMEs.

ONGOING / UPCOMING CALLS

PROGRAMME (+ CONTACTS)	PUBLICATION	DEADLINES	AREAS (AND SPECIFIC CONTACTS)
	17.9.96 September 97	31.1.97 January 98	Call for targeted type A demonstration projects (rational use of energy, renewable energies, fossil fuels).
	17.9.96	31.1.97	Call for targeted demonstration projects (advanced pulverised coal boiler using ultra super-critical steam-water cycle).
NUCLEAR FISSION SAFETY INFO: Werner Balz & Jaak Sinnaeve Fx. +32-2-295.49.91	17.1.95	1.11.97	Concerted actions & support to thematic networks.
TRANSPORT INFO Wilhelmus Blonk Fx. +32-2-296.83.56	15.12.96	15.3.97	Strategic research; rail transport; integrated transport chains; air transport; urban transport; waterway transport; road transport.
TARGETED SOCIO-ECONOMIC RESEARCH INFO: Stephen Parker Fx. +32-2-296.21.37 E-m. tser-secr@dg12.cec.be	15.10.96 15.9.97	15.1.97 15.12.97* * to be confirmed	Science and technology policy options; research into education and training; research into social integration and exclusion (only in certain areas).
INTERNATIONAL CO-OPERATION INFO: see column 4	13.2.95	1.3.97 1.3.98	Grants (Japan, Korea). <i>INFO: Louis Bellemin - Fx. +32-2-296.98.24</i>
	15.3.97	15.9.97	Science and technology cooperation with developing countries. <i>INFO: Timothy Hall - Fx. +32-2-296.62.52</i>
	18.4.97	10.10.97	Cooperation with Central & Eastern Europe and the New Independent States. <i>INFO: Rudolf Meijer - Fx. +32-2-296.33.08</i>
DISSEMINATION & EXPLOITATION OF RESULTS INFO: see column 4	15.12.96	16.3.97-18.9.97	European networks & services of technology transfer & innovation support. <i>INFO: Robin Miège - Fx. +352-4301-34544</i>
	15.12.96	16.3.97	Financial actions (Robin Miège).
	97 (to be determined)	97 (to be determined)	European networks and services of technology transfer and innovation support (Robin Miège).
	97 (to be determined)	97 (to be determined)	Network of innovation relay centres (complementary action). <i>INFO: Javier Hernandez-Ros - Fx. +352-4301-341.29</i>
TRAINING & MOBILITY OF RESEARCHERS INFO: Jürgen Rosenbaum Fx. +32-2-296.32.70 E-m. tmr-info@dg12.cec.be	16.9.96	3.2.97	Research training networks. <i>E-m. tmr-msf@dg12.cec.be</i>
	17.3.97 15.9.97	16.6.97 15.12.97	Research training grants (Marie Curie Fellowships). <i>E-m. tmr-grants@dg12.cec.be</i>
	17.3.97	17.6.97	Access to large-scale facilities. <i>E-m. tmr-info@dg12.cec.be</i>
	16.12.96 16.6.97 15.12.97	1.4.97 30.9.97 31.3.98	Euroconferences, summer schools and practical training courses. <i>E-m. tmr-info@dg12.cec.be</i>
MEASURES FOR SMES INFO: Giorgio Clarotti Fx. +32-2-295.71.10 E-m. marc.van-achter@dg12.cec.be	15.12.94	17.12.97	Industrial and materials technology; standards, measurements and testing; environment & climate; marine sciences & technology; biotechnology; biomedicine & health; agriculture & fisheries; non-nuclear energy; transport.

GENERAL INFORMATION: Otto von Schwerin • Michel Claessens • Stephen Gosden • Piia Huusela • Fax : +32-2-295.82.20
E-mail : michel.claessens@dg12.cec.be • stephen.gosden@dg12.cec.be • piia.huusela@dg12.cec.be

Results of the call for proposals

BRITE-EURAM III:

2ND CALL

939 proposals bringing together 6,802 partners and representing a request for Community cofunding of almost ECU 1.8 billion were submitted following this call, which closed in April 1996. However, the amount actually available under the call was only to ECU 400 million, with 42% for production technologies, 41% for materials and 17% for surface transport. Following evaluation, 261 projects, representing a request for support reduced from ECU 514 million to ECU 440 million by the panel of experts, were selected for participation in contract negotiation. 64% of these are industrial undertakings (one third of them SMEs). A high proportion of projects are in the car industry and materials sector. Initial estimates are that 243 of these projects could be financed out of the available funds. The remaining 18 proposals selected will be placed on a waiting list in case there are any funds remaining at the end of negotiations.

Biomedicine and health:

2ND CALL

This call, launched on 15 March 1996, attracted 769 proposals representing a request for Community cofunding of ECU 825 million, distributed as follows: pharma-

ceutical research (89 proposals), biomedical technology and engineering (200), brain research (222), AIDS and other infectious diseases (125), human genome research (98). 35 proposals for demonstration projects were also submitted.

Biotechnology:

2ND AND 3RD CALLS

Following the 2nd call, the complete list of the 152 selected projects is now available and can be consulted on the Internet site mentioned below⁽¹⁾. 65% of the projects include at least one partner from industry. The principal areas of research are as follows: cell factories (25 projects); genome analysis (6); plant and animal biotechnology (26); cellular communication in neurosciences (24); immunology and trans-disease vaccinology (14); structural biology (22); pre-normative research, biodiversity and social acceptance (17); infrastructures (8); horizontal activities (14).

On the closure of the 3rd call for proposals launched by the Biotechnology programme, 389 proposals had been submitted. The two new areas opened up by this call - Structural Biology & Environmental Electronics and Biotechnologies - were the subject of 26 and 31 proposals respectively. A sharp increase in demonstration projects was also recorded with 37 proposals received compared with just 8 at the time

of the previous call. The evaluation should be completed for December 1996.

(1) <http://europa.eu.int/en/comm/dg12/dg12st2.html>

Agriculture and fisheries:

4TH CALL

This call, which closed on 16 June 1996, was targeted at food and nutrition (area 3) in particular and received by far the greatest number of proposals for RTD projects. These cover research on: microbiological and toxicological aspects (new antimycotics and antimicrobics, new conservation techniques, lipid content control, flavour improvement, etc.); relationships between nutrition and health (in relation to cardio-vascular diseases, cancer, diabetes, allergies, etc.); the applications of vegetal genetic engineering (edible vaccines, new probiotics, etc.); the improvement of nutritional content (protein, fibre, starch content); technologies in the food industry. Proposals were also received for research concerning industrial processes (area 2) with the emphasis on non-food applications (bioenergies, pollution-free agri-foodstuffs processes, industrial uses of vegetable fibre).

Non-nuclear energy

JOULE COMPONENT

Last November the Commission decided to fund 51 research projects in the area of renewable energy follow-

ing a supplementary call for proposals launched early in 1996. The financial contribution will be in the region of ECU 39 million, bringing the resources allocated to renewable energy in the JOULE component to ECU 140 millions or 57% of the programme's total funding. Two further calls for proposals are to be made before the end of the 4th Framework Programme.

Transport:

1ST CALL

Published in December 1994 and closed in March 1995, this call brought 339 proposals involving 2,431 participants and representing Community funding of ECU 488 million, or almost 4 times the available budget (ECU 117 million). On completion of the selection process, 11 projects were selected bringing together a thousand partners. The principal research subjects concern transport systems strategy (28 projects), waterway transport (21), aviation (20), urban transport (15), road (13), and rail (9).

Recent publications

RTD POLICY

Technology Management and Public Policy in the EU - Studies and proposals based on a survey of 250 European companies - ISBN 92-827-552-5

INFO: Office for Official Publications of the European Communities, Fx. +352-48.85.73

INDUSTRIAL AND MATERIAL TECHNOLOGIES

Thematic Networks Information Package - Basic guide for the submission of projects for this kind of network - ISBN 92-827-7343-4

Guidance notes for accompanying measures - Basic guide for the submission of projects for studies, information exchanges, the exploitation and dissemination of results, and training, (1996, at present available in English) - ISBN 92-827-3903-1

INFO: BRITE-EURAM Help Line, Fx. +32-2-295.80.46

ENVIRONMENT AND CLIMATE

The use of remote sensing for land degradation and desertification monitoring in the Mediterranean basin - Report on the seminar in Valencia (Spain) in 1994, edited by J. Hill and D. Peter - EUR 16732 - ISBN 92-827-7784-7

Agroclimatic change and European soil suitability - 1990-94 Research results - Presentation of the models developed by the ACCESS project in order to forecast the effect of climate change on agricultural yields throughout Europe - EUR 16826 - ISBN 92-827-6820-1

INFO: M. Weydert, Fx. +32-2-296.30.24

BIOTECHNOLOGY

1996 Directory of BIOTECH Trainees: Presentation of the CVs of almost 150 Marie-Curie Fellows who have completed their research training thanks to the programme BIOTECH - EUR 16997 - ISBN 92-827-4662-3

INFO: S. Hogan, Fx. +32-2-299.18.60

AGRO-INDUSTRIAL RESEARCH

Air Agro-Industrial Research, Food Projects Synopsis - Presentation of the 72 projects financed under the 3rd Framework Programme.

Bioconversion Assessment Study - Possibilities for producing ethanol by means of the bioconversion of lignocellulosic materials, in particular thanks to the exploitation potential of sweet sorghum crops - EUR 16515 - ISBN 92-827-7210-1

A study on the possibilities to lower the content of methyl-alcohol (methanol) in eau-de-vie from fruit - EUR 16864 - ISBN 92-827-7208-X

Lignocellulosic energy crops in different agricultural scenarios - EUR 16514 - 92-827-7209-8

INFO: A. Luchetti, Fx. +32-2-296.43.22

NON-NUCLEAR ENERGY (JOULE COMPONENT)

Task Force V The car of the future: Newsletter n°2 - Contents: the content of recent calls

for proposals by the Non-Nuclear Energy and Information Technologies programmes, which make a direct contribution to the Task Force objectives.

INFO: Eric Ponthieu,

Fx. +32-2-299.18.47

ExterneE Newsletter - This is now accessible on the following Internet site:

<http://www.jrc.es/extprojects.html>

NUCLEAR FISSION SAFETY

Synopsis of Research Projects (1994-1998) - Description of the 105 projects selected following the 1st call for proposals which closed on 20 March 1995 - EUR 16980 - ISBN 92-827-8195-X

OKLO - Natural Analogue for radioactive waste repository - Report on phase 1 of the OKLO natural nuclear reactor, permitting analogical studies on the behaviour of radioactive waste buried at depth - EUR 16857

Post-disposal safety assessment of toxic and radioactive waste: development and testing of the SACO methodology and code - R.H. Little and al. - EUR 16871

Reinforced Concerted Action On Reactor Safety (1990-1994) - Final Progress Report - Results of 8 projects carried out in the field of the analysis of serious accidents - EUR 17126

INFO: G. Cottone,

Fx. +32-2-295.49.91

RTD-Info available on the Internet

Since issue 13 (October), it has been possible to consult virtually RTD-Info - in French, English or German - on the DG XII Internet site. Issue 14, which you now have in your hands, will be available on-line from January 1997.

Internet address: <http://europa.eu.int/en/comm/dg12/rtdinfo.html>

Agenda

INFORMATION SOCIETY

The Regions and the Information Society - Brussels, Belgium, 30-31/1-1997

INFO: N. De Michelis,

Fx. +32-2-296.32.71

MARINE SCIENCES AND TECHNOLOGIES

3rd MAST and EUROMAR Market Days - Lisbon, Portugal, 20-23/5/1998

INFO: J. Acevedo,

Fx. +32-2-296.30.24

BIOTECHNOLOGIES

Conference of Marie Curie Fellows - BIOTECH programme - Copenhagen, Denmark, 17-18/4/97

From the Laboratory to the Marketplace - Seminar on 2 case studies - Sienna, Italy, 8-15/6/97

European Biotechnology Congress - Budapest, Hungary, 18-22/8/1997

INFO: A. Vassarotti,

Fx. 32-2-299.18.60

NUCLEAR FISSION SAFETY

Melting and recycling of metallic materials from decommissioning - Nyköping, Sweden, 11-13 June 1997

INFO: K. Pflugrad,

Fx. +32-2-295.49.91

INTERNATIONAL CO-OPERATION

Research, Development and Co-operation - Leiden, the Netherlands, 11-13/3/1997

INFO: C.-H. Metzger,

Fx. +32-2-296.60.20

INNOVATION PROGRAMME

Validation of RTD results - Manchester, UK, 31/7/97

INFO: IETT, Fx. +44-171-628.76.92

Down Time to Market Plus - Veldhoven, the Netherlands, 6/2/1997

INFO: Innovation Centre, Breda, Fx. +31-76-564.67.36

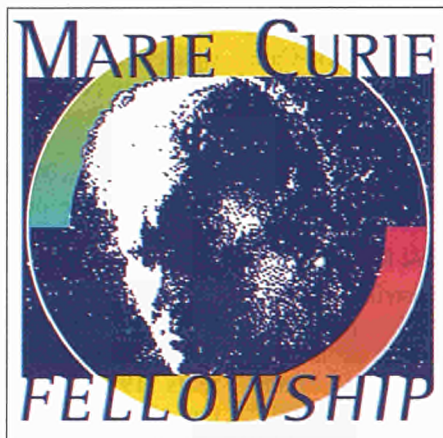
Technology Transfer Days - Kalmar, Sweden, 3-4/3/1997

INFO: Jan Olafsson, ALMI, Fx. +46 491-84.184

Marie Curie Fellowship Association launched

There is nothing like completing your training with between one and three years' research at a foreign laboratory or scientific institution to add that extra impact to your curriculum vitae. With support from the European Union, more than 5,000 young people - either new graduates or with previous research experience - have been given this valuable opportunity. Since 17 October 1996, this grant scheme for research training has been known as the "Marie Curie Fellowships".

Winning a European grant under the Training and Mobility of Researchers programme in order to carry out research in another country is a significant "plus point" in the curriculum vitae of any scientist or engineer. The candidates are many and the selection criteria applied by a jury of scientists and engineers are stringent. A recent poll



The "Marie Curie" label will permit a better identification of the rich experience gained by holders of European research training grants.

showed that almost nine out of ten former grant-holders go on to pursue a research career in which they rise rapidly to positions of responsibility.

It was on 17 October that European

Commissioner Edith Cresson announced the creation of the "Marie Curie" fellowship for young EU grant-holders and launched the new association of which they will now be members. This reference to a model pioneer of contemporary European science will give a clearer identity to the enriching experience gained by past or present recipients of these research training grants.

The new association has set itself the following aims:

- to promote the fellowship's recognition and renown;
- to create a network of contacts between Marie Curie Fellows both during and after their period of research;
- to establish structured links between the association and the research world as a whole;
- to encourage greater awareness of the European dimension of research and to promote the image of science and technology among the general public.

A number of projects are already in the pipeline - such as exchanges in social, cultural, administrative and scientific areas, the launch of an information newsletter, and the creation of an Internet site. The association will not only operate at the international level but also through regional or local groups. In this way it will assist both new fellows and researchers who return home after completing a period of research training, in particular in furthering their career plans. It will also advise the Commission on the implementation of grant programmes. ■

What do the Marie Curie Fellowships offer?

With a total budget of ECU 792 million allocated to the Training and Mobility of Researchers programme⁽¹⁾ for the period 1994-1998, the sum of ECU 277 million should make it possible to award between 3,000 and 4,000 Marie Curie Fellowships⁽²⁾. These grants are available to all EU nationals and nationals of Iceland, Liechtenstein, Norway and Israel under 35 years of age. They fall into four categories:

- at least 65% of the available funds go to young people at a "post-doctorate" or equivalent level, for research periods of between 6 and 36 months;
- up to a maximum of 20% is awarded to doctorate level students or to post-graduates with at least 4 years' research experience, for a research period of between 6 and 24 months;
- "return grants" are reserved for post-doctorate researchers from the EU's less-favoured regions in order to help them return home and join research teams;
- finally, grants are awarded to high-level, experienced researchers (visiting professor level) for periods of between 3 and 12 months in research institutions in these same less-favoured EU regions.

(1) MARIE Curie Fellowships are also awarded by 11 other European RTD programmes.

(2) At the end of 1996 almost 1700 grants had already been awarded under the 4th Framework Programme.

INFO

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

More than a thousand research posts to fill

Do you have a solid scientific background and would you welcome the opportunity to join a European team active in high-tech research? Thanks to the 96 Research Training Networks recently selected following calls for proposals launched by the Training and Mobility of Researchers programme, more than a thousand new posts are to be offered to young people in 1997. They will join some 750 teams already involved.

The Research Training Networks initiative, already successfully piloted under the Human Capital and Mobility programme 1991-1994 (see box), has been considerably reinforced in the Training and Mobility of Researchers programme under the 4th Framework Programme 1994-1998. With a budget of ECU 350 million, it supports net-

works all over Europe which bring together several multidisciplinary teams working on a common and clearly defined subject. The 96 networks selected to date, involving 750 partner teams, cover the fields of chemistry (14 networks), life sciences (23), mathematics and information sciences (12), physics (22), earth sciences (7), engineering (11), and economic and social sciences (7).

The funding granted to these networks will be used to recruit young researchers qualified to contribute to the work of the teams, provided they are employed outside the candidates' country of origin. Three-year contracts are awarded to candidates no more than 35 years old⁽¹⁾ and with the necessary training and experience to equip them to make a valuable contribution to high level research activities.

This method of stimulating training

by encouraging the mobility of researchers working within a network is of proven value - as can be seen from the many research teams to have expressed an interest in it. Another very positive effect of the networks is to create a new stimulus for co-operation between the various teams and their different research topics. ■

(1) Except in special cases (military service or young dependent children).

INFO

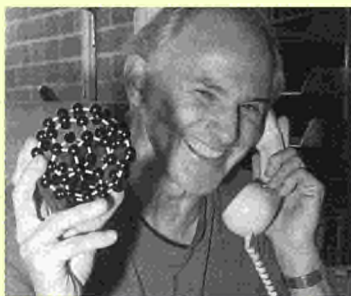
DG12 / G2 - Christiane Bernard

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E-m. tmr-networks@dg12.cec.be

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

The 1996 Nobel Prize for Chemistry and young European researchers



Sir Harold Kroto, winner of the 1996 Nobel Prize for Chemistry, presenting a model of the C₆₀ carbon molecule, whose structure resembles the form and geometric pattern of a football.

Thanks to a Research Training Network funded under the Human Capital and Mobility programme (HCM), young Europeans have been involved in research activities awarded the 1996 Nobel Prize for Chemistry. The Prize was awarded to a trio of scientists - Harold Kroto from the United Kingdom, and Robert Curl and Richard Smalley from the United States - for their discovery of fullerenes. This new family of carbon-based molecules, of which the famous C₆₀ fullerenes present a characteristic "football" structure, have remarkable physico-chemical properties. Their synthesis has opened the door to many promising applications, particularly in biomedicine and electronics.

"The European Commission Human Capital & Mobility programme enabled our research

group at the University of Sussex, to form a trans-european network on fullerenes, spear-headed by our colleagues in Berlin," explains Sir Harold Kroto. *"This network has been particularly beneficial in supporting the training of European research students who have gained valuable knowledge on the new techniques in the study of fullerene behaviour."*

Firmly committed to the training of young researchers, at the time of the 1995 EU Contest for Young Scientists, Professor Kroto took a personal interest in the research activities into carbon molecules of a British winner, school-boy Roddy Vann. This young scientist, who is now continuing his studies at Cambridge University, was inspired by the work of Professor Kroto's team, and is still in contact with them.

A Green Paper for mobility

PUTTING AN END TO THE OBSTACLE COURSE ...

Studying, further training, carrying out research, teaching in another European Union country ... it all still sometimes amounts to something of an obstacle course. In some Member States, unemployed people who opt for mobility for more than three months risk losing their benefits and social security. Neither workers nor students, young graduates on a training placement abroad often find themselves in a legal vacuum. Researchers on a grant can sometimes be exposed to particularly demotivating taxation. As soon as they set off to complete their training abroad, students lose the benefit of their national grants and have no guarantee that their training will be automatically recognised in academic circles...

Yet at the same time everybody points to the benefits of the transnational route and there is a growing demand for further training abroad: 170,000 students benefited from the Erasmus programme in 1995/1996 compared with just 3,000 in 1987/88.

To overcome these obstacles, the Commission has just published a Green Paper entitled Education-Training-Research: obstacles to mobility, which is to be the subject of wide-ranging consultation. Nine possible courses of action are to be the subject of in-depth study and debate.

These are designed in particular to provide a legal framework which will put an end to the legal, administrative and fiscal obstacles to mobility and provide a single Union-wide status for those who opt for mobility. They also seek to create a genuine European qualifications area with mutual recognition of studies. Finally, these proposals will also hopefully allow less privileged students to benefit from training periods in another country - in particular by abolishing the principle whereby grants are linked to the country of origin, improving information about the existing possibilities and encouraging language learning.

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The 70 participants for the 1996 European Union Contest for Young Scientists, Finland.

8th EU Contest for Young Scientists

BUDDING SCIENTISTS

As the winners of the national competitions held in 22 European countries, 70 candidates aged between 15 and 20 entered this year's 8th EU Contest for Young Scientists, sponsored by the Training and Mobility of Researchers programme. The Competition was held from 25 to 28 September in Helsinki. The international jury of leading figures from the world of science awarded the first three prizes of ECU 5,000 to the following candidates:

- Tobias Kippenberg, 19, of Bremen, Germany for an in-car ice-detection system using micro-wave emissions and infrared rays. This innovative process is an improvement on existing devices and was also selected for presentation at the International Science and Engineering Fair in Louisville (USA).
- Yann Ollivier, 18, Paris, France for mathematical research into the flexibility of jointed lattice work. This new approach to a complex mathematical problem - with potentially interesting applications for the construction sector in particular - also earned its inventor an invitation to join a group of young scientists invited to the Stockholm International Youth Science Forum for the awarding of the 1996 Nobel Prize.
- Wouter Couzijn, aged 18, Alkmaar, Netherlands for a self-positioning "Locator" robot. Able to position itself in space and responding to a remote control which is as easy to operate as a TV control, this robot could be used by disabled people or employed in hostile environments.

Three second prizes and six third prizes

were also awarded. The 1997 EU Contest for Young Scientists will be held in Milan from 9 to 14 September.

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Targeted socio-economic research

WHAT SCIENCE FOR WHAT SOCIETY?

What is the ultimate aim of scientific and technological development, if not to improve the quality of life for the citizen? It is not enough to amass knowledge and translate it into material innovations. Equally important is to ensure that this progress has a real impact on a society which is able to effectively and harmoniously integrate these innovations.

That is the objective behind the launch, under the 4th Framework programme (1994-1998), of the new specific programme devoted to "Targeted socio-economic research" (TSER). Three targets have been defined in this area, which has been allocated a budget of ECU 105 million for 5 years: the evaluation of Europe's science and technology policy options; research into education and training; research into social integration and exclusion in Europe. Some thirty specific topics covering these three areas have been identified.

A new type of research programme, TSER issued its first call for proposals in March 1995, limited to "Education and training". A dozen projects were selected on this occasion. On 10 October 1996, the Commission launched a second and wider call. This focused on ten specific themes, this time covering all the three programme areas. The final date for the submission of proposals is 15 January 1997 and the results of the evaluation should be known by the end of the first quarter. A new call will be launched during 1997. ■

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Multimedia in all schools

Learning in the information society. The title alone defines the objective of this action plan launched by the European Commission in October 1996. Over a three-year period (1996-1998), a major campaign will help primary and secondary schools to incorporate new multimedia technologies into their teaching programmes. This is a challenge for democracy in a society where access to knowledge is becoming increasingly dependent upon mastering new information channels.

Europe's families are fundamental to the education of its young people. But they are poorly - and unequally - equipped when it comes to multimedia facilities. Just 2% of French households have a PC equipped with a modem for connection to communication networks. In Germany the figure is 5%, in the United Kingdom 8% - compared to 20% in the United States. Consequently, only a minority of children have the opportunity of acquiring in their own home the skills in the new information technologies which are going to be increasingly important to their future working life.

Schools therefore have a vital role to play in effectively preparing young people in general for the information society. This priority is naturally in keeping with one of education's fundamental missions: in addition to imparting knowledge, schools must also guarantee equal opportunities.



Schools have an essential role to play in preparing young people for the information society (Photo ECTC, Athens, Greece).

UNDER-EQUIPPED SCHOOLS

Schools are also seriously under-equipped. Europe's schools, both primary and secondary, are lagging seriously behind in terms of technology. Just 5% of schools had access to the Internet in 1995, compared to one third of all schools in the United States. But behind this global figure we find very different situations in the individual countries. Whereas three-quarters of schools are connected to information networks in Sweden and Finland, in France and Germany the figure is no more than 2%.

In many cases there is a lack of basic equipment. Less than 1% of Europe's classes have direct access to a telecommunications network. In Ireland, almost 50% of schools in rural areas do not even have a telephone!

A EUROPEAN ADDED VALUE

At the Florence European Council, the call was made for every possible effort in order to speed up the entry of schools to the information society. The Learning in an Information Society action plan, adopted by the Commission on 2 October last year at the initiative of European Commissioners Edith Cresson and Martin Bangemann, was the prompt reply.

The plan aims to mobilise the financial resources of a number of Community programmes in pursuit of four main priorities:

- the networking of schools at European level;
- the development and dissemination of content;
- training and support for teachers and trainers; and,
- informing participants about the teaching potential of multimedia.

Seeking to initiate a dynamic at European level, the plan seeks to bring together experiences drawn from throughout the Union, to speed up the creation of a genuine European educational multimedia market, and to encourage the private and public sector to join forces in the interests of education.

The first concrete result of this initiative is the call for proposals launched on 15 December (see box). ■

The "Educational Multimedia" call for proposals

Further to the Learning in the Information Society Action Plan, the call for proposals launched on 15 December 1996 is one of the initiatives of the Educational Software and Multimedia Task Force. The areas covered correspond to the four parts of the Action Plan. The total financing will be ECU 30 million. The Task Force will be charged with coordinating project selection and identifying the most appropriate programme for managing them.

(1) The principal programmes involved are: Telematics Applications, Targeted Socio-Economic Research; Media II and Info 2000; Socrates and Leonardo da Vinci; Funds granted to trans-European transport networks; Structural Fund loans (according to the priorities established by the Member States).

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Monitoring tropical forests from space

Through a world-wide network of satellites, ground stations, forest fieldworkers and scientists, the TREES and FIRE projects of the Joint Research Centre (JRC) have made it possible to set up a homogenous geographical information system covering the entire tropical belt. Able to identify forest fires and the areas most under threat from deforestation, this system is making a vital contribution to improving our understanding of tropical forest ecosystems and our ability to preserve them.

Although they cover just 7% of the globe, tropical forests play a vital but - as yet - poorly understood role in maintaining balances in the planet's ecosystem. They play a key role in climate regulation and the photochemical processes which take place in the atmosphere. They are also a vital bank for the world's genetic heritage and an invaluable reserve of plant material for food and medicines.

But these forests are under serious threat: during the 1980s, an estimated 15.5 million hectares of forest were lost every year, representing a deforestation rate of 0.8% per year. An equally disturbing phenomenon is the increasing scale of forest fires, most of them attributable to man. In Africa alone, for example, 75% of the savannah regions, covering 300 million hectares, are regularly destroyed by fire. The gases given off by this huge combustion of biomass probably have an influence on global climate change (carbon dioxide emissions adding to the greenhouse effect) and on the photochemical processes in layers close to the earth (formation of ozone, acid rain, etc.).

Until recently, however, collecting accurate data on tropical forests across the globe was a difficult task. The TREES (Tropical Ecosystem Environment Observations by Satellites) and FIRE (Fire in Global Resources and Environmental Monitoring) projects are now addressing this concern.



The gases given off by tropical forest fires, most of them attributable to man, probably have a significant impact on climate and photochemical reactions in the atmosphere.

THE FIRST WORLD MAP OF TROPICAL FORESTS

Set up by the European Commission Joint Research Centre and the European Space Agency in 1990, the starting point for the TREES project was the production of the first global "reference map" of the world's tropical forests created from images constantly sent by satellites. The first sources of data were provided by the US National Oceanic and Atmospheric Administration (NOAA) satellites. This generation of

orbital systems was launched in 1978 and feature AVHRR optical and thermal sensors ⁽¹⁾. By processing these images, each square kilometre of land across the entire tropical belt was classified into several categories, ranging from "intact forest" and "fragmented forest" to "non-forest".

However, these images were lacking in definition. Accurate interpretation required access to better quality data as delivered by two more recent orbital systems, the American LANDSAT and the French SPOT, which send a smaller image but with a higher resolution. The analyses of some of this more detailed information was then further refined by field surveys. A comparison of the picture derived from the satellite images with the reality "on the ground" enabled the TREES system to be calibrated and validated to a high degree of accuracy.

The result is this first global, multi-annual map of the Earth's tropical forest drawn up by the TREES project. Covering the 1992-1994 period, this provides a unique tool in that it monitors the entire tropical zone in exactly the same manner. Previous maps relied on data from a wide variety of sources, making comparisons impossible.

TREES is not a "one-off" effort: it produces consistent, global maps year in, year out, making it vital to the long-term monitoring and understanding of the tropical ecosystem.

AN INTEGRATED SYSTEM OF GEOGRAPHICAL INFORMATION

In addition to the global maps, all the detailed multi-annual data collected by



On the basis of satellite data supplemented with analyses in the field and other sources of information, TREES provides the first multi-annual map of the Earth's tropical forest belt which is both detailed and uniform.

TREES have been integrated into one Tropical Forest Information System (TFIS). TFIS is ideal for identifying and analysing zones of rapid deforestation - or "hotspots".

At the same time, acknowledging the part played by fire in deforestation processes, in 1994 the JRC's Monitoring Tropical Vegetation (MTV) unit also launched the FIRE project. This seeks to process all the images provided by the NOAA satellites for the whole tropical belt in order to reliably detect and analyse fires and their effects.

The FIRE data have now been inte-

grated into TFIS, adding an extra tier of information to the system's basic reference map, highlighting areas of intense human activity where forest fires contribute significantly to deforestation. This tool enables a better understanding of the complex relationships between forest, deforestation and human populations.

TREES II: TOWARDS AN OPERATIONAL SYSTEM

A second stage, "TREES II", will further develop the geographical informa-

tion system in order to make it more operational. TREES II will have a number of priorities:

- It will improve the number and variety of data using new Earth observation instruments (see box).
- It will refine analytical methods - based on data provided by high resolution satellites and field investigations - in order to better identify areas where deforestation is reaching the critical stage.
- It will make the Tropical Forest Information System, incorporating these new data and analyses, more accessible, in particular for the benefit of the networks of organisations which supplied the data to TREES. This opening up to a wider network of users will be made possible by a wider dissemination of the results of projects using tools such as the Internet. ■

Night and Day, Rain or Shine

The optical and thermal remote sensing systems which equip the generation of remote detection satellites launched in the 1980s cannot penetrate the cloud cover or the smoke created by forest fires often found in tropical regions. A promising radar technology (SAR: Synthetic Aperture Radar) overcomes these limitations and such a system was launched in 1991 on board the European Remote Sensing satellite (ERS-1). TREES successfully analysed the data provided by this satellite from 19 areas of tropical vegetation in order to identify some important variables, such as seasonal variations in the vegetal cover, forest clearings associated with ranching or commercial clearing, the way topography and hydrological conditions affect the signal, etc. Overall, TREES showed that using the high resolution ERS-1 SAR images in combination

with the reference maps is an extremely efficient approach to detecting changes in the tropical forest.

However, using these images to produce large-scale maps is a complex exercise as each image is much smaller than the lower resolution photographs taken by the AVHRR type sensors. A significant milestone for the TREES project was the creation of a large "mosaic map" from hundreds of individual SAR images. The mosaic covers over 2,500 square kilometres of equatorial forest in Central and Eastern Africa photographed to a resolution of 100 metres, and provides detailed information on the structure and condition of the vegetation which can be extrapolated to the continent as a whole.

(1) Advanced Very High Resolution Radiometer.

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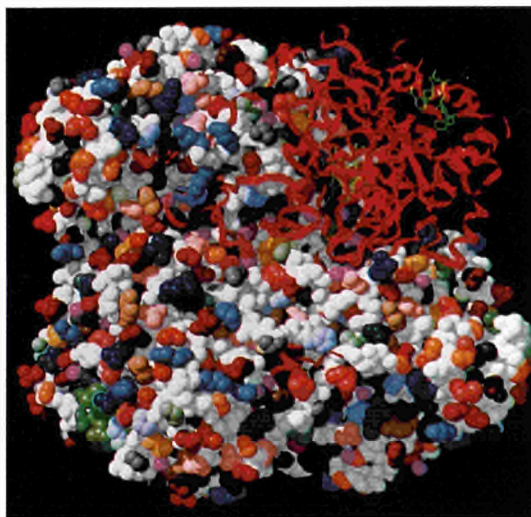
Success of the 1st COST Coordination Structure in Chemistry

Over the last decades, the progress of European fundamental R&D linked to industrial applications in different areas - such as pharmaceuticals, materials, and environment - has contributed to the recognition of the European chemical industry as successful, competitive and prosperous, as well as making a valuable contribution to the quality of life. To maintain and improve this position, cooperation with and consultation of European national research efforts are of critical importance. This has been the objective of the COST Chemistry Actions.

The first COST Chemistry Technical Committee was set up in 1990 to create a strategic plan for Chemistry research within Europe. Seven broad areas were identified and the corresponding COST Chemistry Actions were launched in 1992 for a period of 5 years in the following fields:

- Coordination Chemistry in the context of biological and environmental studies
- Selective synthesis
- Theory and modelling of chemical systems and processes
- Design and preparation of new molecular systems with unconventional electrical, optical and magnetic properties
- Chemistry at surfaces and interfaces
- Chemical processes and reactions under extreme or non-classic conditions
- Molecular recognition chemistry

Scientists welcomed this structure of cooperation and consultation because of the need for research coordination in this area. Today, the success of this programme is demonstrated by:



In order to boost the high level of European research in the most advanced areas of chemistry, COST initiated coordination and dialogue between 117 networks bringing together 564 research teams with, on average, participants from 19 countries.

- the increasing number of total networks set up in the different Actions: 55 in 1993, 86 in 1994, 113 in 1995, 117 in 1996. These Actions involve the participation of 564 research groups, with an

average per network of 5 collaborations between research groups from different European countries;

- the high level of involvement among the European countries with an average of 19 participating countries by Action, which includes in some cases, research institutes from non-COST countries (Rumania, Bulgaria, Estonia, Russia and Ukraine) as well as the Joint Research Centre (Ispra);

- the high number and variety of activities taking place within the networks and the Action, such as scientific conferences, workshops and seminars, short-term scientific missions, including exchange of young scientists and students, and more;

- the high quality of results and publications;

- the recognition factor of the

“COST label”: according to the selection process of the projects by peer review, this label is used in some countries to award research funds to the participating groups.

COST in brief

Complementing the EU Framework Programmes and EUREKA, COST cooperation, established in 1971, takes the form of concerted Actions - essentially, the coordination of national research projects and programmes. These focus on specific themes which are targeted by participating countries according to their research priorities. Its bottom-up approach has helped attract more than 5000 scientists in well over 130 Actions in fields ranging

from Chemistry and Telecommunications to the Social Sciences.

The members of COST are 25 European countries and the European Commission.

More information may be obtained by accessing the COST Home Page on CORDIS.

Internet: <http://www.cordis.lu/cost/home.html>.

As a result of the dynamism of the networks created and the quality of the work being done, in 1996 the COST Chemistry Technical Committee launched a new Action dealing with "The chemistry of metals in medicine". Additional Actions are planned for 1997 in the following areas:

- Bio-organic chemistry for pharmaceutical and medicinal applications
- Supramolecular chemistry
- Organic transformations: selective processes and asymmetric catalysis
- Advanced computational chemistry of increasingly complex systems
- Innovative methods and techniques for chemical transformation

As well as overseeing the organisation and monitoring of the scientific activities in the different Actions, the role of the COST Chemistry Technical Committee is to promote and to improve the image of Chemistry in Europe. In association with the other European organisations for Chemistry ⁽¹⁾, the Technical Committee has initiated a forum called AllChemE, in which COST plays an essential role in the development of a strategic Chemistry policy for Europe. The report of this initiative, "Chemistry - Europe and the Future", has just been published. ■

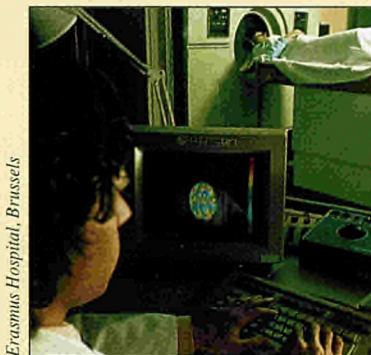
(1) CERC-3 (Chairmen of European Research Council Chemistry Committee); CEFIC (European Chemical Industry Council); EC3 (European Communities Chemical Council); EFChE (European Federation of Chemical Engineers)

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CASE STUDY

Discovering new contrast agents for Magnetic Resonance Imaging



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Nuclear Magnetic Resonance (NMR) technology is based on the absorption of specific radio-frequency energy by the magnetic moments of atomic nuclei placed in strong magnetic fields. Since the 1970s this basic discovery has led to the technology of "Magnetic Resonance Imaging

(MRI)", a highly successful diagnostic tool in clinical medicine: the administration to patients of special products called contrast agents, that diffuse into the body and make it possible in strong magnetic fields to visualise the status of organ function, blood flow or the difference between normal and diseased tissues.

The search for contrast agents initiated the development of a new class of pharmacological products, which focus on paramagnetic substances, mostly metal ions weakly bound to large organic ligands molecular complexes (called "metal chelates"). Among them, Gadolinium ion (Gd³⁺) compounds are especially attractive candidates for MRI contrast agents.

Part of the COST Action D1 "Coordination Chemistry in the context of biological and environmental studies", the project "Studies of Metal Chelates of Relevance to MRI" was launched in order to develop the European research for contrast agents which are less toxic and more sensitive than those being used. Its objective is both to coordinate studies and to improve the communication of

knowledge between researchers in the field across the continent.

Coordinated by Prof. A.E. Merbach (CH), the project was initiated in 1992 by four research groups from the universities of Lausanne (Switzerland), Debrecen (Hungary), Coimbra (Portugal) and Oslo (Norway), which

brought together expertise in the synthesis and physicochemical characterisation of actual and potential MRI metal chelates contrast agents. In 1994 four new members joined, from the universities of Delft (Netherlands), Turin (Italy), Liège and Mons-Hainaut (Belgium).

The work of the different project members has resulted in numerous publications of direct relevance to MRI contrast agents, measurements of properties related to their efficacy as contrast agents and their toxicity, and measurements of the fundamental parameters that are necessary to understand these properties. Several new types of Gd³⁺ complexes, as potential contrast agents in MRI have been synthesised. The complex solution structures and dynamics have been elucidated by NMR techniques. Molecular dynamics simulations also helped in interpreting the observed phenomena. Several European pharmacological companies are associated with this project, which has also led to patentable results.

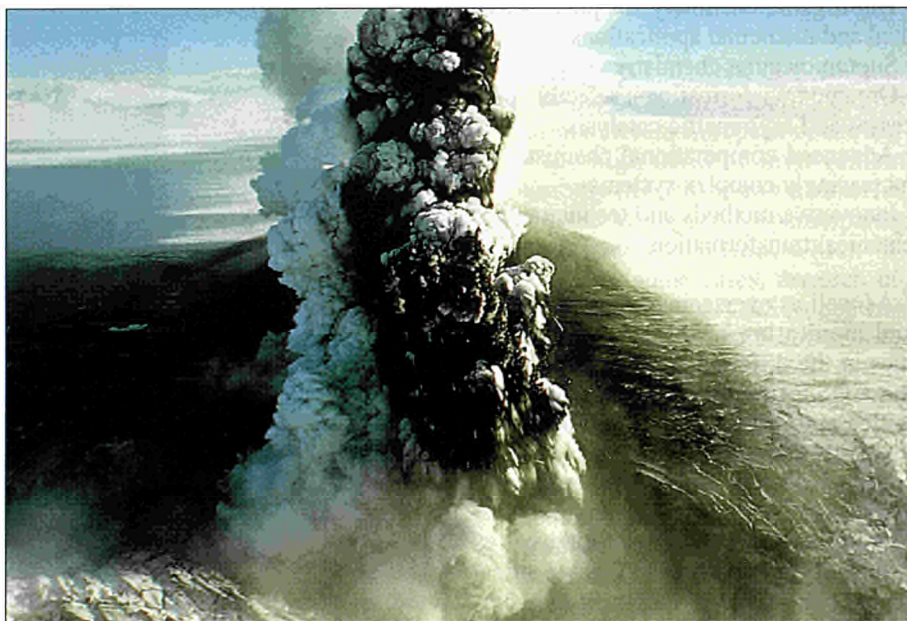
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European research at the volcanic hot spot

The Icelandic volcano Vatnajökull, capped by Europe's biggest glacier, awoke from its slumbers in October 1996. This unexpected event coincided with the launch, just a few months earlier, of a major European research project on this very site, cofunded by the Environment & Climate programme.

The initial objective of the research carried out by this project ⁽¹⁾ was to carry out a series of measurements on the Vatnajökull volcano site in order to improve our knowledge of the exchange of energy between the glacier surface and the atmosphere. Due to the relative speed at which they react to climate change, the major glaciers are believed to have a greater effect on sea levels than the huge continental ice caps such as Antarctica. Vatnajökull, capped by a huge glacier covering 8,000 square kilometres and subject to the alternating action of the accumulation of vast quantities of snow and subsequent melting, is particularly significant in this respect.

The recent "sub-glacial" eruption of this volcano considerably boosted interest in the project, insofar as it had major consequences for the glacier's overall equilibrium, producing a massive impact on the entire surrounding area of land and sea. The base of the glacier melted, resulting in the accumulation of several billion cubic metres of water. In early November - after a month of suspense following the eruption - the volcano released a huge quantity of water and ice. This devastated the coastal area below and is likely to have a major effect on the circulation of sea currents off the coast of Iceland. Such a phenomenon is in fact central to many models used in forecasting global climate change: the melting of glaciers in the North Atlantic and the resulting disturbances of ocean currents could be the origin of rapid variations in climate



observed in the past.

Moreover, the accumulation of water under the glacier destabilises its base, thereby causing a sliding action which contributes to the extension of the ice cap to areas below its present limits. The dispersal of the ash from the eruption also darkened the glacier surface, reducing its reflective capacity and resulting in an increased absorption of solar energy.

The study of the effects of the eruption of Vatnajökull, recorded live, is therefore a unique experience offered by nature. The fact that the European project was just starting up at the very moment it occurred will be extraordinarily useful in drawing scientific lessons. The modelling tools, and the implementation of in situ satellite observations are already playing their part. ■

The eruption of the Vatnajökull volcano in Iceland in October 1996 coincided with the launch of a major European research project on the glacier which covers it.

(1) The partners involved in this project are the Institute of Marine and Atmospheric Research of the University of Utrecht, the Netherlands; the Institute of Sciences of the University of Iceland; the British Antarctic Survey, United Kingdom; The Institute of Meteorology and Geophysics of the University of Innsbruck, Austria.

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RTD-Info is published by the European Commission - DG XII, Research, Science, Development. To obtain this quarterly newsletter free of charge in French, English or German, please send your name, address and the language version you require to:
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