

EC'S FOURTH SCIENCE FRAMEWORK PROPOSED, AS RUBERTI TAKES REINS

The European Community's scientific programs still represent a relatively small proportion of total European R&D, less than 4%, and the people running those programs in Brussels generally are not household words—certainly not in the US. Yet EC science has come to be a disproportionately important element in the process of European integration, and the key positions in EC science have proved to be bully pulpits when the individuals holding the jobs have been strong personalities with strong ideas about how to advance science or technology.

And so, even if EC science is a small part of Europe's landscape, "much more [has been] achieved than the overall cost would suggest in moving people and ideas across the hills and valleys of this rather checkered terrain." At least that was the conclusion of a special evaluation panel, as reported by Herwig Schopper, the former director general of CERN.

Starting in 1984 under the leadership of the former EC industry commissioner Etienne Davignon, one of those EC officials who knew how to make a little stick seem pretty big, the European Community has organized many of its joint science activities under the rubric of multiyear "Framework" programs. Generally these run about five years and overlap at both ends, so that new programs are phased in as old ones are phased out, and overall funding is kept on a steady upward trajectory.

In mid-March the EC Commission finalized its proposal for the fourth Framework, which covers the years 1994-98. It will be the first to be implemented within the legal structure of the Treaty on European Union adopted at Maastricht, The Netherlands, in February 1992, assuming the treaty is ratified. As such the fourth Framework will be the first to encompass all of the EC's science programs. Total spending is expected to be about 50% greater than in the third Framework.

The main emphasis of the fourth Framework will be to encourage mobility of young researchers among the European countries and to promote training of technical personnel with industrial needs in mind. This new approach was already anticipated in the third Framework, which was managed by science commissioner Filippo Pandolfi. It was Pandolfi's growing conviction that the focus of European industrial policy should be training and mobility.

At the beginning of this year Antonio Ruberti, an electrical engineer who served as Italy's minister of research from 1987 to 1992, took Pandolfi's place in Brussels. Considered a stronger advocate for basic research than Pandolfi, Ruberti was responsible as Italian science minister for both research and higher education and helped win greater autonomy for Italy's universities. One of his first acts as the EC's new science commissioner was to appoint an advisory panel of three Nobelists, consisting of Carlo Rubbia, the current director general of CERN, Ilya Prigogine, the director of the International Institutes for Chemistry and Physics in Brussels, and François Gros, director of the Institut Pasteur in Paris.

While Ruberti may prove to be as influential a figure in Brussels and in Europe at large as Pandolfi was, he starts from a somewhat diminished position. Like his predecessor, he will have charge of Directorate General XII, the science and research division of the Brussels bureaucracy, but DG-XIII, which encompasses information and telecommunications technology, has been moved to the portfolio of Martin Bangemann, the industry commissioner. Bangemann, a former economics minister of Germany and as such one of the heaviest of the heavyweights at the EC, is considered a moderate on industrial policy—that is, he regards government intervention in industry with some caution, if not outright skepticism.

Concurrently with Ruberti taking office in January, the EC authorized a research supplement of \$1.1 billion for 1993-94, the final two years of the current Framework. About 60% of that goes to Ruberti's bailiwick and 40% to DG-XIII. The ESPRIT program (computing), RACE (broadband communications) and AIM (medical electronics) are part of Bangemann's DG-XIII, while BRITE-EURAM (new materials) is part of Ruberti's DG-XII.

Fourth Framework

The philosophical foundation of the fourth Framework was formulated to a great extent in "Research After Maastricht," an evaluation published by the EC Commission in April 1992. That document identified an unsatisfactory level of investment in industrial research and a laggardness on the part of businesses in turning scientific and technological advances into commercial successes. While the introduction to the draft fourth Framework credits previous EC science programs for helping to create many transnational networks, it also criticizes them for not taking "sufficient account of technological priorities and a certain tendency towards dispersal of effort." Thus it proposes to concentrate efforts "on a small number of key technologies of major industrial interest."

Besides strengthening the competitive position of European industry and providing support for general community efforts such as the joint agricultural programs (for example, by fostering development of nonfood agricultural products), the other major priority in the proposed new Framework is improvement of the quality of life. This encompasses matters such as "the struggle against social exclusion" (racial, ethnic and class prejudice), preservation of the European cultural heritage, technology for a new urban habitat, global change, nuclear safety, renewable energy and so on.

The Framework is organized in

terms of four overarching "activities." The first, "implementation of research, technological development and demonstration programs by promoting cooperation with and between enterprises, research centers and universities," encompasses everything that was in previous frameworks. The other three activities, comprising programs and projects that previously were dispersed throughout the EC directorates, are promotion of research cooperation with third (non-EC) countries and international organizations, dissemination and optimization of Community research activities, and stimulation of training and mobility of researchers in the Community.

The second activity, promotion of international programs, includes cooperation with non-EC international institutions in Europe, notably EUREKA, the Brussels-based organization that helps build transnational industrial alliances based on proposals from industry (see PHYSICS TODAY, March 1990, page 67). The Framework proposal would strengthen cooperation with EUREKA, of which the EC (as an organization) is a member along with a slew of EC and non-EC European governments.

Total proposed spending for the fourth Framework program is 8.3–11.1 billion European Currency Units, or about \$11.5 billion (ECU 1 ≈ \$1.18), with about four-fifths earmarked for the first activity. Total spending for the third Framework, including the supplement, has been ECU 6.6 billion.

Human capital and mobility

During the first three frameworks and slightly before, EC support for basic research was channeled primarily via the "Science" program (1988–92) and its predecessors, the "Stimulation" (1985–88) and "Experimental" programs (1983–85). These funded research grants awarded on the basis of peer-reviewed proposals, "bursar-

ies," "twinnings" and "operations" (see table below).

Funding for the Science program and predecessors grew exponentially, and by all accounts the programs were highly successful in meeting their stated goals. Demand for grants, for example, far exceeded supply: During the first two years of the Science program, according to Schopper, only about a quarter of the proposals could be funded. The programs resulted in thousands of joint publications, exchanges and transnational links among labs.

The Science program was largely supplanted in the second half of the third Framework by the newly established human capital and mobility program, which is administered by largely the same staff in Brussels and benefits from further increases in funding relative to its predecessors. Grants are made both directly to researchers and to laboratories.

Last August and September the initial rounds of grants were made, with 252 mobility fellowships going to young researchers and 239 to laboratories that will select and receive around 475 researchers. ECU 104 million were allocated to the program in 1992, with ECU 261 million reserved for 1993 and ECU 117 million for 1994.

Setbacks in applied research

The fourth Framework is being negotiated, and Ruberti and Bangemann are taking control of DG-XII and DG-XIII, at a time when European research strategy is under intensive review and evaluation. Not to put too fine a point on it, an increasingly glaring contrast has become apparent between Europe's major programs in basic science and its efforts in applied research.

CERN has won international acclaim with the discovery of the W and Z particles and the brilliantly successful commissioning of LEP. JET, the Joint European Torus in Culham,

England, has claimed the best combination of confinement time, density and energy confinement and priority in yielding the first appreciable power from nuclear fusion. ESO, the European Southern Observatory based in Garching, Germany, has built the New Technology Telescope and soon will have completed the Very Large Telescope. Even if not the world's most advanced, these telescopes produce or are expected to produce some of the best images of the southern skies (see PHYSICS TODAY, May 1990, page 17).

And so, when Europeans have pooled resources in basic physics, they generally have attained world leadership. But when one turns to Europe's very large projects in applied research and engineering, the story in recent years has been rather the opposite: It has been a story of disappointments and frustration.

Take space. The late Edoardo Amaldi once said that joint ownership of research satellites would unite Sicilian peasants and Norwegian fishermen like nothing else; yet late last year, France had to agree to a drastic curtailing of the European Space Agency's plans for manned space activities, a development that is being generally interpreted as the beginning of the end for France's proposed space shuttle (see PHYSICS TODAY, January, page 65). With ESA now looking to Russia for collaborations, dependence on foreign technology is being diversified but not eliminated.

In another development late last year, the European Commission decided under intense British pressure to terminate further subsidies for the proposed European HD-MAC high-definition television system. The EC already had dumped more than a billion ECUs into the program, largely in the form of subsidies to Philips and Thomson. But Philips announced last fall that it would not continue its work unless British authorities reversed their decision not to require satellite broadcasters to use the D2-MAC phase-in system. Those developments are being generally interpreted as the beginning of the end for Europe's proposed analog HDTV standard and as a victory for digital systems proposed in the US (for background, see PHYSICS TODAY, March 1991, page 57 and April 1991, page 91).

Closely related to the HDTV program, which was put under the aegis of EUREKA, is the Joint European Submicron Silicon program, another major EUREKA undertaking. JESSI was buffeted first by the decision by Philips to terminate work on SRAMs, then by the decision by Siemens to

Funding for EC Experimental, Stimulation and Science programs, 1983–92

Period	Contracts	Bursaries* (millions of European Currency Units)	Grants	Twinnings**	Operations†
1983–85	7	0	0.04	6.3	0.2
1985–88	60	0	5.7	35.3	14.9
1988–92	167	149	6.3	39.2	17.3

Source: Science/Stimulation evaluation panel report, 5 June 1990.

*Funds enabling young researchers to participate in laboratories in EC states other than their native countries.

**Funds enabling researchers working in advanced fields to pool efforts.

†Grants to large multinational, multidisciplinary facilities.

enter into a long-term DRAM development program with IBM and Toshiba (see *PHYSICS TODAY*, November 1990, page 79, and September 1992, page 62); last year it endured a budget cut of nearly one-third.

What to do?

The frustrations of recent years in some ways echo the larger frustrations Europe has experienced in trying to maintain solidarity in the wake of German reunification and Soviet disintegration—that is, they are not merely technical.

There has been a lot of debate in the last year about what approach the EC should now adopt to research support. The idea that currently seems to be in ascendancy was expressed in a press release issued by the EC Commission in connection with the finalization of the fourth Framework: "To be more effective, ... research activities will have to be concentrated to a greater extent on a limited number of technologies with multisectoral impact capable of making Europe's industry more competitive ('generic technologies')."

Ruberti has called for "better dovetailing of Community research activities with other European cooperation frameworks such as EUREKA, CERN, ESA and ESO." He also has called for development of "a European instrument for technology assessment."

But Ruberti has made it clear in public statements that he does not regard better-targeted support for applied research as sufficient by itself to assure long-term competitiveness. "Japan has shown that applied research is not enough. We need to guarantee a basic body of knowledge out of which industry can pull innovation," he has said.

Rubbia put it this way in a statement released on the occasion of his appointment to Ruberti's advisory panel: "Many clear thinkers see Europe as being the greatest force in the 21st century. But we Europeans still have to want this to happen and to play all our best cards, in particular our intellectual resources, our research and our education. If Europe finds itself in the forefront of certain branches of research this is due to the coexistence and complementarity of European facilities and national research institutes. In all our various research areas this 'pyramid of facilities' must therefore be developed, increasing in capacity at regional, national and European levels. We should, however, ensure that fundamental research stays in touch with economic reality and human aspirations."

—WILLIAM SWEET

RIESENHUBER REPLACED AS GERMAN RESEARCH MINISTER

Heinz Riesenhuber, the long-time German research minister, was replaced early this year by Matthias Wissmann, a lawyer who previously served as the main governing party's parliamentary spokesman for economics. The surprise move by Chancellor Helmut Kohl has been widely interpreted in terms of a desire to bring new blood into the cabinet and to achieve a better balance of regional political forces. Some have also speculated that Wissmann has a mandate to tie research more closely to economic objectives.

Though Riesenhuber, a PhD chemist, was research minister for close to ten years in a succession of Kohl governments, his departure seems to be little mourned in the German physics community. His effectiveness as an advocate for both basic and applied research had seemed to diminish during the difficult years following reunification.

NEW SOFTWARE HELPS AUTHORS PREPARE PHYSICS MANUSCRIPTS

A new computer software package is now available to help authors who are preparing manuscripts for publication in physics journals. Released in November, REVTeX 3.0 was created jointly by the American Institute of Physics, the American Physical Society and the Optical Society of America, with participation from several other member societies of AIP.

Many authors now use the TeX or LaTeX typesetting programs to prepare manuscripts on their computers. But each journal has specific guidelines on how manuscripts should look when they are submitted. REVTeX is used to format the text, equations, references and so on so that they conform to a given journal's specifications. The program is used in conjunction with TeX and LaTeX.

The latest version of REVTeX can be used on manuscripts for most of the journals published by APS, OSA and AIP. The first version of REVTeX, released in 1988 by APS, was created for use on manuscripts being submitted to the *Physical Review* journals; a second version came out in March 1990. By July 1992, about 15% of the pages published by APS were being prepared using TeX and REVTeX.

REVTeX 3.0 is available free through PINET, the electronic network operated by AIP, and from other sites in Europe and the US. To obtain the entire REVTeX package, which consists of 26 files, send an electronic mail message to fileserv@shsu.edu (or fileserv@shsu.bitnet); in the body of the message, type "SENDME REVTEX."

BRINKMAN DOMAIN IS EXPANDED AT AT&T BELL LABS

A reorganization of research has taken place at AT&T Bell Labs, occasioned apparently by the departure on 1 March of Kumar Patel, who has become vice chancellor for research programs at the University of California, Los Angeles.

The three laboratories and their directors in the former Research, Materials Science, Engineering and Academic Affairs Division, which Patel ran, have been transferred to William Brinkman's division, which has been renamed Physical Sciences and Engineering.

The labs and directors transferred are materials and processing research, headed by Robert Laudise; passive components research, headed by Alastair Glass; and materials and technology integration research, headed by Greg Blonder.

No laboratories were eliminated in the reorganization.

IN BRIEF

Physics News in 1992, a 97-page summary of research highlights prepared by Phillip F. Schewe and Ben P. Stein in the public information division of the American Institute of Physics, is available from AIP c/o AIDC, 64 Depot Road, Colchester VT 05446; (800) 488-2665. An initial copy costs \$5 and additional copies \$3.

Geophysics News: 1992, a compendium of research highlights edited by Debra Knopman, S.A. Morse and Lynn Teo Simarski, is available free of charge from the American Geophysical Union, 1630 Connecticut Avenue, NW, Washington DC 20009.

A brochure entitled "Education Programs and Activities of the American Institute of Physics and Its Member Societies" is available from the AIP Education Division, 1825 Connecticut Avenue, NW, Suite 213, Washington DC 20009. ■