

# EC Science Plans Assessed

H. Schopper, a former Director General of CERN and a member of a panel that evaluated the European Community's science programme, discusses the panel's report with the Editor.

The European Community programme to stimulate science has emerged in its short lifetime (the experimental phase started in 1983) as a familiar object on our research landscape. A report of a panel set up in late 1989 to review the programme concludes that much more was achieved than the overall cost would suggest in moving people and ideas across the hills and valleys of this rather checkered terrain.

The panel comprising six distinguished scientists and chaired by Sir Sam Edwards, Professor of Physics at the Cavendish Laboratory, Cambridge was invited by Professor Fasella, the Director General of the EC Directorate that runs the science programme (DG-XII), to evaluate both the programme and CODEST, the committee that decides upon proposals. This was foreseen in the Decisions of Council that lead to the programme's implementation.

The timing was appropriate because the panel started work just as the current programme, namely SCIENCE Plan 1988-92 which is one of the programmes in the Community's overall research and technology Framework Programme, was about to enter its third year. Moreover, it reported back in June 1990 shortly after the adoption by the Commission of the EC of the proposals for the majority of the 15 programmes making up the next (1990-1994) Framework Programme. The panel's recommendations can therefore be taken up in the latter stages of SCIENCE as well as in the implementation of its successor, which will have a substantially larger budget (488 MECU versus 167 MECU) assigned to human resources and mobility under the provisional title RESEARCHERS' EUROPE.

## Overwhelming Demand

Evaluating SCIENCE Plan, and its fore-runners STIMULATION Plan 1985-88 and the Experimental Phase 1983-85, was not straightforward because the four goals laid down by the Decision of Council in 1985 were fairly qualitative. Nevertheless, the panel was asked to consider how closely the objectives have been reached, the quality of the scientific results, the effectiveness of the programme's management and whether EC support had brought additional value.

A literally overwhelming demand was immediately apparent. As shown in the Table, an exponential increase in the budget from 1983 to 1988 was accompanied by an equally impressive growth in the number of proposals so that at no point was the programme able to provide more than 20% of the funds applied for.

Although the desire for cooperation matched the support offered, the quality of

proposals did not suffer. For instance, in the first two years of SCIENCE Plan, CODEST had to turn down about 40% of the 60% of proposals (roughly 400-600) that were judged by referees to be above average in quality. This extraordinary excess demand led to a virtual lottery, and implied a tremendous amount of perhaps wasted effort as there were on average three external referees per proposal drawn from 3000 experts worldwide who took part in 2000 consultations in 1989 alone. Community officials were also consulted to assure coordination with other EC programmes.

## Science Programme

The mix of schemes funded by SIMULATION and SCIENCE clearly struck a chord within the European scientific community. Support is divided between bursaries, research grants, arrangements for twinning laboratories, and operations (large, targeted research projects — see box on page 153). As detailed in the Table, the small experimental phase from 1983 to 1985 involved mainly twinings; the 1985-88 STIMULATION Plan saw the expansion of twinings, grants and especially the large operations projects. Student bursaries were introduced in the SCIENCE Plan starting in 1988 at the expense of twinings which still remained the dominant component in the first two years.

## Contacts Enriched

So what has been the impact of the science programme? A detailed survey of STIMULATION by independent consultants showed that the Plan's 286 twinning and operations contracts resulted in 2910 links

between laboratories involving about 1500 joint publications and communications.

A second independent assessment — this time of questionnaires sent in August 1988 (during the first year of SCIENCE) to the 629 laboratories participating in the same spectrum of contracts — also indicated some significant positive effects in spite of little change in the level of personal contacts. SCIENCE had stimulated a three-fold increase in the number of laboratories who exchanged scientists and co-authored papers reflecting a profound enrichment in their relationships. Prior to an EC contract, one-half of the pairs had no contact with each other and only 30% a significant, tangible contact indicating the relatively low level of cooperation between laboratories in the 12 Member States. The observed effects of an EC contract were perhaps self-evident: the number of laboratories having no contact was virtually zero (by definition?) and the intensity of interaction clearly mirrored the type of contact (with the sharing of funds prompting the strongest cooperation!).

## Overall Impressions

Generally speaking, the panel was obliged to use less quantitative approaches to address its tasks. Aside from discussing the programme with researchers, the panel held five plenary meetings attended by scientists who examined completed contracts or coordinated large contracts, consultants who analysed the programme, and Community officials.

The overall impression was that the STIMULATION and SCIENCE Plans complemented in a very popular manner the much larger national science programmes and the EC technology defined initiatives by encouraging multinational cooperation. Some investigators clearly felt this "subsidiarity" could inhibit research but the panel argued that Community-level programmes bring home to individual countries the existence of standards which must be met if research is to be effective. They also provide an element of choice that is lacking in many nationally-oriented programmes.

European Community Science Programmes 1983-1994

Plan	Period	Budget	No.	Bursaries		Grants		Twinings		Operations		Funds applied for awarded
		MECU	Contracts	No.	MECU	No.	MECU	No.	MECU	No.	MECU	%
Experimental	1983-85	7	74	0	0	2	0.04	71	6.3	1	0.2	-
STIMULATION	1985-88	60	467	0	0	181	5.7	257	35.3	29	14.9	15-20
SCIENCE (1st. 2 years)	1988-92	167	504	149	4.7	141	6.3	178	39.2	36	17.3	≈ 15
RESEARCHERS' EUROPE	1990-94	518	(Total)									

## Sources

1. Report of the panel set up to evaluate the SCIENCE/STIMULATION plans (1983/85-1985/88-1988/92) of the European Community; presented to CODEST on 5 June 1990 (to be published).
2. *Innovation and Technology Transfer*, Newsletter 11/2 and 11/3 (Commission of the European Communities) 1990.
3. Third Framework Programme for Community Research and Technology Development (1990-1994); Proposals for specific programmes (CEC, July 1990).

All Member States have benefited substantially but the scientific results identified so far were of mixed value because it is largely the exploratory projects that have been completed (32% of STIMULATION's and 57% of SCIENCE's projects were still running when the panel reported). Support has been concentrated over a broad range of basic research topics (generally in the natural sciences) that are not covered by the EC's sectorial programmes.

#### Recommendations

The panel recommended emphasizing newly evolving, multidisciplinary fields where multinational collaboration is weak to attract the **outstanding researchers** who one would have expected to have participated. A shift to larger projects in strategic fields also has the potential to make the programme more visible as well as more effective in promoting collaboration. It was appreciated however, that a change in emphasis in this direction implies that the science Directorate needs to play a stronger role in establishing and running a **science policy** and in promoting the creation of centres of high quality research. In the belief that a few, well-funded, state-of-the-art projects are more effective than many smaller grants (that are anyway more acceptable to the richer laboratories), the panel argued that it may even be necessary to go so far as declaring fields of **special interest** with their own budgets. In this way the Commission could also seek applications on certain topics instead of essentially relying upon unsolicited proposals.

As an additional objective, several million ECU should be assigned to collaborative networks for **infrastructure support** which is excluded at present so that visiting scientists from the weaker states can be provided with facilities to return to.

The panel thought that the implementation of the programme should allow maybe 10% of contracts to be extended beyond three years using some form of carefully evaluated **"continuation proposal"**. The grants scheme should also be extended by a few per cent to help distinguished **senior scientists** move between laboratories as

this would be very effective in promoting lasting cooperation in networks and enhancing twinning arrangements. Germany's Alexander von Humboldt Fellowship scheme was offered as a suitable model.

The panel thought that the administrative costs of the two Plans appeared modest and that the 3-6 months needed to assess a proposal reflect the high quality of the selection system. However, several more months passed before research could start if an investigator needed to be awarded a bursary or grant to work on a twinnings or operations project. It was recommended making the programme implementation **more flexible** and responsive by having, for example, maybe 10% of the grants and bursaries awarded directly by major centres.

The increasing workload clearly implies some **reorganization of CODEST** since the committee's relationship with the referees was no longer adapted to the size of the science programme and the attempts to differentiate between undifferentiable proposals. CODEST meeting every three months had little time available for discussions and was faced with poorly defined opinions in referees' reports as their number grew. However, the committee's characteristic feature of being able to provide **independent scientific advice** by involving eminent scientists should be maintained and enhanced. The panel envisaged the creation of sub-committees or panels with perhaps some delineation by subject matter (the **"Referees Network"** scheme — see *Europhysics News* 21 (1990) 99). The idea is that panels reporting to CODEST would rank proposals on the basis of reports from referees, who would still be appointed by CODEST to ensure high scientific standards. CODEST in deciding between proposals would help implement a science policy by recommending "weighting" for the various fields. The overall effect should be to provide a clearer definition of the programme now that it has become large, well-known and multifaceted.

The panel praised the dedicated staff who manage the programme but asked that efforts to reduce the time between the completion of financial forms and the signature

of a contract continue. The introduction of **tailored applications forms** and a **format for proposals** was suggested so as to ensure that complex procedures do not deter some applicants.

Forms common to all EC programmes were introduced recently so as to standardise procedures. They have neither speeded up processing nor enhanced the clarity of the system; they should be modified to permit more scientific content and shortened for those applications seeking small amounts of funds. In addition to **more flexible** application procedures, the panel also recommended making the selection procedure **less anonymous** by publicizing it to the scientific community, and negotiation of contract budgets more easily understood by involving the referees. Arrangements such as seminars allowing face-to-face contact with CEC staff were advised.

As reported in *Europhysics News*, **EFTA** countries can now participate in SCIENCE Plan's twinning and operations schemes. Extending the programme to include the recently democratized countries in **eastern Europe** was also envisaged. The CEC has recently proposed to Council that scientific cooperation with these countries should take place in fields in which the EC will gain advantages (e.g. Hungary is strong in statistics) and include an extension of the 1990-94 Framework Programme for providing the freedom of movement of researchers. Practically speaking, this will involve cooperation with various institutions.

#### The Future

Some of the panel's recommendations are already being implemented in SCIENCE Plan which has clearly emerged as a very successful complement to the national programmes. There was general agreement among the scientific community that the cooperative activities fulfilled a great need by forging new bonds and strengthening links between researchers. The community anticipates that the expansion envisaged in the next Framework Programme will consolidate the Plan's important achievements.

It has already been announced by the Commission that it intends to offer opportunities for training and mobility to 5000 researchers over the next five years. Grants will be awarded and mainly young post-doctoral scientists will be encouraged to participate in "high-level" research activities at centres of excellence and specialist institutions, or in networks among them.

## Delegates of AM's to Council

The two new delegates of the Associate Members to EPS Council, elected following the recent postal ballot, are:

L.F. Feiner, Philips Research (NL)

P. Thomas, JET Joint Undertaking (UK)

The delegates remaining in office are:

W. Schmidt (acting for O. Meyer), Kern-

forschungszentrum Karlsruhe (FRG)

G. Winstel, Siemens, R. and D. (FRG)

### SCIENCE Plan Contracts

**Bursaries** enable young scientists (two-thirds are between 25 and 30 years old) to acquire additional training by participating in research projects in laboratories in EC Member States other than their own. Travel and accommodation are typically funded for 1-2 years at an average level of 20 kECU *per annum*.

**Grants** are awarded to a laboratory to cover the cost to the laboratory of short or long stays by visiting scientists to enable them to pursue a research project or a specialized high-level training course. About 50% of Fellows are under 30 years old and the average cost of a contract is 40 kECU *per annum*.

**Twinning**s enable researchers working in advanced fields in two or more EC Member States to pool efforts. Most contracts involve 2-4 partners at an average cost of 150-200 kECU covering all marginal expenses including equipment.

**Operations** are targeted research projects where a generally multinational and multidisciplinary research team is expected to reach a defined goal by being able to bring together the best expertise in a cooperation network. The average contract costs 500 kECU and as for twinning, covers all marginal expenses.