is 'strategic'. Lane — and the rest of the science community — will either have to convince Congress that much basic research can comfortably wear that label or accept that research directions will have to be changed.

Supporters of science in Congress are sanguine about the outcome. "My feeling is that there's going to be no lessening of funding for basic research, but probably a little more guidance on which areas are critical for the nation — as we did before with defence-related science," says George Brown, chairman of the House Science, Space and Technology Committee.

Keen listeners: Hillary and Bill Clinton impressed scientific guests at a recent White House reception.

But if funding for civil science is to grow — and 1993 has seen healthy budget increases at least at the NSF and the National Institute of Standards and Technology (NIST), the administration's chosen workhorse for technology transfer — defence research must continue to contract: there is nowhere else for the money to come from.

The ending of the Cold War would seem to point in this direction. Indeed, efforts are being made to ensure that concern for economic security delivers the same pay-off to the scientific community as did the previous concern for military security.

But the shift cannot be guaranteed, particularly with the recent nomination as Secretary of Defense of Admiral Bobby Inman, who has already expressed his independence from the administration in remarkably forthright terms, and is seen as the dark horse in the new "science cabinet". Inman has previously shown strong interest in research and high technology. A successful rearguard action by him to shore up the vast defence research budget could wreak havoc with Clinton's plans for expansion elsewhere.

More immediate concerns are likely to dominate the science policy agenda in the coming months. Proposals for health care reform will become sufficiently concrete to influence the future path of biomedical research. And NASA's proposed "international" space station will fly a dangerous (and possibly fatal) mission into Congress.

But the space station's destiny will be of more concern to the aerospace industry than to most scientists. The latter are likely to be more worried about a slow — and Hollywood-assisted — erosion of their public image. The dedicated, white-coated researcher, labouring to save the planet from poverty and disease, risks being supplanted in the public mind by a money-grabbing, plagiarizing con-artist.

This phenomenon has some way to go. A recent opinion poll showed the National Academy of Sciences to be the most credible of all American institutions, well ahead of the military in second place — and with six times the level of public confidence enjoyed by either Congress or the media.

But top scientists have been alerting their peers to the risk of losing this reputation. Alberts and Lane have been among those urging scientists to get out to schools, offices and factories and win the public's appreciation. Outside Washington, that is the priority for 1994. **Colin Macilwain**

# Italy draws order out of chaos

**Munich**. Last month, Italy's Ministry of Research and Universities announced plans to scrap the country's much-criticized system of distributing research funds through small committees, and to introduce for the first time a formal peer-review process for almost all government-funded research.

This is the latest move by the ministry to develop tighter control over the quality of the research that it funds and align its procedures for allocating research funds more closely with those of other Western nations.

The new system will be introduced gradually beginning in 1994, when three per cent of all research grants will be allocated after peer review. It will be followed by a scheme under which research projects receive international evaluation at defined intervals.

At the same time, discussions have begun between the ministry and Italian industry to identify long-term strategic research needs. The ministry has already decided to launch a strategic programme on robotics, once its budget for next year has been agreed. Also under consideration are programmes in environmental technologies, informatics and nanotechnology.

Much of the credit for bringing order into a reputedly chaotic ministry must go to the new minister of research, Umberto Colombo, who has been in office only since May. But he is not a politician, and therefore may be replaced after next spring's elections. If so, there are many in Italy who hope that the reforms he has started will be respected by his successor. **Alison Abbott**

# Japan: Recession threatens shift to basic research

**Tokyo**. While most countries around the world — including its immediate neighbours, South Korea and Taiwan — are promoting research aimed at developing new technologies, and cutting back on basic science, Japan, the pioneer of this strategy, is heading in the opposite direction.

But as the economic recession continues to bite and international competition becomes more fierce, Japan may find that it too comes under pressure to follow the worldwide trend in order to restore its economic growth. This will be a critical year for deciding which path it will follow in future.

Since the beginning of the 1980s, government and industry in Japan have both accepted that they should support basic research, reacting in part to criticism from the West, and particularly the United States, of the country's perceived tendency to live off the fruits of Western science.

In the latter half of the decade, some of this talk was translated into action. Companies flush with cash began setting up basic research laboratories at home and overseas, the latter often in close association with Western universities.

Similarly, government agencies such as the Ministry of International Trade and Industry (MITI) launched a number of projects aimed at supporting basic research. A typical example is the International Human Frontier Science Program (HFSP), established in 1989 by MITI and the Science and Technology Agency (STA) to support international research on the brain and biological functions, with the bulk of the funding coming from Japan.

Public pronouncements and actions by the government still support this push for basic research. Last year, for example, the Ministry of Education, Science and Culture continued its drive for large increases in the budget for university research grants — still very small compared with some Western countries — with the aim of almost doubling the budget in a few years.

Similarly in October, MITI, in collaboration with industry, began a large project on long-term research on nanotechnology. Several US semiconductor manufacturers have joined the project because, they claim, it is difficult in the current economic climate to win support for such research from their own companies or government.

In line with this trend, a number of government-funded research organizations have carried out reforms and introduced external reviews to strengthen their ability in basic research. First off the mark was Tokyo University, which, after persuading the government to increase funding for buildings and graduate research, brought in a team of ▶

foreign and Japanese scientists to assess its physics department in January 1993.

Similar reviews followed of the STA's Institute of Physical and Chemical Research (RIKEN), and the Ministry of Education's Institute of Space and Astronautical Science. And MITI has given its 15 institutes some autonomy in deciding how to spend their funds. In return it has asked them for more accountability, in particular the introduction of external reviews to ensure they remain at the forefront of basic research.

The situation in neighbouring Taiwan and South Korea is very different. Two years ago South Korea launched its "G7" project, under which the government and industry plan to invest 3,400 billion won (US$4.2 billion) by 2001 to catch up with the technological achievements of the world's seven leading industrial nations.

Some South Korean researchers carrying out very basic research in fields such as structural biology have managed to win funds from this project. But its main focus is on specific technologies, such as high-definition television, megabit semiconductor chips, new materials and biotechnology.

Similarly, the Taiwanese government, which has traditionally supported university and academic research much better than its neighbour Japan, has introduced a policy of supporting research aimed at specific technological goals.

The National Science Council (NSC) has cut funds for investigator-initiated grants by 20 per cent, and is diverting the money to university-industry consortia for "mission-oriented" research in ten areas, ranging from consumer electronics to aeronautics. The NSC says it is doing this because university researchers have placed too much emphasis on publishing papers and pursuing theoretical studies.

Japan, which in the past has been in the forefront of countries pushing technology-orientated research, is under pressure to return to this approach. Government officials such as those who helped launch the HFSP are becoming concerned that, because of the tendency of their colleagues to use developments in the West to argue for new projects, there may be a swing back to more applied research just as efforts to support basic research are getting off the ground.

There are similar fears in industry. Many Japanese companies set up well-funded basic research institutes during the boom of the late 1980s. Their official line is that they have no intention of cutting back on basic research, and that any cuts in spending have been part of across-the-board cuts for research and development; if anything, they claim, basic research has suffered the least.

But researchers in these institutes fear that as the recession continues to bite management may begin to look on these new institutes as a luxury they cannot afford — or at least to direct their research more towards applications. **David Swinbanks**

# Europe flexes its muscles

**Paris**. The joint research efforts of the 12 member states of the European Union (EU) jumped from relative obscurity into the political spotlight at the end of 1993. This year will see how much talk is translated into action.

At their summit meeting in December, the EU heads of states endorsed a white paper (policy document) from Jacques Delors, the president of the European Commission, giving considerable importance to support of research.

Two events in 1993 changed the face of EU research politics. The Maastricht Treaty came into force in November, giving new powers to the European Parliament. The main change is that the parliament, like the member states, can now veto the Framework budget; and it has been quick to insist that this power of veto carries the right to shape EU policy from the outset.

Reinforcing this message, the parliament organized a big European Science Summit in Brussels in October. The take-home message was that it wants the fifth Framework, which will start in 1998, to support more research into the social and economic impact of science. The parliament also wants more spent on research in renewable energy, life sciences, environment and new industrial technologies.

The other twist was the commission's decision to delegate management of an entire ECU24 million (US$27 million) plant molecular project to a group of scientists. If the experiment succeeds, the commission will probably set up similar structures in other research areas. This signals an important shift in policy. Previously, suggestions that bodies such as the European Science Foundation could administer EU research programmes have been quickly dismissed by the commission.

Any development to decentralize research administration from Brussels would tie in neatly with Delors' plans to encourage EU member states to do more to coordinate their national science policies. **Declan Butler**

CERN Photo

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**Unrivalled: with the SSC's demise, eyes are on Europe's Large Hadron Collider.**

# Germany: still feeling the pinch

**Munich**. Germany has long been one of the world's biggest spenders on research and development. Indeed, for several years it has come top of the league for spending on civilian research as a proportion of gross national product. But the picture is no longer so rosy. With reunification continuing to drain coffers already under pressure from the world recession, government research budgets have been frozen.

Last year, the Federal Ministry of Research and Technology (BMFT), which handles over half of the total government research budget, had to make do with the same amount of cash — around DM9.4 billion (US$5.5 billion) — as in 1992. This figure will not increase significantly in 1994; and with inflation expected to be over 4 per cent, that effectively means a cut in spending.

The government wants industry to benefit much more from public investment in research. So far, and despite urging from certain sectors of industry and the country's Social Democrats, it has resisted pressure to achieve this aim merely by shifting funds from basic to applied research.

In contrast, the government's main concern at present is to increase the efficiency with which research results are transferred out of the laboratory into industry. Funding of basic research, at nearly 40 per cent of the BMFT budget, is generous. But Germany is aware that it has been slower to turn the products of research into wealth-creating products than its main competitors, the United States and Japan.

In addition, Germany faces public hostility towards key technologies, particularly biotechnology and genetic engineering. Expressed through stringent legislation controlling genetic experiments, this hostility has been a major disincentive for industry to invest in this area.

Chancellor Helmut Kohl's coalition government is keen to address both issues, and to create a more friendly environment for both industry and applied research. The gene laws have already been revised to make them less restrictive. And Paul Krüger, the research minister, has various plans to bring researchers and industry into closer contact.

Last summer, for example, Krüger set up a technology council made up of twelve representatives from industry and the ▶