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)

IMAGE
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REASONS

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

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**

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 con-

cern 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 ►

scientific community, to advise him on how to develop a more coordinated and responsive research strategy. One recommendation of the council, which met for the first time in September, was that the research minister should have broader responsibilities.

In particular, the council has said it would like the minister to have more control over the total government research budget; at present, responsibility is divided between at least four ministries. It now has the task of suggesting how the desired closer contact between science and industry can become an effective reality.

The creation of the technology council has prompted lobbying from groups keen to see a change in policy. At the end of November, for example, the Christian Democrats published a 22-point proposal for a more strategic allocation of research funds.

This was followed in December by recommendations from the Bundesverband der Deutschen Industrie, German industry's umbrella organization, on topics the technology council should take up to improve strategic thinking about research. Most of the recommendations coincide with the council's own initial conclusions.

The growing interest in science and technology policy has also prompted a parliamentary debate due to take place next week (13 January). Krüger is expected to take the opportunity to insist that, despite previous rumours to the contrary (see *Nature* 365, 481; 1993), there will be no shift in the proportion of research ministry funds going to basic research in the near future. German scientists are approaching the new year cautiously, but perhaps with less foreboding than in the recent past. **Alison Abbott**

France shifts the focus from military to civilian technology

Paris. Shortly before Christmas, a report to the French government recommended that France give up its autonomy in armaments manufacturing, and share its costs with other European countries.

Such a proposal would have been unthinkable a few years ago; that it is now being seriously considered demonstrates the impact that changes in the world's geopolitical scene have had on French thinking about its technology strategy — and, indirectly, on its support for science.

France ended almost 12 years of unbroken Socialist rule in March 1993 by voting decisively for a conservative government. Over the next few weeks, the government will set about developing a national research strategy through a vast national consultation with a debate in parliament.

Although the new government is taking the credit for this initiative, much of the demand for change has arisen from policies launched by Hubert Curien, the minister of science in the previous Socialist government, and has been prompted by geopolitical adjustments to the end of the Cold War.

These adjustments have in particular removed the justification for much of the research that has assured France's military might, and earned it a disproportionately strong voice at the world negotiating table. As a result, France is having to reshape its research base into a tool for promoting industrial rather than military competitive-

ness, swapping its military goals for a desire to protect and exploit its strengths in such areas as computer software, biotechnology and the audiovisual sector.

Change in 1994 will also focus on longstanding structural problems in the research and university system and will be intended to stimulate the productivity of the science base. Current problems include poor coordination of national research policy, and lack of mobility of scientists both within the research organizations and between the universities and industry.

The national consultation is unlikely to bring much radical new thinking to these problems. But, like the ensuing parliamentary debate, it should help to crystallize potential solutions, and stimulate public awareness of the importance of research to the economy.

The most likely outcome will be an enhanced trend towards more strategic research, achieved not by simply increasing support for applied science, but by making basic research and technology-transfer more directed and efficient.

Basic science will receive some protection merely because almost all French researchers are civil servants on whom the government is reluctant to impose job reductions. Nonetheless, observers predict that areas of long-term basic research will probably stagnate.

On the ground, 1994 will see a big increase in the number of small mixed laboratories bringing together industry and government-funded scientists. The FFfr 1.6 billion (US\$270 million) government-backed biotechnology programme, BioAvenir, that links Rhone-Poulenc with a clutch of public laboratories, is likely to become a model for close cooperation between industry and public science (a similar programme for chemistry, ChemiAvenir, is already on the cards).

Intriguingly for a government pledged to loosen the state controls of its predecessor, the task of ensuring that industrial competitiveness becomes a priority for the whole research system will be achieved in 1994 by stronger central control of strategy. The Centre National de la Recherche Scientifique (CNRS), for example, is due to sign the first of the new five-year contracts under which the ministry and research organizations aim to agree on fixed objectives and the means to achieve them (see *Nature* 365, 598; 1993).

François Kourilsky, the director general of CNRS and a Socialist supporter, steps down in June. CNRS management will probably replace him by someone more sympathetic to the government's aims, and more radical reforms may follow.

Declan Butler

Russian election re-opens old conflicts

Moscow. Russian science, like much else in the country, enters the new year in a state of turmoil and uncertainty. Much of this results from last month's elections, one of whose immediate effects could be the virtual disappearance of the Ministry of Science, and a decision to return responsibility for basic science to the Russian Academy of Sciences.

During the past year, the ministry has been at the forefront of efforts to reform Russia's scientific system, bringing its practices more in line with those of the West by, for example, encouraging greater competition between researchers and closer links with industry.

Shortly after the elections, however, President Boris Yeltsin announced plans to make drastic cuts in the number of ministries. According to some sources, the Ministry of Science and Technical Policy leads the list.

Closing the ministry was first proposed to the president in September last year in a memorandum by Nikolai Malyshev, his

adviser on science and education. Malyshev proposed putting the academy back in charge of all basic research, and merging the Ministry of Science — which he described as functioning in the "old-fashioned" Soviet way — with the Ministry of Education and the State Committee on Higher Education to form a single Ministry of Science and Education.

Ministry officials and their supporters deny Malyshev's charges. They claim that, because of low salaries, the number of staff working in the ministry is actually decreasing. They also reject the criticism that newly-created bodies such as the Russian Foundation of Basic Research waste money in the classic Soviet way.

Academy officials argue that the organization needs to be given new authority to restore the fortunes of Russian science. Its critics claim that such a move would, in practice, do the opposite. The debate is guaranteed to intensify in 1994.

Vladimir Pokrovsky