Shakeup Under Way for Australian Science

A complete overhaul of the nation's research system has been made central to the government's plans for turning a mining and agricultural economy into one based on high technology

Canberra

AUSTRALIA is a country with a long and respected tradition in basic science. Yet its level of industrial support for research and development is no higher than that of Iceland.

Until recently, this discrepancy has not mattered much. A prosperous economy based primarily on agriculture and mining had ensured that what is often referred to as "the lucky country" could generate sufficient foreign earnings to buy from abroad whatever technology it needed. But with the price of raw materials dropping and a trade gap growing rapidly, the country is being forced to change direction.

Over the past year, the Labour government headed by Prime Minister Bob Hawke has been taking a series of dramatic steps designed to restructure the nation's scientific activities in a way that enhances their contribution to economic growth and, in particular, high-technology exports. "The government has decided that we must concentrate our research resources and plan for strategic directions in the future with defined objectives in mind," said John Dawkins, the minister in charge of the newly-created "superministry" of Employment, Education and Training, in announcing the changes during a budget speech in mid-October.

These steps have included a new "applications-oriented" structure for the nation's main research agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO); the creation of a new Australian Research Council (ARC) to take over responsibilities for supporting university-based research; and new policies that remove the automatic right of all university academics to claim research support.

The government's strategy, which has been contentious in many parts of the research community, has two major thrusts. The first is to increase its direct involvement in selecting the goals of publicly funded research. A substantial proportion of ARC's funding will in fact be devoted to specified areas of strategic research.

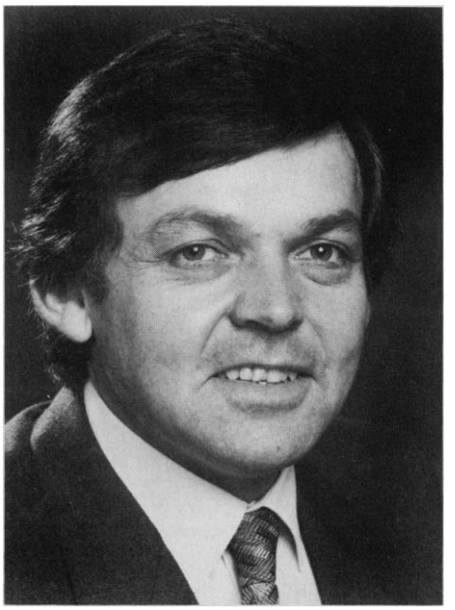
The second is to increase the involvement of the private sector, both directly and indirectly, in supporting and directing the nation's research efforts. Thus, ARC has been given explicit responsibility for increasing links between industrial companies and university researchers.

In many ways, the new directions in Australian science policy, with its emphasis on the contribution of science to the nation's international competitiveness, are little different from those being introduced in other industrialized nations. Several factors, however, distinguish the problems faced by Australia as it tries to modernize its research base. For example, the relative prosperity generated by exports of primary products in the recent past has sheltered Australian research institutions from the type of pressure for structural change that those in other industrialized nations—in particular Britain, which provided the original models for much of Australia's research system—have experienced.

A relatively weak tradition of centralized government direction over all areas of social activity also sets Australia apart from many other countries. This results partly from the fact that Australia has a federal system in which individual states tend to play a more important role in setting policy than they do in, for example, the United States, and the power of central policy-makers is correspondingly less.

Finally, much of the technology transferred into Australia—and thus the R&D on which the country's technology is based—remains under the control of foreign (primarily U.S.-based) transnational corporations. This is one of the main reasons for the low expenditure on industrial R&D in Australia itself, over half of which is carried out by foreign corporations.

These three barriers have become the principal targets of the government's efforts to achieve a major break with past traditions. So far, the most heavily affected organization has been CSIRO, still the most broadly based government research institution in any industrialized country, with a research staff of 7500 and responsibilities for basic and applied research in fields ranging from agriculture to electronics.



John Dawkins. *Minister of Employment, Education and Training, and an architect of the new research strategy.*

CSIRO has now seen its $315 million annual budget cut by 3% and has been given instructions to reorganize its research along eight preselected lines of strategic research. The council's new chairman, Sir Neville Wran, a lawyer who until recently was the Premier of New South Wales, has promised that "there will be a tighter monitoring of research to maximize its economic or social value to the Australian community."

For the first time in the 61-year history of CSIRO, priority areas are being identified and some fields of research are being explicitly dropped. "A small nation like Australia must be selective in R&D areas," says CSIRO chief executive Keith Boardman. "We need to focus more sharply on certain programs and devote sufficient resources to make them worthwhile; in other words, we should be attempting to pick winners."

Similar changes in the funding of university research will, the government hopes, result from the creation of ARC. Research awards were made by ARC's predecessor, the Australian Research Grants Scheme, solely on the basis of academic merit; the new ARC will be expected to allocate its research money with a view to the potential contribution of the research to the nation's economic base, and some of its funding will be explicitly earmarked for this purpose.

Greater direction of university research is also expected to result from a new system for funding universities, part of what one vice-chancellor describes as an "agonizing reappraisal" of the whole higher education system. Until now, universities have received their government support (including an al-

lowance for research) through the relatively autonomous Commonwealth Tertiary Education Committee, a body modeled closely on Britain's University Grants Committee. Under the new arrangements, responsibility for university funding will be transferred to a new Higher Education Council, which, together with ARC, will come under a new National Board of Employment, Education, and Training.

Furthermore, the government has made it clear that, in future, universities will only be allocated research funds if they can demonstrate explicitly that the money will be used effectively, with part of their funding being allocated to the creation of university-based research centers of excellence.

On the industrial front, the minister for Industry, Technology and Commerce, Senator John Button, has been introducing a series of measures designed to boost private industry's willingness to sponsor research, including a 150% tax break on new R&D expenditures.

In his most recent initiative, Button has been negotiating agreements with a number of leading U.S. companies (the first being Honeywell). He is offering special tax concessions to their Australian-based subsidiaries as "corporate citizens," but only under certain conditions—one of which is that the company agrees that its subsidiary will spend 5% of its annual turnover on research and development in Australia.

There appears to be broad support for the general direction of the government's moves from the scientific and academic community. However, strong concerns have also been expressed about the implications of some of the specific measures. Many scientists, for example, have been voicing fears that an excessive concentration on strategic research could undermine Australia's strength in basic research to meet its more long-term social needs.

Lawrence Cram, a physicist at the University of Sydney, told participants at a recent meeting in Melbourne organized by the Academy of the Social Sciences that when CSIRO recently closed its solar physics research group as part of the general shift from basic to strategic priorities, the funding for this work was not transferred to universities, as a government-commissioned report had recommended. As a result, solar physics research has been ended precisely at a time when concern is growing about the ozone hole over the Antarctic, already covering parts of the Australian continent.

A second complaint is that the new arrangement for research funding being proposed by the government, under which ARC will not be an independent agency, could carry its own dangers. "We had originally envisaged the ARC as a statutory body, to be headed by a governing body which would be something like the National Science Board in the United States," says Ralph Slatyer, director of the research school of biological sciences at the Australian National University.

Slatyer is chairman of the Australian Science and Technology Council, which originally suggested the creation of a single ARC in a report published in 1986. "We now fear that ARC may not have either the independence or the status necessary to do its job properly," he says.

Universities, too, have been expressing concern that the new arrangements could lead to excessive government interference in their activities in its attempts to make the education sector more directly responsive to the nation's economic priorities.

"With all their imperfections, universities may in fact do a better job if left alone than they will do if they are directed by bureaucracy and by people who are not intimately involved in the business of education," says Peter Karmel, vice-chancellor of the Australian National University.

"Sudden, radical change could damage Australia's scientific and research base in a manner from which it might take many years to recover."

Such complaints have received little sympathy in political circles. In a radio interview, for example, Senator Button pointed out that "this is the first government in Australian history which has not cut back on research budgets in time of difficulty."

The Minister for Science and Small Business, Barry Jones—widely credited for stimulating the current debate over Australia's technology policy with a recent book entitled *Sleepers Awake*—is even more outspoken in his criticism of the academic community. In an interview with *Science*, he accused university scientists of being "wimpish" in their reaction to the government's proposals, quick to complain about restrictions on their autonomy but slow to defend themselves against charges of the lack of social relevance of much of their research.

Many of those involved in these debates admit that the strong language being used on both sides, which is not unusual in Australian politics, disguises much of the basic agreement that exists between leaders of the research, academic, and political communities over the necessary changes. "As far as [the changes needed in] universities are concerned, I think that Button and Dawkins are absolutely right," says Ken McKinnon, vice-chancellor of the University of Wollongong, near Sydney. McKinnon had previously warned in a public address that "unbridled enthusiasm at the federal level for 'reform' of the universities constitutes a serious threat to sensible changes."

But McKinnon also warns that a streak of anti-intellectualism, deeply embedded in Australian culture, remains a serious danger. "Politicians must not succumb to the shibboleths of what universities are like. They have to get into the realities of the thing. Knocking people on the head is likely to be unproductive," he says.

Even Jones has reservations about some of his own government's motivations. "There is a danger that there will be an overreaction to the 'ivory tower' attitudes of some academics, with the result that a precondition for any research project will be the need to demonstrate its payoff," he says. "There are certainly forces in government inclined to that view."

The government itself has acted quickly to head off any significant opposition to its plans. Dawkins' proposals for the reform of both research and higher education institutions, for example, were announced in a budget speech at the end of September with virtually no advance warning, and several of his main recommendations, such as the creation of ARC, have already gone into effect, leaving the details to be worked out later.

Some warn that this speed itself could create problems. "Sudden, radical change could damage Australia's scientific and research base in a manner from which it might take many years to recover," David Penington, the vice-chancellor elect of the University of Melbourne and a strong critic of the government's proposals for better targeted research, has commented. McKinnon warns of Dawkins' "feckless disregard for traditional values."

But whatever the academic world feels, much of Australian industry is firmly behind the plans. "The economic realities are simply that Australia has to specialize in the most promising areas of science and technology," wrote Bob Ward, general manager of BHP Research and New Technology, in a letter last month to the *Melbourne Age*. "My own belief is that Dawkins is mapping out a future for federal support of research in science and technology which will be the savior of research in Australian universities." ■ **DAVID DICKSON**