An Industry-Friendly Science Policy

A restructuring of Britain's research councils, aimed at making academic research more useful to industry, is now taking hold—and unease is growing in some disciplines

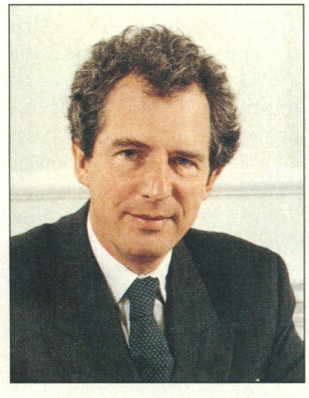
Britain's university researchers must feel like they are in the midst of a permanent revolution. Only 3 months after he completed a reshuffling of the research councils that channel government money into academic science, science minister William Waldegrave was himself shuffled out of his job last week. Prime Minister John Major dispatched Waldegrave to the agriculture ministry as part of a realignment of the cabinet and replaced him with the former employment secretary David Hunt. Hunt, a lawyer, is a completely unknown quantity when it comes to science policy. But he told *Science* earlier this week that he intends to continue the reforms of U.K. science that Waldegrave set in motion during his 2-year tenure—reforms that potentially go further than measures now being pushed by many other countries to harness university research to economic development.

Like his counterparts in most industrial nations, Waldegrave tried to restructure the country's science base to improve the conversion of cutting-edge basic science into technologies that will profit industry. The main change—outlined in a white paper, or policy document, released last summer and implemented on 1 April—was the reorganization of the research councils, which were given an explicit mission to enhance industrial competitiveness. The goal, Waldegrave said, was to develop better links between basic research and industry, not to drive academics into applied research.

Waldegrave must have thought he had the formula right, because at the time most researchers cautiously backed his proposals (*Science*, 4 June 1993, p. 1419). Indeed, the dominant reaction was simply one of relief that research policy was back on the government's agenda after years in the political backwater. But judging from interviews with leading British researchers conducted over the past few weeks, Waldegrave's successor may not have quite such an easy ride. In fact, now that the reforms are taking hold, dissent is beginning to bubble to the surface.

What researchers had not expected was the enthusiasm with which some research-council officials are interpreting their new mission. Indeed, many scientists fear that their research freedom is under threat, because the largest of the reconstituted councils is now poised to make industrial relevance a key factor in funding decisions. And adding to the alarm is a proposal from the government that industrial research teams should be allowed to bid for funds from the research councils, a move that could drain money from the universities. The reforms "could actually damage basic research," says Derek Roberts, provost of University College London. "It's a very delicate flower."

Yet despite these worries, researchers continue to support many of the changes. Few, for instance, are mourning the loss of the Science and Engineering Research Council (SERC), which was generally perceived to have become unwieldy and overly bureaucratic. "There was far too much micromanagement by far too many committees," says physicist John Mulvey, secretary of the academic pressure group Save British Science.



Shuffled. Science minister William Waldegrave *(left)* has been replaced by former employment secretary David Hunt *(above)*.

The new system splits SERC's broad research portfolio—which stretched from biomolecular science to particle physics and accounted for almost half of the research councils' $1.8-billion annual spending—across three new agencies. SERC's biology has been merged with the old Agricultural and Food Research Council to create the Biotechnology and Biological Sciences Research Council; most "big science" is spun off into the Particle Physics and Astronomy Research Council; and the rest of the physical sciences come under the Engineering and Physical Sciences Research Council. Completing the new system are three bodies that remain largely unaltered by SERC's demise: the Economic and Social Research Council, the Medical Research Council (MRC), and the Natural Environment Research Council. The idea is that each council will serve a well-defined academic community and a corresponding range of industries and so get the two sides to interact more effectively than could a broad-based body like SERC.

The government's desire to marry science and industry has also led to the appointment of dual heads for all the research councils: Each now has a full-time chief executive, appointed from the ranks of academia, and a part-time chairman who is a leading industrialist. The councils are all taking steps to increase the involvement of industrialists in setting strategy—the engineering and physics council, for instance, is setting up a "users' panel," in which industrialists will discuss their technological requirements, to help define research priorities. They are also thinking of new ways to stimulate technology transfer. MRC chief executive Dai Rees, for example, is dangling a carrot to encourage university grant-holders to interact with companies interested in commercializing their research. In return, he says, MRC could provide infrastructural support, such as computing and protein-synthesis facilities, to these academics' labs much as it does for researchers in its own units.

For the most part, biologists and environmental scientists seem happy with the new system. The agricultural, medical, and environmental research councils, they point out, were already strongly "mission-oriented" organizations that defined their research priorities in terms of national strategic goals—and the new biology council seems to be operating in much the same way. "They are looking after our interests quite well," says mathematical biologist Roy Anderson of the University of Oxford. And given that the particle physics and astronomy council's mission statement doesn't require it to place the same emphasis on wealth creation as the other councils, researchers in those disciplines are also reasonably content.

Concern is rising, however, among researchers looking for funding from the engineering and physics council, which seems to

be interpreting its industrial competitiveness mission with the greatest zeal. With an annual budget of some $550 million, it is the largest of the six research councils, and although it is a direct successor to SERC, the two organizations' governing mindsets could hardly be more different. SERC's main mission was to ensure the health of university-based science. But this "charity" style of operation, says the new council's chairman, British Telecom research director Alan Rudge, will now be replaced with a business-like model.

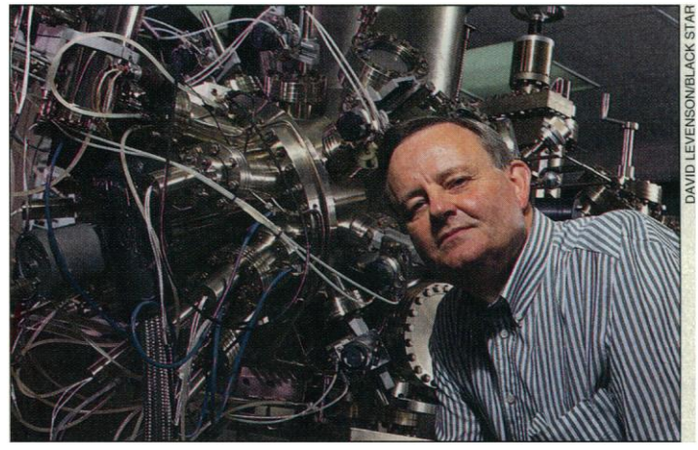
What that means is that any researcher coming to the engineering and physics council with a grant proposal will now be asked to show that there is a "user" interested in the results of the research. "[W]hereas previously we were driven by just excellence," says the council's director of planning David Clark, "now we'll be driven by excellence and relevance." It's this shift of emphasis that is setting off the alarm bells. "There's a total culture change," says semiconductor researcher Bruce Joyce—who already has firsthand experience of the new funding environment.

Joyce, who worked in the electronics industry for 30 years, heads a 100-person semiconductor research center at London's Imperial College, supported in large part by a 3-year grant from the engineering and physics council. When that was reviewed earlier this year, the center's scientific work—on the growth of semiconductor films deposited using the technique of molecular beam epitaxy—was highly rated. But because British companies are weak in that area, the center was told to shift the emphasis to a different deposition technique—metal-organic chemical vapor deposition—and focus more on the development of new semiconductor devices. To comply with those instructions, Joyce's team has had to start collaborating with a group at the University of Sheffield. "There's no expertise here in that deposition technique," complains Joyce, who says his research is more rigidly directed now than it was during his time in industry.

Increased competition

Most researchers attribute this shift in emphasis at the engineering and physics council to Rudge's influence, and are now watching anxiously to see if similarly strict "relevance" criteria are applied across the whole of the council's portfolio. "Were it to be pushed through in the most extreme form, it would be a total disaster for British science," says solid-state physicist Mike Springford of the University of Bristol, who formerly chaired SERC's physics committee. But the engineering and physics council's chief executive Richard Brook responds that researchers won't necessarily have to show that their work is directly relevant to industry—the "user" could just as easily be a researcher in an adjacent discipline, he says, "which is not such a dramatic shift."

While having to show industrial relevance is unpopular with many researchers, a potentially greater worry is that scarce grants will soon be subject to even fiercer competition. The reason: The research councils—which have in the past concentrated their spending in universities and at their own institutes—are under political pressure to open up their grant programs to all comers, including scientists from other government labs and industry. The goal is improved efficiency: It's possible, for instance, says Ken Pounds, chief executive of the particle physics and astronomy council, that software companies could represent a "better buy" than academic groups to write the computer programs needed for a space astronomy mission.



DAVID LEVENSON/BLACK STAR

Directed research. Bruce Joyce was told to shift the emphasis of his research on semiconductors to make it more relevant to British industry.

In principle, few bench scientists oppose the idea of letting government labs compete for research council funds—provided that the competition takes place on a level playing field. Academics, they say, should also be able to compete for research contracts awarded by those labs' parent ministries. That notion is supported by the biology council's chief executive, Tom Blundell. "My own view is that it can't happen unilaterally," he says.

Many British universities, which are already strapped for cash, view with alarm the prospect of competing with industry, however. "It will be a natural response of the major industrial laboratories to dabble in this pond," says University College London's Roberts, formerly technical director of the electronics company GEC. "That implies a shift of resources away from the universities."

Research-based companies contacted by *Science* mostly confirmed that they would be interested in applying for research council grants—but all predicted that demand would not be great. "The threat that research labs in industry will come piling in...is rather low," says Mark Richmond, group head of research at the pharmaceuticals company Glaxo and former chair of SERC.

The precise conditions under which the research councils' grant programs will be opened up are now being debated by the councils' chief executives and director-general of research councils John Cadogan, the former British Petroleum research director appointed to oversee the new system. Cadogan declined to comment on the issue, but the engineering and physics council's Brook stresses that the councils "are aware of the sensitivities of the university community."

Misplaced blame

The overriding complaint from the academic community, however, is that the government's reforms, by focusing on the research councils and academia, do not address the real problem. The blame for Britain's disappointing record in technology transfer, say academic scientists, lies mainly with industry and investors. "They don't seem to have the commitment to long-term research," says ionospheric physicist Tudor Jones of the University of Leicester, whose work has potential spin-offs for companies interested in the long-range transmission of radio waves.

That view is echoed by molecular geneticist Frank Grosveld of MRC's National Institute for Medical Research in north London. In 1992, he cofounded his own company, called Therexsys, to develop new vectors for gene therapy, after years of seeing his work picked up by U.S. investors and ignored in Britain. "My general perception in this country is that industry doesn't like to buy an idea," says Grosveld.

And while venture capitalists and industrialists counter that British academics are less willing than their U.S. counterparts to risk their own time and money in start-up companies, some senior industrialists concede that researchers like Grosveld and Jones have a point. "I have more than a measure of sympathy with that view," says Peter Doyle, research director of Zeneca, formerly the pharmaceuticals and biotech arm of the chemical company ICI, who agrees that most British companies invest too little in research and development.

When Waldegrave was in charge, researchers were confident that their concerns would at least be given a fair hearing. "[He]

went to a great deal of trouble to talk directly to a range of different scientists," says Carole Jordan of the University of Oxford, president of the Royal Astronomical Society. Now researchers can only wait and see how the new minister responds.

Nobody expects Hunt to abandon the white paper's central goals, given the political momentum that has built up behind Waldegrave's reforms. The major question, however, is whether he will have sufficient time to devote to science policy. Waldegrave himself was only a part-time science minister—he also had responsibility for the civil service—and Hunt will have even less time to devote to science policy. In addition to the science and civil-service portfolios, he has been given a new post as cabinet "chief of staff," acting as Major's right hand and chairing six key cabinet committees.

At best, notes Oxford's Anderson, that position could give Hunt a unique opportunity to direct science policy across the whole of government, maybe allowing him to press other ministers to address the failings of U.K. industry when it comes to picking up on research results from academia. Certainly, Hunt argues that his chief-of-staff role will strengthen research policymaking: "My new responsibilities place the cabinet minister in charge of science at the heart of government," he told *Science*. The downside, however, caution some scientists, is that science could fall off the bottom of Hunt's priority list—just as many researchers are looking for a steadying ministerial hand to ensure that the reforms ushered in by last year's white paper do not threaten basic science.

–Peter Aldhous

GOVERNMENT-INDUSTRY COLLABORATION

NIH Panel Rejects Pricing Clause

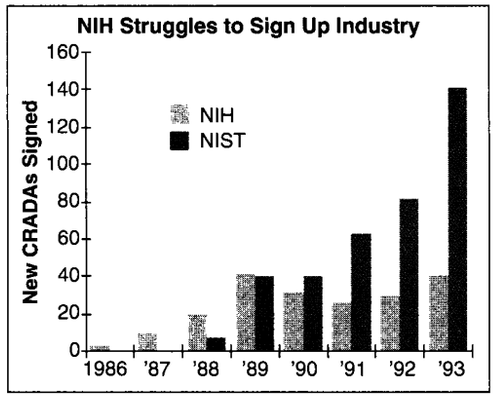
In 1989, the National Institutes of Health (NIH) got caught in the public outcry over the price that Burroughs Wellcome Co. was charging for the anti-AIDS drug AZT. NIH scientists had collaborated with the company in developing the drug, and members of Congress wanted to know why Burroughs Wellcome was able to charge patients more than $2000 for a year's supply. As a direct result of that flap, NIH adopted rules that prohibit its scientists from entering into any research collaboration with a private company unless the company promises that the price of any product from the collaboration reflects the government's role in developing it.

In theory, the idea seems perfectly reasonable. But last week an NIH advisory panel heard a chorus of complaints from industry and NIH scientists—many of them members of the panel itself—that this so-called "reasonable pricing" policy has been at best misguided. They charged that it has hampered potential collaborations between industrial and federal scientists and led to NIH racking up one of the worst records of any federal lab in fulfilling Congress's aim of commercializing government-funded research.

After listening to these complaints for the best part of a day, the panel's recommendation to NIH was no surprise: Abandon all attempts to influence drug pricing. Its report will go to NIH Director Harold Varmus, who is expected to consider changes in NIH's policies later this year.

Created by a 1986 technology transfer law, Cooperative Research and Development Agreements (CRADAs) are the primary vehicle that establishes collaborations between federal researchers and industry. They are fueling the technology-transfer boom at federal research agencies such as the Department of Energy and the National Institute of Standards and Technology. But among all the research agencies, only NIH has insisted on inserting a reasonable-pricing clause in most of its CRADAs.

NIH's clause innocuously calls for a "reasonable relationship"—supported by "reasonable evidence"—between the price of a product of NIH-industry collaboration and the public investment in that work. But biotech and pharmaceutical companies have refused to enter into CRADAs with NIH because they fear Congress may use the clause to investigate their pricing policies, to demand access to their financial records, and maybe even to set the price of new drugs. Such fears may not be entirely unfounded: Last year Representative Ron Wyden (D–OR) introduced a bill that would have effectively set the price of CRADA-developed drugs, and he and others have proposed similar legislation as part of health-care reform packages.



Stalled. Although NIH does five times the in-house research, it lags far behind the National Institute of Standards and Technology in generating cooperative research agreements (CRADAs) with industry.

NIH scientists have felt the chill. Mitchell Max, head of the clinical trials unit at NIH's National Institute of Dental Research, testified last week that some companies withhold experimental drugs from NIH researchers who want to use them as research tools for fear that any formal government tie could come back to haunt them when the drug is ready for market. "It's having a crippling effect on my research and that of others at NIH," Max said. "I and others will leave [NIH] if we can't get the drugs to do our work."

Although most panel members and those who testified last week favor scrapping the pricing clause entirely, some felt there was room for compromise. Suggestions included:

- Deleting the pricing clause in the case of CRADAs for investigational drugs used as research tools when the company already has a solid patent position on the drug and the total NIH contribution to the project is less than $1 million;
- Exempting CRADAs in which NIH makes an "insignificant" contribution to a product's development costs; and
- Requiring companies to provide "reasonable access" to the drug for those who cannot otherwise afford it.

But industry representatives weren't looking for compromises. They argued that, even if the government has the right to control price or access, NIH—as a research agency with virtually no regulatory functions—is the wrong agency to play that role. Restrictions on basic research, argued Alison Taunton-Rigby, chief executive officer of the Boston-based biotech company Mitotix, "should not be used to compensate for deficiencies in the health-care system." A spokesperson for Wyden told the panel that "my boss agrees that NIH is not the right place to do this," but he added that Wyden believes the federal share in fostering some government-industry collaborations is large enough to warrant lower prices—and that the rules must be spelled out somewhere.

Even if the controversy over the pricing clause is resolved, companies thinking about entering into a CRADA will still have plenty to complain about. A preliminary agreement between an NIH scientist and a company requires six additional layers of review, a process that can take more than a year. In addition, the agency also restricts both the research scope of a CRADA collaboration and the intellectual property rights it is willing to extend to the company. These policies, says the Biotechnology Industry Organization, "undercut the incentive of companies to enter into CRADAs."

–Christopher Anderson