Teething troubles for UK technology labs

London

A THREE-YEAR-OLD experiment in government–industry research cooperation in Britain — set up in parallel to similar US efforts — has run into trouble and appears to be heading for a shake-up. The first two of the programme's 12 Interdisciplinary Research Centres (IRCs) have received critical reviews by independent experts, and, in a climate of funding cutbacks, at least one of them could eventually be closed, sources say.

The poor performance of the first centres to be reviewed is an inauspicious beginning for the ambitious UK effort, and a worrying harbinger of things to come. Intended as Britain's answer to a recent series of US government–industry laboratories (the Science and Technology Centers and Engineering Research Centers of the National Science Foundation), the IRCs are remarkably similar to their US counterparts. Both countries give their centres four-year rolling grants (averaging about £2 million annually for each of the UK centres) and expected them to match the government funding with support from industrial and academic co-sponsors, largely to encourage transfer of technology between the sectors.

But the UK programme had the misfortune of coming just as the British economy was about to hit a downturn and the budget of its sponsor, the Science and Engineering Research Council (SERC), was facing a £40 million shortfall. Economics alone cannot, however, explain the problems of the University of Cambridge's centre for superconductivity and the centre on engineering design run by a consortium headed by the University of Glasgow, the two centres now under SERC review. As the independent researchers who examined the two centres earlier this year discovered, both have been plagued with management and organizational troubles that severely limited their research productivity in the first year.

SERC has decided to put any new centres in abeyance while it ponders what to do with its £20 million programme. "We just want to sit and think a little," says David Clark, deputy director of SERC, who runs the IRC programme. "It's an appropriate time to pause, because we're short of money." Funding shortages have forced SERC to ask the centres to cut spending by 10 per cent this year, and 5 per cent next year.

Reviewing the history of the centres has proved useful, if sobering, for SERC. Indeed, the story of at least the two IRCs under review might be a case study in exactly how not to set up an innovative new research centre. By its own admission, SERC violated several of the unwritten rules of big science management in setting up its IRCs, and the agency is revamping the programme to avoid such mistakes in the future.

As opposed to many of the first 12 centres, future IRCs (if there are any) will:

■ **Respond to an established demand.** Having a group of researchers in place and eager for a centre makes it far more likely that the centre will succeed once in place. Rumour has it that SERC set up a superconductivity IRC mainly to please then-Prime Minister Margaret Thatcher, who had seen a news article about superconductivity and called a science official to find out what Britain was doing in the area. Similarly, the idea for the engineering design centre was SERC's alone; with little established base to build on at Glasgow, it took the centre nine months just to assemble staff and find laboratory space in a nearby research park before it could do its first science. "We didn't even have room to sit, much less a place to start research in earnest," says Bernerd Capaldi, who directs the 30-person Glasgow centre.

"When we set up the first centres, we did it from the 'top down', with the initiative coming from us," adds Clark. "In the future we'll do it 'bottom up', based on proposals that the community brings forward."

■ **Start with strong leadership.** The first two centres to be critically reviewed

The perils of industrial participation

Cambridge

As mantras go, 'industrial participation' has little competition in the world of government and academic research centres. Without a healthy dose of industry support and collaboration, current thinking goes, basic research will not become technology and technology will not become products. And that, in a time when society is increasingly asking science to prove its worth, is unthinkable. But as one UK research centre found out, industrial participation can sometimes be more trouble than it is worth.

When the UK Science and Engineering Research Council (SERC) set up an Interdisciplinary Research Centre for superconductivity at the University of Cambridge in 1988, the centre was encouraged to find at least 50 per cent of its support from industry by the end of its first six years. To help it along, SERC found it a director who not only came from industry, but would also bring some expensive equipment with him. Peter Duncan had been research director for Tube Investment Ltd, a UK technology company. When it went out of the research business, he and the surplus Tube Investment electron microprobe analyser moved to Cambridge.

Things would never again look so good. Duncan soon left, and the microprobe analyser he brought with him turned out to be 15 years old and every bit as unreliable as a machine of that age might predictably be. How useful is it? "It serves us in a limited way," says current director Yao Liang, after some pause.

Liang, a well-respected Cambridge solid-state physicist, replaced Duncan in 1989. But the equipment problems were just beginning.

The UK company GEC offered the centre what appeared to be a real prize — a molecular beam epitaxy (MBE) machine, worth more than £300,000, that the company was no longer using.

MBEs can create films one atomic layer at a time, and are invaluable for creating new superconducting circuits. But there was one small catch: the machine had been contaminated with cadmium and mercury and would require cleaning. It took a postdoctoral researcher 18 months of scrubbing with steel wool before the MBE was free of the toxic chemicals. Total cost to the centre: hard to estimate, but at industrial rates at least £100,000.

Even new equipment found ways to complicate the infancy of the centre. When Cambridge decided to buy a £100,000 SQUID (superconducting quantum interference device) magnetometer to measure tiny magnetic fields, it had a choice of proven machines from US companies, or a half-working prototype from a Cambridge company called Cryogenic Consultants. Officials at the centre decided that it would be politic to buy British, so Cambridge selected the UK company, to its subsequent regret. Cryogenic Consultants delivered the magnetometer two years late and laboratory staff are still trying to get the machine to work properly. "It was competitive on paper," is the best Liang can say about it.

At its two-year mark, the Cambridge centre claims about a 30 per cent industrial share in its £6 million a year support. But about half of that, says Liang, is "in kind" — equipment, goods and non–monetary contributions; the stuff of headaches, if experience so far is any guide. Perhaps the best rule for future industrial participation might be one of the oldest: cash only, please. **C.A.**

also happen to be the two that were announced before their directors were appointed. With such a weak start, it is not surprising that management at the two centres has been troubled ever since. When the Cambridge centre finally found a director — Peter Duncan, who came from the UK technology company Tube Investments Ltd — he soon turned out to be unsuitable, not because he was not an experienced manager, but because he had little background in superconductivity.

Although he was replaced in 1989 by Cambridge superconductivity researcher Yao Liang, morale at the centre remains low. The SERC review was triggered when Peter Edwards, one of four deputy directors (three too many, say some centre researchers) decided to leave for the University of Birmingham earlier this year.

■ **Be more centralized.** The four disciplines (chemistry, physics, material sciences and earth sciences) from which the 50-person Cambridge centre gets its researchers are located in four different parts of the university campus.

That means "a lot of pedalling" for the bicycling few who have the endurance and enthusiasm to collaborate outside of their own discipline, according to one scientist.

Next month, much of the centre will be moved into a new £1.5 million building, but many individual researchers will remain in their far-flung departments, making their way to the central laboratory as best they can.

SERC will decide what to do with the Cambridge and Glasgow centres in the autumn, after its funding council examines the reports from the review groups. Several of the other centres are also in line for review.

Like many other large science efforts, the IRC programme is controversial and has drawn the wrath of researchers who claim that the IRCs take money away from individual investigators. SERC, however, maintains that this is not the case, and while SERC insists that it found the money elsewhere. In a time of tight UK research funding, there are many who would like to see it cut to release funds for new grants. The Cambridge centre, for example, consumes one-third of the entire UK superconductivity budget.

Sir Mark Richmond, the chairman of SERC, is known to be less enthusiastic about the programme than was his predecessor, Sir William Mitchell, who started it. And industrial participation, at a programme-wide average of about 30 per cent, has not been up to expectation, in part due to the UK recession. Short of an economic turnaround at SERC, the current IRCs may be the last.

Christopher Anderson

Ozone hits new low

STRATOSPHERIC ozone over Europe has decreased by 8 per cent in the past decade, a decline that goes well beyond predictions, according to a new UK Department of the Environment study. The new figures — based on satellite measurements — show that the rate of depletion has doubled since 1980, compared to the previous decade. John Pike, head of the UK Stratospheric Ozone Group, which published the report, suggested that ozone levels could drop by 15 per cent of 1980 figures by 2000 in the latitudes between Spain and London. In April, a US study found ozone over the United States was also disappearing faster than expected, although the decline — 5 per cent since 1978 — was measured in winter and cannot be directly compared with the UK figures, taken in spring. C.A.

ERS-1 off at last

FLYING without insurance and with only a 4-minute launch window, Europe's first Earth Remote Sensing (ERS) satellite beat the odds last week with a nearly flawless launch following a 2-month delay. Systems testing and instrument calibration should occupy it for most of the week, but ERS-1 will then begin to receive data from its principal instrument, a microwave device that can operate as a synthetic aperture radar. Other on-board instruments will conduct environmental surveys using radar altimetry and devices to measure sea level and temperature, wind speed and direction. The scientific priority for the satellite is understanding the physical processes underlying climate change. Four microsats' that were also aboard the Ariane-4 rocket will provide communication links and study bird migrations. C.A.

Waves rediscovered

NEARLY three decades of UK government programmes aimed at harnessing ocean waves to create electric power have finally produced their first working installation — a small concrete bunker in which incoming breakers push trapped air past a turbine to send some 75 kW of electricity into the local power grid.

Located on the remote Scottish island of Islay, the station is the third fully operational wave-energy power plant in the world, joining one in Norway and another in Japan. Between 1974 and 1983, the UK Department of Energy spent more than £15 million researching several wave power designs that were eventually discarded after a heavily criticized review found them uneconomic. Funding for wave power then fell by about a factor of 10. Now the department is redoing that study, taking into consideration future restrictions on greenhouse gases, realistic fuel costs, and new technology. C.A.

In-depth probe

SEEKING to end the 'stigma' of research on Scotland's Loch Ness, UK biologists last week announced a new project to explore the lake, which, as well as being the legendary home of 'Nessie', the Loch Ness monster, is the UK's largest body of fresh water. The only previous study of the lake's topology was done in the early years of the century and even its depth is known only to be 'at least' 750 feet.

"It is time that Loch Ness was fully explored, not by publicity seekers but by scientists," said Nicholas Witchell, who co-founded Project Urquhart, the £2 million, 3-4-year effort, which is sponsored in part by the Natural History Museum. This is not to say that the scientists would ignore Nessie should it turn up. "There are several interesting observations that have yet to be explained," Witchell said. In fact, said Colin Curds, a museum zoologist, "it is highly likely that species new to science will be discovered during our studies." He has diatoms and worms in mind, but who knows? C.A.

Limits to *Endurance*

BRITAIN'S oldest Antarctic support ship, HMS *Endurance*, is rotting and rusty and may be condemned after a dry-dock inspection is completed, and battle lines are already forming over a replacement. Should *Endurance* be decommissioned, the British Antarctic Survey wants a replacement — preferably something similar to the *Polar Circle*, a ship built by a Norwegian company several years ago for US consideration. The US National Science Foundation leased a US-built boat instead, and the *Polar Circle* could be obtained and converted for UK research purposes for about £23 million. Military officials, however, want to apply *Endurance*'s operating costs to offset budget cuts, and use military guard ships already assigned to the Falkland Islands for Antarctic duty. The military position is improved by the fact that a new airstrip on the Antarctic Peninsula could soon take over the simple transportation duties of *Endurance*. C.A.

Parallel boost

UK computer research received a boost this month when two government funding agencies announced the creation of new parallel computing centre at four universities, part of a £34-million, four-year programme that takes advantage of industrial interest — and willingness to invest — in the growing field of multiple-processor machines. Joint government and industry funding (with about £21 million from industry) will increase staff and buy computer hardware for centres at Oxford University, the University of Edinburgh, and consortia in London and Southampton. C.A.