

which is likely to intercept the intended target. Given the kinds of targets the planners have in mind, however, the computational and mechanical tasks that they must solve are formidable.

This is why the issue that will face the new Administration in Washington, and its counterparts elsewhere, is whether the game is worth the candle. For whatever virtues laser weapons may eventually be shown to have, there is no doubt that they will be uncommonly susceptible to relatively simple countermeasures. A simple false skin on every warhead would do the trick, while laser weapons would themselves be put off their stride by much less powerful hostile lasers. These are the reasons why even hawks in Washington are now asking that Mr Reagan should not decide to spend even larger sums of money than at present on the

development of laser weapons. For the time being at least, there are better ways in which the Pentagon could spend large sums of money. The time for going all out for laser weapons is not now but later, perhaps when somebody has a clear idea for a laser weapon system that could perform a tangible if limited role in the foreseeable future. Mr Reagan's opponents on laser weapons cannot, however, have it both ways. If the technical problems are as formidable as they say, and the opportunities as negligible, there is little danger that wasting money in this way would further disturb arms control negotiations with the Soviet Union. If there were a prospect that, say, a workable anti-ballistic missile system based on a laser might be developed within a decade, it would be a different matter. On present form, that danger is remote.

What if Britain wants not to change?

The Centre for Technical Change has made a brave start on a daunting problem — the diagnosis and, with luck, the cure of Britain's chronic problem of turning research and development into prosperity (see page 114). Sir Bruce Williams, the newly appointed director of the centre, is a prize catch. His appointment should go a long way to still some of the muttering about the centre's chances of success. Even so the centre's wellwishers will keep their fingers crossed. British institutions, but especially the civil service, habitually resist gratuitous advice, which is why organizations like the Brookings Institution have not flourished in the United Kingdom. The most obdurate of the problems which the new centre will have to solve is that of making people listen to what it has to say. To do this, it will need guile but also an imaginative, even a radical, agenda. Where should it begin?

There is no shortage of conventional accounts of what is wrong with the British economy, and with the linkage between the economy and technology. For the past thirty years, public support for research and development has been generous, even profligate, but only in retrospect has it dawned on people that much of this effort has been misplaced. Defence research, especially in aerospace and electronics, has taken the largest share of public funds. Throughout this period it has been assumed, in the face of experience and against reasonable expectations, that work carried out in secret in government laboratories would somehow filter through to revivify the civil economy. In retrospect, nobody is surprised that this has not happened, that the British aircraft industry has an annual turnover smaller than that of Boeing or that the British government is having to spend public money on last-minute attempts to foster the design and manufacture of microprocessors. Yet the huge defence laboratories remain more or less intact, ageing slowly as their staffs approach retirement.

During the past thirty years, British governments have inconsistently tried to remedy this state of affairs. They have encouraged the production of graduates in science and technology (1955–65) in the belief that such people would make a market for their services. They have encouraged the creation of large technical companies (1964–70) in the vain hope that the conglomerates would seize the opportunities which technology presents. They have wasted money and, worse, people's talents on glamorous projects with no economic benefit such as the Concorde project (inherently uneconomic) and nuclear power (where even successful innovations have been pigeonholed until recently). Throughout this period, governments have sought without conspicuous success ways of encouraging technical innovation in the general run of British industry, finding only that the small and medium-sized firms best placed to profit from radical innovation are the least able to raise the necessary capital.

This depressing record shows that there is no point in hoping that research and development, or skilled manpower, can by themselves improve the exploitation of innovation by British industry. Indeed, the chances that such an old-fashioned recipe would work are less than they have ever been. Industry, especially small industry, does not lightly think of spending extra on

research and development at times like these. (The exceptions are those companies, many of them in the chemical industry, which have learned in the past thirty years that research and development is not merely profitable but indispensable.) Moreover, there is little hope that the new centre will be able to produce such a more penetrating analysis than other analysts of the ills of the British economic system that the scales will fall from people's eyes, expectations of prosperity will be reduced to some amount commensurate with the Gross Domestic Product and the ills of inflation and deflation will be cured less painfully than by monetarism.

So where is the Centre for Technical Change to look for an agenda if these obvious fields of enquiry are likely to be ineffectual? Fortunately, not every hopeful door is shut. There are two particular fields in which the centre could do sterling service. First is the British education system, now most of all distinguished by its eccentric and inexplicable differences from other educational systems in other industrialized states. British first degree courses are shorter than elsewhere, but those who embark on them have to demonstrate in advance that they have already covered much of the ground. The result is that too many narrowly educated people, mock-specialists before their time, are turned out into a world in which their teachers are constantly declaiming the need for continuing education to meet changing needs. Throughout the educational system, the pursuit of academic excellence is properly regarded as a virtue. Improperly, the use of the educational system for the pursuit of something else, say wealth or even happiness, is regarded as a kind of sin. Occasionally, out of subliminal recognition that there may be an inconsistency somewhere, people like Sir Monty Finniston are persuaded to preside over inquiries into the parlous condition of this or that profession (engineering in his case). Perhaps they are lucky, since their inquiries are always so confined that governments usually decide not to act on their recommendations or (as in Sir Monty's case) to act halfheartedly. For a nation as preoccupied as the British with education, it is increasingly ridiculous that so much of what is said should make so little sense.

The second field in which the Centre for Technical Change should take an interest is closely related. British civility is, of course, renowned, and is probably also a product of the educational system. People do not openly seek to embarrass one another. The result is that casual acquaintances need not fear that they will have to disclose their salaries at dinner parties, which makes for congeniality. Unfortunately, the same principle applies in the real world. People in industrial research make their reputations by publishing in academic journals; occasionally they become (unpaid) visiting professors at a neighbouring university. Salesmen sell first to their sales managers, and afterwards to their customers. Rarely is it allowed that the pursuit of pound notes can be a seemly occupation — or that the consequences of success can ever be worthwhile. The problem for the centre, in tackling such a subject, is twofold. Is it capable of objective analysis and presentation? And would such an analysis, however rigorous, merely persuade the genteel British that things are better as they are?