from the administration), the academy seems to regard itself as a kind of Supreme Court and not a kind of lobby. What the nomination committee should now be asking is whether these genteel conventions should be abandoned.

There is no doubt that there is at present a great vacuum to be filled in Washington. As things have turned out, the profession of science is woefully unrepresented by independent organizations. Gone are the days when PSAC (the President's Science Advisory Council) could expect to be giving advice on thermonuclear weapons in the morning and the development of university research in the afternoon. Quite properly, government agencies now have full-time professionals to give advice instead, so that the distinguished committees of advisers have necessarily declined in influence. Moreover, there is no reason why scientists should complain that the Office of Science and Technology at the White House has had less independence under Dr Donald Hornig than it used to enjoy in the glamorous days of Wiesner and Kennedy. The truth is, of course, that the Office of Science and Technology is an integral part of the machinery of government, with administrative responsibility for things like the science budget. There is no reason why the office should keep more sensitively in touch with professional opinions than is necessary to ensure that government policies function as they are intended to.

But what about the National Science Foundation? Should not this be the kind of independent link between the administration and the scientific professions that the University Grants Committee used to be in the relations between the British Government and British universities? Unfortunately, even if this had been a realistic goal, the NSF has never been strong enough to act as other than a grant-giving organization. Even though there will be a new chairman at the NSF in the new year, it is likely to remain a broken reed for at least as long as penury persists.

This is where the national academy, in the next few years, could play a part which did not exist in the fifties. It could, for example, and indeed it should, be much more outspoken on the way in which Congress deals with the science budget each year. It should, for example, be the duty of the president of the academy to insist on confronting Congress and the administration with the views of the scientific community on the imbalance between public expenditure on the long distance transport of human bodies beyond the atmosphere and the resources devoted to sober and comparatively cheap activities such as ground based astronomy. By the same test, the academy could have done a great deal to head off the administration from some of its recent extravagance on oceanography. But the real problems, still fully to crystallize, concern the financing of university research and higher education. Just what does the future hold and how should the real needs of science be defined and then forced on Congress and the administration? This is the role the next president of the academy could fill most usefully. What the nomination committee should be looking for is a kind of politician—somebody who can first make sure that the academy defines common views on policies which concern it which are more than just lowest common denominators of people's prejudices and somebody who can then give these views a fair wind in public life. In the next few years, a talent for dispassionate advice is probably less important than an ability to cajole, shame and even frighten the Government into sensible policies on the allocation of resources. Obviously the committee has a tough job on its hands. But if it finds the right man it will win not merely a local harvest, but will also provide an example for academies elsewhere.

SCIENCE MUSEUMS

What Manchester does Today

THE city of Manchester, the university and the Institute of Science and Technology have just achieved something that has been talked about in Manchester since the 1790s—the setting up of a science museum. This is entirely proper, for there are few cities in the world which can boast as rightly as Manchester does of anything like a comparable continuous association with the development of science and technology from its very beginnings. Dalton, Joule, Reynolds, Rutherford, Weitzmann and Robert Robinson, to name but a few, were all associated with Manchester. Now the city, the university and the institute have agreed to put up £4,000 each for a science museum, partly to keep memories alive.

The plan, however, is to build a museum, not a mausoleum. Those associated with the project, and especially its newly appointed director Dr R. L. Hills, are determined that it shall be a living museum. In the best Mancunian tradition, the science museum, like the Manchester Museum, will be closely associated with the cultural life of the city, the research work of the two universities and science education in the city's schools. Where school science is concerned, the hope is that the museum will be so intimately involved in sixth form science teaching that it will act as an antidote to the Dainton disease.

Although discussion of a science museum in Manchester dates from the 1790s, when proposals for starting a museum there, along the lines of the Royal Institution in London, were being tried out, the museum really dates from discussions about five years ago between Dr D. S. L. Cardwell, the head of the newly created Department of History of Science and Technology at the Institute of Science and Technology, and his colleague, Professor W. Johnson. They developed a scheme for a science museum, using the Manchester Museum as a model, and Mr Hills, as he then was, supported by an SRC grant, harnessed the enthusiasm and goodwill of the city, local industrialists and the universities. The museum is being housed, to begin with, in the Oddfellows Hall, a building destined to provide a site for a hall of residence. It will be opened in the next few months to groups of sixth-formers.

There is no shortage of exhibits. Apart from the university's collections of apparatus and papers left by Dalton, Joule and Reynolds and many others, the museum has been overwhelmed with offers of industrial

machinery and the chief problem has been persuading donors to keep material until the museum has space to house it all. The museum is at work moving a Boulton and Watt beam engine donated by the National Coal Board, which is to be shown in working order. As many exhibits as possible will be made to work, and steam engines will be driven by steam, not electric motors. Where original machinery is not available, the museum intends to make replicas from contemporary plans and its first project is the construction of a Newcomen atmospheric engine. The philosophy at Manchester is that a science museum must explain scientific principles, and a working replica is more valuable than a broken antique, an explanation of an escapement is better than a gallery of clocks. As well as exhibiting working machinery the museum is to re-create a series of period laboratories, ranging from the 18th century to the present day and, wherever possible, furnished with original apparatus which works.

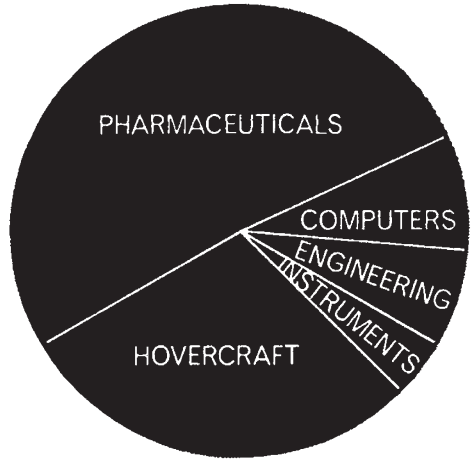
In four or five years' time, the museum will probably have to find new accommodation. There is no site in view, though people seem firmly convinced that a permanent home is bound to turn up. Initiative and enthusiasm promise success, although it is plain that outside help could provide still further assurance.

INDUSTRIAL INNOVATION

Bridging the Gap

SINCE 1965, when the National Research Development Corporation became a dependant of the Ministry of Technology instead of the Board of Trade, its capital has been increased ten-fold. First, in 1965 it was raised from £5 million to £25 million and then in May this year was doubled. For the first time since the NRDC was set up in 1948, it looks as if the Government is taking the corporation seriously. Indeed, with £50 million to work with, there is no reason why the corporation should not fill its statutory function and secure "where the public interest so requires, the development or exploitation of inventions resulting from public research and any other invention as to appear to the corporation that it is not being developed or exploited sufficiently". With luck and good management, indeed, it ought not to be difficult for the corporation to do this and make a profit—that certainly is the optimistic forecast of the director, Mr J. C. Duckworth. Although all his colleagues do not agree, he believes that the corporation will be making a profit in the near future. In the short term, profits are perhaps not the chief consideration, but in the long term the NRDC should aim for nothing less and the report for the past financial year now published (HMSO, 7*s*.) is encouraging if not dazzling. The net returns to the corporation were £1·35 million, of which £1·17 million was income from licences, more than half of it from the United States. Outgoings, however, were £3·321 million. Although on the face of things, these are poor results, the total return in the past 19 years has been only £8·22 million and income has more than doubled since 1965. To earn its £8·22 million, the corporation has invested £23·255 million, but Mr Duckworth maintains that the real cost to the country has been the £1·2 million or so which has been invested in failed projects which the Treasury has agreed can be written off.

The Bailey bridge is no longer the corporation's chief money spinner. Revenue from pharmaceuticals, and in particular cephalosporin which is being produced by Glaxo in Britain and Eli Lilly in the USA, far outweighs that from all the other projects put together. So long as cephalosporin is not superseded, and Mr Duckworth is quick to say that that could happen at any time, licence revenue should keep on growing. The corporation's much greater investment in hovercraft is also beginning to show returns, and the air cushion industry as a whole—hovercraft, hovertrains, hoverbeds and now hover pottery kilns in which the pots to be fired are kept suspended by jets of hot air —is potentially one of the corporation's biggest money spinners.



The cumulative receipts from projects in various sectors of industry supported by the NRDC.

With its increased capital the NRDC has shed the image, thrust on it by a derisory budget, of being fairy godmother to garden shed inventors. Industry is eager to get its hands on risk capital and the NRDC is finding itself increasingly involved in financing industrial inventions, the innovation of better production techniques and—as a new activity started last year—it has underwritten the performance guarantees of newly developed chemical plant that has been exported. This would have been outside the corporation's terms of reference in the old days. It does not, however, follow that the NRDC has lost interest in small projects and in individuals with bright ideas. Of more than 1,000 submissions from private individuals last year, eleven are being investigated further. Of the 254 projects on the NRDC books at the end of March, 61 are in the £1,000 to £5,000 range. At the other end of the scale, five projects are to receive nearly £15 million between them.

In the long run, however, the acid test will be whether the NRDC can make a profit and, more important, stimulate the development of really profitable industries. Recognizing bright ideas is one thing—and the corporation is supporting work ranging from the isolation of locust attractants from grass and pharmacological compounds from raspberry leaves to further development of carbon fibre laminates—but no one knows better than British industry that turning them into commercially successful ventures is quite another matter.