

operation.

Although it is too soon to know whether GMAG will or should go out of business, the recruitment of specialists in genetic manipulation to the committee may now become increasingly difficult. The group, in any case, will have its hands full with the scrutiny of proposals for work in categories II-IV of the guidelines procedures, and with the principles for regulating large-scale manufacture. The reconstitution of the Dangerous Pathogens Advisory Group, expected soon, should, however, help to clarify GMAG's long-term future.

Engineering research

Planning for more

Washington

Federal policy-makers are now in the process of deciding whether the National Science Foundation (NSF) can provide an adequate framework for regenerating the health of the nation's engineering efforts. NSF officials are confident that it can. A prominent component of plans for reorganizing the foundation, formally presented last Thursday to the National Science Board responsible for foundation policy, is the creation of a new engineering directorate (see *Nature* 11 September). Applied science, which shares a directorate with engineering, would be distributed among the other research directorates.

Concern for the health of US engineering research has arisen as part of the wider debate about declining productivity and stagnating innovation. Equally important, however, has been what NSF acting director Dr Donald Langenberg describes as an "upsurge of interest" from engineering societies over the state of their profession and the role of federal support.

Both NSF and its critics agree that US engineering is in poor health. A rapidly escalating demand for engineers for large-scale construction projects in the oil and chemical industries has created a national shortage of engineers. This situation will be exacerbated by the demands of new plants to be financed out of the government's \$20,000 synthetic fuels programme.

The shortage is reflected in the high salaries paid to engineering graduates, while another result is that few graduates are tempted to stay on at university to do research once they have completed their first degree. Many postgraduate courses are now largely filled with foreign students and NSF estimates that, overall, there are 2,000 empty positions in university engineering faculties.

Some universities are designing schemes to compensate. Carnegie-Mellon University in Pittsburgh, for example, plans to offer loans of \$1,000 a month to PhD candidates, which need not be paid back if the candidate stays on and teaches.

However, there is general agreement that more than a piecemeal approach is needed;

the question is the form it should take. Dr Leo Young, president of the Institute of Electrical and Electronic Engineers (IEEE), has proposed a "blue-ribbon commission" — somewhat similar to Britain's Finiston Committee — to look at the problems facing the profession.

In Congress, discussion has focused on a bill introduced by Mr George Brown, chairman of the House science and technology subcommittee, which proposes setting up a National Technology Foundation. Mr Brown admits that his proposal has been put forward chiefly as a vehicle for discussing a range of proposals and that a revised bill is likely to be presented to the next session of Congress.

However, many engineers have not lost the opportunity to vent their frustrations at what they consider to be a lack of support from the federal government in general — and the NSF in particular — especially in fields outside space and defence research.

"Those university departments supported by the Department of Defense and the National Aeronautics and Space Administration have fared well, while civilian engineering, such as building technology and machinery design, have been neglected" complained Dr Bruno O. Weinschel, head of a private engineering company and secretary of IEEE.

National Science Board chairman Dr Lewis Branscomb of IBM admitted at congressional hearings on the bill that NSF support for engineering may have been weak in the past, but he insisted that this was now being remedied. He pointed out that for the past two years the board has proposed greater increases in the foundation's support for engineering research than for any other area of science.

NSF is hoping that its planned reorganization will go some way towards meeting its critics and will in particular head off any attempt to set up a new, separate institution (which might, in addition to the organization split, also be in a position to compete for funds). At a public meeting two weeks ago, held to discuss the reorganization proposals, Dr Langenberg said that engineering research could benefit financially from having its own directorate. He also hinted that reorganization plans were likely to be accompanied by a request for a significant increase in funds for engineering research when the foundation's budget request for 1982 goes to Congress in January.

Further financial commitments are likely to result from President Carter's decision about how to embrace science and engineering education in US schools and colleges, a report on which was sent to the White House by NSF and the Department of Education last month, and is expected to be made public shortly. But even if the Administration agrees that there is room for a larger role for engineering in the foundation, Congress may take some convincing. In debating the NSF appropriations in July, the House of Repre-

sentatives rejected a proposal for a 10 per cent increase in funds for the engineering directorate.

The White House report is likely to have a good deal to say about engineering research in American universities and colleges. Although, elsewhere, engineering graduates tend to stay away from doctoral courses, in its United States the demand is still quite high. There is, however, increasing concern about the willingness of potential faculty members to teach.

Perhaps more significantly, the powerful House Appropriations Committee claimed that its restriction of the use of NSF funds planned for various innovation projects was imposed "to ensure that an unacceptable level of unbudgeted items does not erode funding for basic research programmes which is — and continues to be — the *raison d'être* of the foundation".

These sentiments find an echo, though somewhat muted, within the scientific community. At the public meeting on 13 September, representatives of several of the NSF's advisory committees expressed concern that too great an emphasis on engineering and applied science could put a further squeeze on basic research. Dr Langenberg replied that he felt basic science was sufficiently robust not to be significantly threatened, but not everyone present was convinced. **David Dickson**

Electronic publishing

Keyboard papers

Those who wish to publish a research article in a journal, who are asked to referee a paper or who simply want to read what their colleagues have been publishing may in future have to turn to a computer terminal. The fully electronic scientific journal is still a few years off, however. But a group of British researchers is already beginning to consider its possibilities, in a project supported to the tune of £256,000 by the British Library.

The aim of the project, which begins in earnest in November, is to investigate whether electronic journals might ever be feasible, how much they would cost the user and the type of problems they would pose to users. The leg work is being done by groups at the University of Birmingham Loughborough University. The Birmingham group, under Professor P. Jarratt, will be providing the central computer facility and hardware and software to other participants in the project at a cost of £122,000. The Loughborough group, under Professor B. Shackel, will coordinate the setting up of an experimental electronic journal using the rest of the funds.

About 35-40 people dotted throughout universities in Britain will be collaborating. Each centre will provide its own terminal linked in to the Birmingham computer. The British Library funds will go towards