Research and Development at the University

The direction of federal support and opportunities for response by consortia are changing.

Don E. Kash

That our society is undergoing changes of a new order is one of the few points on which there is substantial agreement at all points on the American political spectrum. Following from this is a widely held belief that public policy responses must also be of a new order. We are beginning to see fundamental questions asked about both the organizational and conceptual basis of our society. As *Fortune*'s (*1*) reviewer of Galbraith's new book indicates, "Despite the upswell of academic radicalism during the past decade, there has not appeared any radical economic treatise, any 'newest economics,' to challenge the neo-Keynesian orthodoxy that is now established in universities, government, and corporations and trade unions alike. That is to say, such a treatise hasn't appeared until now. With the publication last month of John Kenneth Galbraith's *The New Industrial State* . . . the situation has changed."

The appearance of Galbraith's book punctuates the converging concerns of numerous segments of our society. We are members of a society in transition, and the university has been the source for many of those forces which are behind transition. To modify a label recently used by White in a series in *Life* (*2*), our universities have become "action universities." They no longer stand aside, if they ever did, providing ideas, manpower, and disinterested criticism for a "real world" out there. Now the demand is that they help run the real world and increasingly, that they provide planning for it.

It is the purpose of this paper (*2a*) to ascertain the nature of the external demands that are and will be made on the universities, and to suggest some ways in which university consortia might respond. With that genius which is unique to it, the Congress has sensed and has been looking at the problems of the technological society almost continuously since 1964. This paper is based primarily on an investigation of those congressional activities.

The author is associate professor of political science and director of the program in Science and Public Policy at Purdue University.

Goals

Although it would be generally agreed that specific national priorities are hard to define, some effort in this direction is basic to understanding the changing emphasis of congressional concern. The crux of our interest consists of those goals relevant to the expenditure of the government's $17 billion of research and development (R & D) money. At the most general level, it is perhaps appropriate to talk about the motivations that have led to this expenditure.

Ralph Lapp (*3*) correctly pinpointed the importance of military security and national prestige when he said that the program of federal support for R & D was the result of three foreigners: Hitler, Stalin, and Khrushchev. Although military security is likely to continue to consume the largest portion of federal R & D funds, congressional and public concern with it is in relative decline. This is so, in part, because the program has demonstrated its success, because it is now well developed, and also because our domestic problems are demanding more attention.

Two motives, of growing importance in the making of national science policy, are special interests and economic and social progress. Special interests include such demands as that for wider geographic allocation of R & D funds and the demands that already existing programs be supported; for example, the aerospace industry. The special interest motive would appear strong enough to sustain the major elements of the existing R & D support system.

The motive that appears to demand new directions in R & D programs is economic and social progress. This results from a widely held belief that science and technology (included here are the social sciences) can contribute significantly to domestic progress. A second, supportive factor is the belief that based on a resolution of the Vietnam conflict there will be new monies available (*4*). With that resolution most congressmen foresee military and space expenditures remaining on a plateau at the same time that expenditures for civilian needs steeply rise.

Public Policy

With the rising importance of the goal of economic and social progress has come a parallel demand, by those congressional committees which have looked at the technological society, for help from the universities in planning public policy. If it can be said that we have had a public policy for science up to now, then it has only been the sum of all of the individual and discrete decisions made by the numerous federal agencies. There is a growing interest in changing this. No one wants a centralized, monolithic policy-formulating process. Congressmen generally feel it to be the strength of our system that "federal policy determination is fragmented, practical rather than theoretical, and that few formal statements of policy are produced" (*5*). Nonetheless, there is growing sentiment that improved forecasting and planning of public policy are necessary. It is thought that wise use of science and technology can go a long way in reducing the costs implicit in our rapidly changing society.

In a perfectly rational society, policy would be made something like this. Goals would be articulated. Various strategies for achieving those goals would then be defined. A cost-benefit analysis of the various strategies would follow. And the final step would require taking action along the lines of the selected strategy.

Although, for the congressman, there is an almost humorous quality in the rigid order of that process, what we

have today seems too far at the opposite extreme. It involves making policy by adding immediate and discrete actions. The emerging theme of Congress is that we must be capable of some pragmatic middle ground of policy making. At a minimum, it is believed that public policy can be so planned and organized that, ". . . objectives or goals at subordinate organizational levels should not conflict with those of their parent organizations" (*5*, p. 2).

Congress and the federal agencies generally are calling for two kinds of advice regarding policy from the universities. The simple and straightforward call asks how do we achieve better health, eliminate poverty, and so forth? The other is related but somewhat different—how do we formulate policies which, while achieving their goals, do not create even more serious problems than the ones they have just solved?

Whether systems theory is a response to compelling circumstances, or whether the circumstances are recognized because of systems theory, there is a widely held belief that science and technology have made our society into a highly complex system. What congressmen see as being one of the major consequences of science and technology to date is a changing of the time scale.

The Daddario subcommittee (*6*) put it as follows. "The subcommittee believes that we cannot blindly adapt technology to our needs with the traditional assumption that there will be ample time to iron out any bugs on a leisurely shakedown cruise. A bigger effort must be made not only to foresee the bugs, but to forestall their development in the first place."

Many in the government believe that since the universities have helped society meet problems in the past they are the logical places to find the answers to these new problems. Further, there is a negative impetus. Even those who express less confidence in the universities do not know where else to go. This is not to imply that there is no role for other institutions, such as the nonprofit or the profit-making concerns, but rather that all resources will be needed, and that the universities are especially critical.

This hope placed in the universities is reinforced by a belief that the methodology is available. That methodology is loosely labeled systems analysis. There is a belief that the techniques that RAND applied to Air Force problems and that were later applied to the Department of Defense can be applied to broader public-policy programs. For instance, the Clark subcommittee stated: "The subcommittee finds the systems approach to be a promising way to meet and solve some of the complex social and economic problems confronting state and local governments" (*7*, pp. 58–59).

The approach of Congress and the federal agencies to the university is schizoid. Although congressmen believe that the universities have the intellectual resources, they wonder if the universities can organize themselves to respond. One problem is the tradition of autonomy: ". . . where the university has admitted only reluctantly in the past that other universities also exist—and then, let us face it, mainly for the purpose of arranging football schedules" (*8*, p. 64). Another problem is that of the "walls of separation" between disciplines. In response to this last problem there are continuing calls for ". . . the training of middlemen capable of communicating the results of research to practitioners and the problems of practical decision to social scientists" (*9*, p. 10).

The government in Washington is convinced of the value of interdisciplinary, transdisciplinary, multidisciplinary, or crossdisciplinary work, whichever term happens to be in vogue. This would appear to be, in part, a reaction to the frustration felt in dealing with the universities with their structure based on disciplines. Perhaps no rule is more widespread in the university today than that which says, "When applying for federal support, make it interdisciplinary." Haworth set this tone as follows. "It seems to me that an integration of knowledge gained from the social sciences . . . must be integrated with the knowledge of the harder sciences . . . and so an important part of our future thinking is to try to bring this about" (*10*, p. 69).

In summary, then, the hearings and reports of Congress convey the clear word; (i) that government needs public-policy help; (ii) that the universities have the creative talent to give it; (iii) that systems analysis provides the method; and (iv) that at present the universities are inadequately organized to offer the help.

In response to this feeling—one should perhaps characterize it as a sense—federal agencies and the Congress are groping around for new organizational approaches. Again, Haworth articulates the thinking ". . . we believe that there need to be some additional centers for advanced specialized research for attacking some of these multidisciplinary problems, centers for such things as the study of urban ecology, regional planning, economic analysis, things of that sort. This does not mean necessarily that one sets up a new institution, although in some instances this may be called for, but rather that the resources of the university or several academic institutions be brought together from a broad range viewpoint and have an integrated attack on some of the problems" (*10*, p. 70).

Applied Research

Implicit in the previous discussion of the mood and position of Congress and the federal agencies is one common theme—that is, that the universities must concern themselves, in larger part, with applied or programmatic research. Our universities not only are being asked to respond to perceived problems, but also to help perceive problems. No demands are being made that universities get out of the basic research business. Rather, the demand is that the universities take on in addition a larger share of responsibility for applying the basic research to practical needs.

If Congress is to get its way, then universities must organize to meet these demands. They must recognize that support for science is likely to be viewed as an instrumental activity oriented toward achieving social and political goals. In fact, this is not different from what has been the case except that the subject of the study will be different.

Civilian Sector: Social Sciences

The overwhelming concern of Congress for R & D (Vietnam notwithstanding) is directed to the civilian sector of society; this focus has generated growing interest in the social sciences. Although the natural sciences and engineering were capable of meeting the needs of the military, essentially by themselves, few have hopes that they alone can meet this new challenge. Leland Haworth characterizes this belief: ". . . I think that the solution of many of the most crucial problems that the country faces, in fact, the world

faces, are going to depend very, very substantially on the social sciences and on their integration with the natural sciences and engineering" (*10*, p. 64).

No one can wonder that the universities hesitate at the prospect of being involved in the public-policy process in an immediate way with the social sciences playing a major role. First, this means the universities will be treading on treacherous political ground. Second, it means treading on that ground somewhat under the influence of scholars who have, at best, a partially developed methodology to apply. Nonetheless, that is precisely the challenge. The following quotation about political scientist Alfred de Grazia of New York University (his ideas were summarized in a staff study for the Reuss subcommittee) exemplifies this type of criticism ". . . [H]e [de Grazia] boldly states, the main thing that is wrong with much of the research sponsored by executive agencies is that is it not political enough. It tries to hide itself in 'objectivity.' It tries to be 'value-free' at all stages, instead of in the scientific stages of research only. Accordingly he is scornful of useless, powerless, blindly empirical research. . . . He is skeptical even about the value of greatly enlarging the resources available to such unprogrammatic granting agencies as the National Science Foundation or the Smithsonian Institution" (*9*, p. 17).

The President's view is:

> . . . Johnson . . . asked the intellectual to interest himself with the critical evaluation of government programs. ". . . [T]he power to evaluate," he suggested, ". . . is the power to say, about public policies or private choices, this works. But this does not. This costs more than we can afford, or this costs more than it is worth. This is worth more than it costs. This will give an acceptable result. But this will complicate the problem and make it impossible to solve."
>
> And the President gave his own answer to a question that this committee has asked social scientists: what help should, and should not, the federal government expect from private social scientists in the . . . evaluation of national policies and programs? He stated that the government needs "guidance and discriminate judgment as well as exhortation.
>
> "That judgment is exactly what those to whom circumstances have given a good education, are called upon to provide.
>
> "Their judgment may be wrong, and they must live with that knowledge as other men do who have been chosen by their fellow citizens to exercise the powers of government.
>
> "But they must provide it; it is an obligation of responsible intellect" (*9*, pp. 12–13).

In summary, the demand is for more use of the social sciences, but with an interdisciplinary systems approach focusing on applied problems.

Larger Projects on the Horizon

Overlying the various concerns already discussed is a growing pattern of movement within the federal government toward a smaller number of larger projects. In the past even the mission-oriented agencies of the government have tended simply to set forth problem areas in which they would consider project proposals. One congressional study noted this pattern with respect to the Department of Housing and Urban Development and then commented favorably that "apparently recognizing the shortcomings of this random approach, the Department is now creating guidelines and priorities to insure an integrated program of research in areas where the need for information as knowledge is most urgent" (*11*).

Interviews with staff people in Washington indicate that this pattern will grow. One suggestion is that groups of universities might set up a central management capability which would then coordinate and integrate individual research projects on individual campuses.

Purposes of the University

The initial dilemma in attempting to meet the new demands being made on our universities results from an uncertainty about our purpose. For anyone associated with the university, the problem revolves around that black pit called service.

It is particularly appealing in the era of large, perhaps overactive, universities to define our fundamental missions as basic research and teaching. It seems doubtful, however, that we can demote service to a second-class position. President James Perkins of Cornell views service differently, as a third and equal mission of the university. Whether it is what we want, his definition is much closer to what we have. The land-grant colleges set a pattern which has been irresistible even to the private universities. The three missions of teaching, research, and service are clearly ". . . subtly and intricately meshed" (*8*, p. 33).

The question then is how much and what kind of service? The arguments already presented in this paper suggest the broad outlines. In general the demands on the university call for its applied research to provide advice and, in limited instances, develop prototypes. Successful operations research during World War II planted the seeds from which the present demands have grown. The second stage of this development was the establishment of the nonprofit advisory corporations designed to provide research and analysis to aid defense decision-makers. Pressure for the universities to generate increased activity of this type and to focus on civilian problems is a result of the large number of highly complex problems. It is also a result of the belief that the universities are the only institutions with enough talented individuals to meet these problems. For this reason, the pressure on the universities is likely to continue even though there is reason for wondering whether the capability of the university in the area of social planning in general and systems analysis in particular is not overestimated. According to Perkins, "there is almost no problem in our society that does not increasingly require expert advice. It is also true that expert advice can be found most frequently and in greater variety in the university than in any other institution" (*8*, p. 37).

Perkins goes on to suggest two criteria which the university should use in making its choices. He suggests (*8*, pp. 37–38), first, that we keep in mind that ". . . the unique contribution of the university in all this is knowledge, not operating skills, and this should be a limiting factor of great importance. The government and particularly the corporation have been organized in our society to get things done, and it is to these institutions that society normally looks for operational responsibility. The university's social scientists can provide the economic case for a sales tax, for example, but they should not be expected to collect the money. The fact that lines can be drawn between advice on how to do something and assistance in doing it thus constitutes a limiting force which aids the university in its need to preserve its balance and its unity."

His second standard is (*8*, pp. 33–34) ". . . that the real integrity of the university is violated when large decisions in one area (teaching, research, or service) do not consider the impact on the other two. I would state it even more

strongly: university integrity is compromised when decisions about any one of our three aspects of university activity fails to strengthen the others."

Responses from Individual Universities

What are the possible responses of the universities to the new directions of federal demand, while maintaining the limits laid down by Perkins? One response is to go on in the present pattern. That is, to take Clark Kerr's advice and keep the system loose and unstructured (*12*, chap. 2). Under this arrangement the directions of the University are essentially controlled by the activities of individual faculty members or groups of faculty members in taking on federal projects. This approach has all of the appeal associated with any decision to keep things essentially as they are.

That view is likely to be challenged, however, because it only partially meets the growing demands of government for help in the short run. Should the universities proceed along the present path it seems likely that they would receive a smaller proportion of the new federal R & D funds to be spent on the civilian sector than would be the case if other options were taken. Further, it seems clear there would be a substantial increase in competition for the services particularly of social scientists. This would result as both nonprofit and profit-making organizations increasingly hired social scientists to do federally supported R & D work in this new area. Finally, this is likely to accelerate the criticism of the sort made by Teller, namely, that we are not producing enough applied researchers. This may lead to the establishment of certain graduate programs at the applied research facilities. Suggestions of this kind are being made in connection with some of the government laboratories.

A second response might be for a more rapid development on individual campuses of problem-oriented programs. Many of these already exist and tend to overlay the disciplinary structure. That is a response to the evidence that basic research seems to go better under a single-discipline structure, whereas applied research responds better to a problem-oriented, multidisciplinary arrangement. If the demands suggested above continue to be made, there is likely to be rapid growth of programs which will make these competitive with the single-discipline structure.

Perhaps the most serious criticism of this approach from the outsider's point of view is that individual universities are unlikely to have all the specialists necessary to do the best work. Again to quote Perkins (*8*, p. 34): "With respect to research, the controlling factor is the increasing necessity for choosing among fields and areas where the university can expect to excel. Knowledge is growing so fast that no university can pretend to cover it all. . . ."

From the insider's point of view, there is another danger. Even if the individual university were capable of meeting the demand for talent, large-scale projects would be detrimental to the teaching and basic research. Since applied research projects are unlikely to receive continuous support, the individual universities would constantly be subjected to making adjustments.

Interuniversity Responses

As Haworth indicated, many of our most compelling problems will require experts from several universities. An interdisciplinary research program handled by a single university is unlikely to be able to tap the best combination of talent.

A response involving cooperation among a given group of universities would appeal greatly to many congressmen and federal officials. This approach has much to recommend it. First, it would protect the departmental disciplinary structure at the individual universities which is so conducive to basic research. This in no sense implies the denial of problem-oriented programs on the individual campuses. Rather, it provides an alternative where the projects would be so large or of such a nature as to disrupt the balance of the individual campus. If the trend is toward larger mission-oriented research programs, the central organization might well act as the prime contractor, subcontracting projects to groups on individual campuses. It could then coordinate and synthesize the various parts.

A second factor that recommends a central coordinating body for a given group of universities is the opportunity such a body would offer graduate students. It should provide them with the kind of unique applied experience that is increasingly being called for. Should the central body have its own facilities (for example, laboratories, computers, and the like), then it would provide the kind of experience which Teller has called for. At the same time this facility would be under the control of the universities which could protect the quality of the experience for the student.

A third argument for the central body for a group of universities would be the quality it would produce. Any group of major universities together contain a most impressive array of talent. A regional transportation study which used the combined talent of the regional universities should surely be of higher quality than one done by a single university. It should also have the positive feedback that comes from having the most creative people in contact and working with each other.

In addition, the combined talent within such a group of universities with a permanent management capability would allow them to handle large-scale projects. Through a process of subcontracting parts to interested groups at the member universities, each university would doubtless expand its opportunities for research over the long run. The mechanism of the central facility should also increase the universities' capability for influencing public policy.

There appear to be a variety of organizational patterns for an interinstitutional applied research capability. No matter which of the patterns might be followed, however, the importance of sustained support cannot be overemphasized. Since we are concerned with developing a civilian-oriented capability for doing what the defense analysts have done for the Department of Defense, it is useful to look at RAND. The importance of continuing support is clearly illustrated when it is recognized that it took RAND 5 years to become productive (*13*, pp. 91–92).

The continuity of support is also necessary to insure the independence of the research organization from a continual soliciting of contracts. It would also allow the universities to define research on their own.

Organizational Patterns

Of the various possible organizational patterns for a research capability under the control of a university consortium, four are most frequently discussed. The

first is characterized by a small central administrative staff which assists the member universities in identifying pressing problems, seeks out the experts on these problems at member institutions, brings these experts together to plan a study, and acts as a coordinator and supporter of the expert group during the various stages of the study. This arrangement offers the great advantage of being able to tap the vast resources of all the member institutions. It would be of greater service if it had an expert staff of systems people of its own, as well as such support facilities as laboratories and computers. There should be value in having the physical facilities necessary to bring the researchers together for extended periods of time while they are working on a project.

A second organizational possibility would be the establishment of a research facility or institute at one of the member universities. This facility would be equipped with necessary computers, and so forth, to provide support for the researchers. The permanent staff of the facility could be part of the continuing staff of the university where the facility is located. Faculty members and graduate students from the other universities could come to the central facility, as they needed, on leaves of absence or under some other arrangement. It would be necessary for individual university policies to allow for leaves of absence of 2 to 3 years depending on the duration of the study. This arrangement would give the facility the advantage of access to such existing libraries, and the like, as are already established at the university. The research facility or institute could have a governing board of representatives from all the member universities with the facility's director being responsible to that board.

A third organizational alternative would be the creation by the consortium of universities of a research facility away from the member institutions' campuses. This could be similar to RAND in its organization, but governed by the member universities. Again, this would allow faculty members and graduate students to move freely between their universities and the central facility. It would have all of the characteristics of the previous model except for the location on one of the campuses. It should be located at a city with good transportation facilities.

This third alternative, however, has the distinct disadvantage of requiring creation *in toto* of all the needed equipment and buildings. It would doubtless be feasible only if continuing federal support were obtained.

Finally, the existing federal laboratories offer an option. The facilities of the Atomic Energy Commission and of National Aeronautics and Space Administration come to mind here, although at present there are serious legislative constraints. Some of the facilities appear to have accomplished their initial missions.

The most important advantage here is that these excellent facilities already exist. They are also the recipients of continuing federal support. Argonne, for instance, seems well situated to become a regional management-research center for certain kinds of civilian-oriented, federally supported research. With a governing board made up of the regional universities it should be uniquely capable of tapping regional resources.

A cautionary note needs to be entered at this point. It is difficult enough to carry on interdisciplinary research, but to propose that such research also be interuniversity is to compound the problem. The problems here warrant another paper. I will content myself on this point by emphasizing that consortia seem to work best when they are the result of decisions by the universities, as in the case of the Midwest's Committee on Institutional Cooperation (CIC), rather than interstate compacts, such as the Western Interstate Compact for Higher Education. The general problem with governmentally established consortia is stated by Herman Wells, chancellor of Indiana University, as follows.

> . . . [V]oluntary cooperation, within the framework of flexible agreements, has been the strength of the CIC. The CIC certainly was not the first compact between publicly assisted universities, but it was the first of its kind. Earlier arrangements for academic cooperation among public institutions of higher learning were written into law through the signing of interstate compacts which were complex to devise, cumbersome to administer, and transferred far too much academic control from the campus to the statehouse (*14*).

In the same sense that the CIC was an initiative of the universities designed to achieve a workable consortium it is to be hoped that the universities will take the initiative with respect to the kinds of consortia suggested above.

Communicating the Results

One final element needs to be noted in connection with policy research. Although the need for policy help is the basis for the demand that universities go more heavily into systems analysis, and advice-giving activities, the advice will not be used automatically. To be an effective advice-giver, the universities or their facility must assume responsibility for communicating that advice. This means a good deal more than simply submitting the finished study in writing.

All too often the results of policy research are not used by the client agency. As one student suggests, "Offhand, it might be expected that the client, by virtue of his role, would function wholly to foster utilization. Having commissioned a research project, he, among all the parties concerned, would be the most highly motivated to use its results. Where utilization does not occur, therefore, one would be tempted to look elsewhere for explanation. However, an examination of the record suggests, perhaps surprisingly, that the client is very often directly responsible for the nonutilization of the results of research which he sponsors" (*15*).

Should the universities be unwilling to recognize the problem stated above and plan for it, then the applied research is likely to be in the worst, as well as the best, sense "academic." Perhaps this point is best made by quoting Smith (*13*, pp. 216–218) at some length.

> At the outset is it important to recall that decision-making . . . is a process. Phrases like the "decision-making process" and the "process of policy formulation" are not mere incantation: they refer to the continuous flow of decisions, large and small, that make up the seamless web of policy formation and administrative action in the federal government. The dynamic flux of the policy process makes the job of the advisor particularly difficult. It means that there is no orderly procedure whereby the advisor can state his views or explain his research and then retire from the scene confident that his advice will receive systematic consideration. There are numerous distractions and competing demands on the decisionmaker's time and span of attention. Decisions once made can become unmade a week later. The advisor may face a difficult task to secure a full hearing for his views in the first place, and then must struggle to keep attention focused on his recommendations for a long enough period to assure action of some kind. Continuity is thus an essential attribute of effective communication of policy oriented research.

A corollary of this is that the advice cannot simply be given to the top levels if favorable decision and effective implementation of advice is desired. Consider the case of a high level decisionmaker accepting the recommendation of an advisory group and making a "policy" decision designed to implement the advice. Unless the subordinates carry out the decision effectively the whole intent can be defeated. Comprehension of the basis for the decision reached at the higher level can be a vital factor in winning the consent and enthusiasm of those who must execute the decision and, in doing so, make a myriad of other decisions which can determine the success or failure of the original decision. It follows therefore that it is often desirable to communicate the research advice to the working levels of an organization as well as to the higher policy levels.

Summary

In summary then, the growing call from government for the universities to do applied research in the civilian sector has many disturbing elements. It asks the university to provide more policy advice. In addition, it calls upon the university to become an advocate for that policy research. One can hardly be a part of the university tradition in this country without being initially appalled. Yet the demand is clearly there and it is hard to disagree with Perkins when he says, "The University—as the most sophisticated and, let us hope, independent agency now at work advancing, transmitting and applying knowledge—has come too far to retreat before what may be its finest hour" (*8*, p. 24).

References and Notes

1. I. Kristol, *Fortune* **76**, 90 (1967).
2. T. H. White, *Life* **62**, 23 (1968).

2a. The material for this paper is taken in part from a broader study done for the Council on Economic Growth, Technology, and Public Policy of the Committee on Institutional Cooperation.

3. R. E. Lapp, lecture to seminar on science and public policy at Purdue University, 24 February 1967.
4. Refer to report of the Committee on the Economic Impact of Defense and Disarmament; chaired by G. Ackley, July 1965 (U.S. Government Printing Office, Washington, D.C., 1965), pp. 16–23.
5. U.S. Congress, House Select Committee on Government Research, *National Goals and Policies*, No. 10, 88th Congress, 2nd Session (U.S. Government Printing Office, Washington, D.C., 1965).
6. U.S. Congress, House Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, *Inquiries, Legislation, Policy Studies Re: Science and Technology*, 2nd Progress Report, 89th Congress, 2nd Session, 1966 (U.S. Government Printing Office, Washington, D.C., 1966), p. 24.
7. U.S. Congress, Senate Subcommittee on Employment, Manpower, and Poverty of the Committee on Labor and Public Welfare, *The Impact of Federal Research and Development Policies upon Scientific and Technical Manpower*, 89th Congress, 2nd Session, 1966 (U.S. Government Printing Office, Washington, D.C., 1966).
8. J. A. Perkins, *The University in Transition* (Princeton Univ. Press, Princeton, N.J., 1966).
9. Staff Study for the U.S. Congress, House Research and Technical Programs Subcommittee of the Committee on Government Operations, *The Use of Social Research in Federal Domestic Programs*, Part I, 90th Congress, 1st Session, 1967 (U.S. Government Printing Office, Washington, D.C., 1967).
10. Statement of L. Haworth before U.S. Congress, Senate Subcommittee on Government Research of the Committee on Government Operations, *Hearings: National Foundation for Social Sciences*, 90th Congress, 1st Session (U.S. Government Printing Office, Washington, D.C., 1967).
11. U.S. Congress, House Committee on Government Operations, *Federal Research and Development Programs*, 34th Report, 89th Congress, 2nd Session, 1966 (U.S. Government Printing Office, Washington, D.C., 1966), p. 10.
12. C. Kerr, *The Uses of the University* (Harvard University Press, Cambridge, Mass., 1963).
13. B. R. Smith, *The RAND Corporation* (Harvard University Press, Cambridge, Mass., 1966).
14. H. B. Wells, "A case study of interinstitutional cooperation," *Educ. Rec.* **48**, 355 (1967); also see (*8*), pp. 63–90; a➞ B. R. Keenan, "The Midwest's CIC: experiment in regional cooperation," *Public Admin. Rev.* **23**, 40 (1963).
15. C. Y. Glock, in *Studies in the Utilization of Behavioral Science* (Institute for Communications Research, Stanford University, 1961), vol. 1, p. 7; also quoted in (*13*, p. 216).

NEWS AND COMMENT

CBW: British Protests Grow about Porton Center

London. Criticism of government policy on chemical and biological warfare (CBW) in Britain has recently begun to approach in intensity the British protest against nuclear arms policy in the period before the test ban treaty.

Last week the government announced two moves which are interpreted here as direct responses to the protests. First, the defense ministry said it would open its microbiological establishment to the public for 1 day next fall or early next year. The open day is obviously meant to allay anxieties by stressing the center's activities in preventive medicine and basic research. Then the Foreign Office announced that Britain will seek a new international convention to supplant the Geneva Protocol of 1925 which forbids use of poison gas, but has become something of an anachronism because of the development of new chemical agents and biological weapons. Protestors greeted the government declarations not so much as victories as indications that further changes are possible.

Action by students and by scientists, questions in Parliament, and a redirection of activities by peace groups have all contributed to the rise in pressure. There is no concerted campaign; the aims of the critics differ. On one flank are those who ask simply that secrecy be lifted from a government research program which is avowedly defensive. On the other are those who, usually from pacifist conviction, are deeply suspicious of any research related to CBW and are now seeking more information. The effect has been to bring about the most open public discussion of CBW to date.

The first of a recent series of incidents which brought CBW into the news occurred at the new Essex University when students prevented a senior scientist from the ministry of defense's chemical research establishment at Porton Down from addressing the university chemical society. The same man was later the target of a similar demonstration at Birmingham University.

In a noisy confrontation at Essex, students seemed mainly interested in questioning the Porton scientists about the CS riot control gas (a more toxic tear gas) which was developed at Porton and used by the United States in Vietnam and by French security forces in the Paris riots. At both Essex and Birmingham students appeared tactically to be taking a page from the book of American student action against campus recruiters for Dow Chemical, manufacturers of napalm. But at Birmingham, students and faculty went on