just in time to avert such a development. Now senators who favor ratification of the Protocol must judge whether making a fuss about CW in Vietnam will jeopardize the chances for favorable action. The informed guess is that the Senate Foreign Relations Committee will hold brief hearings this month or next. Then it will send the treaty to the floor for quick ratification, which will require the approval of two-thirds of the senators who vote on the question. The attitude of the Senate establishment was probably summed up by Majority Leader Mike Mansfield (D–Mont.), who promised speedy action when the President formally transmits the Protocol to the Senate. "I see no reason why there should be any controversy," he explained.

Zablocki, meanwhile, is continuing hearings before his House subcommittee, where he has provided a forum for some critics of the Government's practices in Vietnam. On 2 December, Yale biologist Arthur W. Galston estimated that pregnant Vietnamese women living near heavily sprayed areas might consume dosages of 2,4,5-T in water from cisterns that would come close to the amounts at which, the recent studies show, damage is done to animals.

He also enumerated various harmful effects on the Vietnamese ecology that might result from the massive defoliation campaign, including soil erosion, soil lateralization, and the disturbance of breeding spots for shellfish. But the Zablocki hearings alone are not likely to have the political impact that might have come from a doubleheader capped by Senate hearings.

Biological Weapons Ban

Aside from the decision to submit the 1925 Geneva Protocol to the Senate for ratification, the other major new policy announced by the President 25 November was a total ban on biological warfare, even in retaliation. (It has long been official U.S. policy to refrain from first use of chemical and biological weapons, tear gas and herbicides excepted.) The President also endorsed a draft convention, proposed by England, calling for elimination of stockpiles of biological weapons, said biological research will be confined to defensive measures such as immunization, and called on the Defense Department "to make recommendations as to the disposal of existing stocks of bacteriological weapons." As explained by a high White House source at a

background briefing on the decision, the National Security Council concluded that biological weapons were "only primarily useful for first use; that the effect in retaliation would be long-delayed, the consequences would be too uncontrollable." Testimony before the House Appropriations Committee this year by Dr. Donald M. MacArthur, deputy director of research for the Defense Department, further illuminates the shortcomings of biological agents as strategic weapons. "You cannot prepare these agents for long periods of time before use," he said. "Also . . . light kills them and so to be effective you have to only disseminate them under cover of darkness." MacArthur calculated that a single attack could be effective only 100 to 150 miles downwind, far short of the continental coverage required by most strategic applications. Defense officials expect that the Pentagon's production facilities will be all but eliminated except for the small amount required to produce laboratory quantities for defensive research. Some of this research may be carried out under the Department of Health, Education, and Welfare instead of under Pentagon auspices.

—ANDREW HAMILTON

Project Cambridge: Another Showdown for Social Sciences?

The current dispute over a Defense Department financed research project in the use of computers for social science at the Massachusetts Institute of Technology (M.I.T.) has the makings of a first-class university-government imbroglio. The plan, called Project Cambridge (or CAM), is a 5-year $7,600,000 proposal sponsored by the Defense Department's Advanced Research Projects Agency (ARPA) to develop new computer methods and programming techniques tailored to the needs of social scientists. ARPA has given M.I.T. $1,500,000 for the first year of the proposal, which was originally submitted by a joint committee of Harvard and M.I.T. professors. The genesis of Project Cambridge is a classic case of the convergence of the interests of

academic entrepreneurs, disinterested scholars, and government bureaucrats. Its fate will have important ramifications for the university's relations with the Pentagon, for university research policy, and for the pattern of development of the social sciences.

As early as 1967, social scientists at Harvard and M.I.T. met together at a seminar chaired by Harvard psychologist George Miller (now of the Rockefeller Institute) to discuss the need for central computer facilities and better computer systems for the social sciences in the Cambridge area. In comparison with their colleagues in the physical sciences, social scientists were then, and still are, regarded somewhat as second-class citizens at the computing centers and by the developers

of computer techniques. The group felt that many of the innovations in computer techniques available for the physical sciences ought to be adapted and made available to social scientists. Later a tentative proposal by the group to set up a joint project was turned down by the National Science Foundation (NSF), largely on the grounds that the foundation had only $300,000 a year to spend on computer applications in the social sciences.

In late 1968, M.I.T.'s Ithiel Pool, a successful pioneer in raising government funds for large-scale projects in social science research, had an idea that served to crystallize the project. The M.I.T. computing center had decided to retire two of its 7094 computers. These computers were used for the M.I.T.-developed CTSS, one of the better computer systems for processing social science data. Since Pool is a member of the M.I.T. political science department, which had led the field in the development of quantitative work in the social sciences, it occurred to him that the money to keep at least one of the machines in operation could be raised

from the federal government if a joint Harvard-M.I.T. proposal for the development of computer aids for social science were drawn up. Besides saving money, the idea had a compelling technological argument; once a complicated computer software system is developed, adapting it to a new computer is as difficult as starting anew.

The Cambridge area seemed a likely place to locate such a facility for the social sciences. Harvard and M.I.T. social scientists are top men in their fields. In addition, many of M.I.T.'s computer scientists had done pioneer work on computer techniques for Project MAC, an ARPA-M.I.T. project to develop time-sharing techniques and ways to handle large amounts of data by computer. Much of Pool's own research had been funded by ARPA, several other Project Cambridge idea men had also had ARPA money, and one of them (J. C. R. Licklider) was a former head of ARPA's information processing program. It was therefore natural to go to ARPA for the money, especially since its budget for computer work far outstripped the funds of any other government agency, military or nonmilitary.

Proposal to ARPA

The proposal to ARPA for Project Cambridge came at just the right time. ARPA, the top-level Pentagon R & D office charged with innovating new research and coordinating the research efforts of the individual military services, was involved in redefining its program in the social sciences. Overseas and foreign-areas research sponsored by the Department of Defense (DOD), much of it by ARPA, had been under attack for some years by Congress and by academia. In the fall of 1968 Senator William Fulbright (D–Ark.) had initiated a campaign to cut $48.5 million from the Pentagon's social science program (the amendment passed the Senate last September). Within the Pentagon, social science was also in trouble. Some DOD research officials, especially those who funded basic science or weapons research, were concerned that foreign-areas research had become so controversial in the eyes of Congress that it might endanger research they considered was more vitally needed.

Led by Davis Bobrow, the new head of ARPA's social and behavioral sciences division and a political scientist who had strong connections with the scholarly community, the ARPA social scientists decided during 1968 to

reorient ARPA's social science program in three areas. ARPA believed that to further their work social scientists needed to group themselves into "critical masses" (like the Manhattan Project) instead of working on smaller, individual projects, which are ineffective and more vulnerable to Congressional attack. Second, ARPA officials believed that social scientists must concentrate their efforts on the development of analytic tools and new technology like computer software, rather than on the gathering of raw data; this approach also would ease ARPA out of controversial foreign-areas research. Finally, ARPA decided to stress the development of basic models and simulations of situations useful to the Defense Department rather than funding smaller research projects with more narrow applications.

For a brief period last spring, Project Cambridge seemed all things to all people; it would alleviate the attacks on Pentagon-funded social science by Congress and academia, bring more scholars doing basic research under ARPA's wing, and provide needed funds for the computer sciences. ARPA decided to concentrate its next year's funds in Project Cambridge and in two other projects that fit this new overall pattern at the University of Michigan and at the University of California at Los Angeles. Harvard and M.I.T. professors formed a joint advisory board in the spring and began to discuss the scope of Project Cambridge and how the money would be granted to individuals for their work. Project Cambridge was to be, in effect, a bank to grant money to individuals for work on new computer techniques, or an umbrella for projects with wide substantive differences but with similar technological problems. Ithiel Pool could use his money to process Vietcong data; the Harvard psychologists could use theirs for educational research.

In the late spring the embers of the Harvard student strike were still smoldering as the Project Cambridge proposal written by M.I.T. professors began to have wide circulation in the Cambridge area. The first few pages of the proposal describe some of the purposes of Project Cambridge as "the improving of education and training, resolving conflict and the improving of organizational management. . . . Our urban problems will be better handled if we can teach better, reduce conflicts and organize our efforts better. Our economy will run better if we

can train our manpower better, solve industrial disputes, and improve the efficiency of large organizations. We can reduce the chances of war if we can learn more about foreign peoples, relax tensions, understand the nature of conflict, and build better international organizations. Our national defense stands in need of the same kind of knowledge, for it too needs to train people, resolve issues, run large organizations." The proposal also indicated that among the kinds of work that would be enhanced by the new methods developed by Project Cambridge were Ithiel Pool's ComCom simulation project, which deals with communication between people in "closed societies like the Soviet Union," William Griffith's research project "Communism, Revisionism and Revolution," whose files include data on revolutionary and radical movements around the world, and Pool's and Griffith's detailed interviews of the Vietcong.

Neutral Computer Tools

The language of the proposal and its grandiose ambitions were seized upon by student radicals as evidence of the corrupting influence of the university and the social sciences on society. It is clear from the proposal and from all statements by Project Cambridge participants that the purpose of the project, in Ithiel Pool's words, was to develop "neutral computer tools," which would apply to any kind of social science from counterinsurgency in Latin America to the response patterns of carrier pigeons. But the list of projects in the proposal itself is almost entirely composed of the kind of social science being done at M.I.T. for the Pentagon which student radicals have attacked as counterinsurgency.

Student reaction to the proposal was swift: a joint Harvard-M.I.T. student committee composed, astoundingly enough, of all warring factions of the radical student movements was formed "to fight the Cambridge project." Rumors abounded; the radical students soon became convinced that Project Cambridge would tie in Pentagon crisis managers with university data banks full of intelligence on revolutionary movements around the world. In a perceptive article in the *Harvard Crimson*, a former editor denied there would be such a setup but editorialized, "The project is sponsored by an operating arm of the U.S. government, on the understanding that the research to be undertaken will eventually serve that

McElroy Asks Expanded NSF Role

National Science Foundation (NSF) director William D. McElroy on 18 November testified at hearings on technology assessment held by the science, research, and development subcommittee of the House Committee on Science and Astronautics. In the following excerpts from his remarks, McElroy proposed that NSF assume active responsibility for technology assessment activities as part of an expanded role for the agency in the conduct of national science policy.

. . . The budgetary history of the past few years strongly suggests that, although science is truly an 'Endless Frontier,' there is a point beyond which the American people require something more than the pursuit of truth as an end in itself, without a proximate relationship to the worldly conditions of human life. The time has arrived, in my judgment, when the National Science Foundation must play a more active role in the formulation and recommendation of national science policy. . . . In particular, the Foundation must exercise a significant role in identifying the specific ways in which scientific research can contribute to efforts to cope with such major societal problems as environmental quality, urbanization, and transportation and to the international relationships of the United States. It must thus be actively involved in recommending Federal and national policies on broad questions which, although not necessarily scientific in themselves, require an appreciation of the scientific factor. . . . The Foundation must further develop reasoned positions on such fundamental matters as the magnitude and distribution of the scientific research component of the Federal budget, needs for research in specific fields, opportunities for exploiting scientific events and developments in the national interest, and the means for meeting the needs for specialized scientific and technical manpower.

The recently enacted amendments to the statutory authority of the Foundation have provided the basic mechanism for this expanded role. . . . A major concern for (NSF) . . . must be technology assessment.

. . . The priority system that is ultimately used for technological assessments also implies the priority system for the support of that fundamental science needed to make the assessments. . . .

I agree that technological assessments should be sponsored through contracts with private organizations . . . [including] industry . . . supported by the Foundation. . . .

The traditional approach of the Foundation to support of academic research has been largely through the funding of unsolicited proposals for research. I believe, however, that the urgency of the work to be done suggests that it will be necessary for the Foundation also to seek proposals, and to initiate research either through sole source negotiation or through competition on a merit basis. . . .

I believe that the Foundation should have the authority . . . to perform four of the functions described in the report of the National Academy of Sciences [*Science*, 5 September], namely, the specific performance of technological assessments principally through contracts, the support of scientific research required for or implied by such assessments, the sponsorship of conferences and symposia related to technological assessments, and the preparation of in-house position papers and policy recommendations concerning assessments, their evaluation and their implications. . . .

In conclusion, Mr. Chairman, I believe that the time has come for the Foundation to assume a new posture, one that seeks the amelioration of the human condition through the wise use of our scientific strength, and one that recognizes that technological change is not only inevitable but can be adapted and managed to contribute, on balance, to the quality of human life.

agency's operations. . . . There is every reason to expect that the ultimate result of much of the work that the Cambridge Project will support will indeed be the creation and modernization of Defense Department informational facilities and techniques."

The Harvard participants of Project Cambridge became concerned during the summer. The tone of the M.I.T. proposal was hardly neutral. Men like Philip Stone, a young computer expert who had done much work for UNESCO and was slated to become executive director of CAM, realized that the game of entrepreneurship called for close association with Defense Department needs, but associating themselves with M.I.T. professors who openly advocated applied mission-oriented work for the Defense Department troubled them. Although most of the Harvard social scientists wanted Project Cambridge money for their own basic research, many students did not see it that way. Some Harvard professors were saying "off the record" that they thought M.I.T. was pushing Harvard's participation to legitimize the project in the eyes of Congress, the academic community, and the students. On the other hand, Stone realized that no other government agency or foundation had the kind of money ARPA was willing to spend on such a massive project.

The debate over Harvard's institutional affiliation to Project Cambridge, raged throughout the summer and fall. M.I.T. accepted the first year's grant of $1,500,000 and the joint advisory board began to make grants. In September president Nathan Pusey of Harvard called for a full study and recommendations by the Division of Arts and Sciences' Committee on Research Policy; Pusey may even call for a faculty vote on the controversial project before the administration makes a final decision on Harvard's institutional role. (Two of Harvard's autonomous faculties, the Business School and the Graduate School of Education, are conducting their own studies.)

Partly as a response to the radical students' outcries about a "counterinsurgency data bank" for the Pentagon and partly as a response to the difficulty of protecting the privacy of interview sources, a special CAM advisory committee recommended that ideas for central data storage be dropped. Countless forums were organized by CAM members, including Harvard psychologist Edwin Newman and M.I.T.'s Ithiel Pool and J. C. R. Licklider, to improve

the project's image in the students' minds. Harvard and M.I.T. professors stressed that the project involved only basic research on computer methods, that the advisory committee and not the Pentagon had authority over the research done by the project, and that no classified work was involved.

Critics of Project Cambridge among the faculty and graduate students pin their objections to the project on the question of DOD financing and its influence on social science work. Some of them, like M.I.T. political scientists Joseph Weisenbaum and Hayward Alker, have refused to participate in CAM if it has DOD funding. Chad Gordon, a member of the Harvard department of social relations, summed up much of the feeling in a memo to the CAM advisory board: "As the Defense Department's posture in the world becomes increasingly bizarre and dangerous, any participant in such projects will undoubtedly feel called upon to account for his actions to colleagues, students, and the wider public." It is this issue of accountability that troubles many at Harvard, an intellectual community that shelters perhaps a wider range of academics—from big-time entrepreneurs to ivory tower medievalists—than any other scholarly community in America.

University-Wide Debate

By now Project Cambridge has become the subject of a university-wide debate at Harvard and M.I.T. involving the wider questions of the role of the Defense Department in funding any kind of social science or computer work (even basic and unclassified research), the role of technology in the development of the social sciences, and the effect of large-scale government funding on the university and its autonomy. According to dean of Engineering and Applied Physics Harvey Brooks, who heads a subcommittee (on Project Cambridge) of the Committee on Research Policy, which will report to the dean and faculty of Arts and Sciences, his group is looking into three sets of issues. One question is whether the availability of such a large sum of money from a source outside the university will distort the teaching and pattern of hiring in the social sciences at Harvard. Another question is whether "the Administration can delegate out to an autonomous group of Harvard professors who are part of a group involving non-Harvard professors the authority to administer such a large project."

Brooks says also that the committee investigation "will include the question of Defense Department support, which many people at Harvard are concerned about." Harvard University does not, as an institution, accept classified research, a position adopted in 1954. Brooks reports that about 7.5 percent of Harvard's operating budget comes from the Defense Department, and a large portion of ARPA money goes to his Division of Engineering and Applied Physics.

Debate at Harvard on Project Cambridge will undoubtedly focus on the Brooks report because of the influence of the School of Arts and Sciences on the rest of the university. The Brooks subcommittee report has been submitted to its parent committee, the Committee on Research Policy, which is expected to vote on the recommendations this week. Although the results have not been made public, it is known that the subcommittee's report was in fact two reports, with differing recommendations, and that the committee itself is divided. Publication of the report will, therefore, not settle the questions. Because of the likelihood of campus demonstrations and the widespread feeling that taking on such a huge Defense Department project at this time would be a reaffirmation with national implications of the Pentagon's role in university research, it is unlikely that the committee will recommend that Harvard as an institution should participate.

Several professors, including Philip Stone, Joseph Weisenbaum, and Marshall Smith of Harvard's Center for Educational Policy Research, are beginning an effort to get Project Cambridge transferred to the National Science Foundation or to get a large-scale commitment from Congress and NSF to begin funding computer work in a substantial way. NSF and ARPA officials, although enthusiastic about the idea in the abstract, do not think that once the project is transferred, Congress or NSF would agree to spend that much money per year on one project, given the meager size of NFS's budget for computer sciences. For these Harvard professors the difficult question is whether or not to take money from a source that they may object to but that is the only available source.

The transfer of the project to NSF or Harvard's refusal to participate as an institution, although important opening wedges in ending the Pentagon's monopoly over the financing of social

sciences, will not settle the kind of wider questions that students and younger faculty members are asking about the social sciences. The operational question would remain: Should Harvard, having decided not to participate in CAM, ask individuals not to participate? But more seriously, young social scientists on many American campuses are troubled by the effect of computers on American life and by the substance of their research. What about these problems of privacy? Can anything important for solving the inequities of American society be learned from computerized social science? Might $7,600,000 for Project Cambridge be better spent on substantive research with direct social payoff, or even on purposes other than scholarly research? Project Cambridge like Project Camelot, raises difficult and disturbing questions, but it is also leading to useful soul searching about the purposes of the social sciences.

—JUDITH COBURN

Miss Coburn is a free-lance writer and a visiting fellow at the Institute for Policy Studies in Washington, D.C.

APPOINTMENTS

C. R. Wharton   K. M. Endicott

Clifton R. Wharton, Jr., vice president, Agricultural Development Council, to president, Michigan State University. . . . **Kenneth M. Endicott**, director, National Cancer Institute, NIH, to director, Bureau of Health Professions Education and Manpower Training, and **Carl Baker**, associate director, National Cancer Institute, to acting director of the institute.