In Science Policy, Who Holds the Power?

The Office of Science and Technology, strategically ensconced in the White House, is the highest-ranking science group in the Government. No other body has as broad a responsibility for examining and trying to coordinate the Government's scientific involvement.

Yet its absolute powers are nonexistent, and its effective powers are only those that accrue from the weight of its prestige. Agency heads do not have to listen to it, and unless the President decides to lend his weight to one of its recommendations, it causes little fear in the scientific community.

Now, however, a report prepared for the House Military Operations Subcommittee by the Library of Congress' Science Policy Research Division (see page 335) has raised the question that has been on the minds of several Congressional committees: should OST be given the power to enforce its own recommendations?

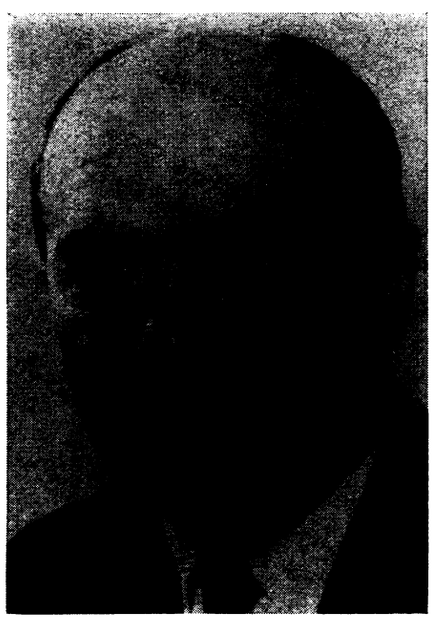
OST is less than five years old, a mere infant among Government agencies, but in that short time the area over which it is supposed to watch has changed radically. These changes, according to the report, range from the stabilization of Sino-Soviet relations with the U.S. to the increased emphasis on social and economic problems, to the leveling off of research and development budgets with the resultant "inflamed competition" for science funds.

The report could become the basis of Congressional hearings to hammer out legislation designed to give centralized scientific policy power to some individual or agency, several policy advisers believe, but the present structure of committees, councils and commissions in the Federal science establishment is so gnarled that no one knows who the winner would be likely to be.

At the top of the heap are OST and its Federal Council, and the President's Science Advisory Committee, all headed by Dr. Donald F. Hornig, the President's Science Adviser.

Tangled up in the list are:

- The National Science Foundation which once had the responsibility for doing what is now OST's job—coordinating Federal research programs. But it lacked the muscle to direct the activities of agencies such as the Defense Department and the National Aeronautics and Space Administration. So the job was shifted to OST.
- The National Academy of Sciences, a prestigious private but Congressionally-chartered group, which provides advice to Federal agencies and has a strong if unofficial role in establishing policy.
- The National Aeronautics and Space Council, set up by the 1958 Space Act to set policy and direction for the space programs of NASA, DOD and the score of other agencies involved in space.
- The National Marine Resources Council, set up last year to do for a dozen ocean-oriented agencies what NASC was to do for space. Both NASC and NMRC functions are duplicated somewhat in OST.
- The influential science chiefs of each of the major Federal agencies, some of assistant secretary rank and some, like defense and space, even more free-wheeling in policy matters because



Dr. Hornig: atop the gnarl.

of the size of the programs over which they preside. These are also the men who sit on the Federal Council.

If Congress does decide that the power should be centralized somewhere, OST might well lose out. Its present role is so vague that the lawmakers could decide to simply reorganize the whole mass, giving the scepter to some group that may not even exist yet.

There have been repeated suggestions in the past that a Department of Applied Sciences be established to actually set policies and determine the balance that should be given the practical scientific problems in various fields. No such study of balance has ever been made, the report points out. The National Academy of Sciences has not responded to the mutually-agreed-upon request by the House Science and Astronautics Committee to analyze the relative emphasis of different fields to support national goals, and OST has failed to request any such study.

One body that is at least equipped to do this kind of weighting is the Federal Council on Science and Technology, a sub-group of OST. The Council is made up of a series of sub-councils, each one devoted to a specific problem or discipline and including a member from each interested agency. However, says one of the officials who helped prepare the report, though the sub-councils have been attending to their respective disciplines, the Council itself has done very little about taking an overall view.

The report attempts to set forth information without evaluation, but a certain tone is visible in the choice of words. For example, Presidential Science Adviser Dr. Hornig was quoted as describing U.S. science policy as a "mosaic," while a few sentences later the report used the somewhat less-mild term, "fragmented."

Even if no legislation is soon forthcoming, the report will be a useful document, one official said. It is the first time that the morass of executive orders, reorganization papers and legislative documents that define the confused Federal science policy establishment have ever been coherently collected in one place.

More Computers For the Campus

Computers, which have already invaded wide areas of industry, government and the professions, are also a new resource in learning that can increase the quality and scope of education for the college student.

This is the new direction urged as the goal of Federal Government support to colleges and universities by the President's Science Advisory Committee in a report on computers in higher education.

The Committee calls for a broad program to make college students of the 1970's as familiar with using a computer as they are with driving a car.

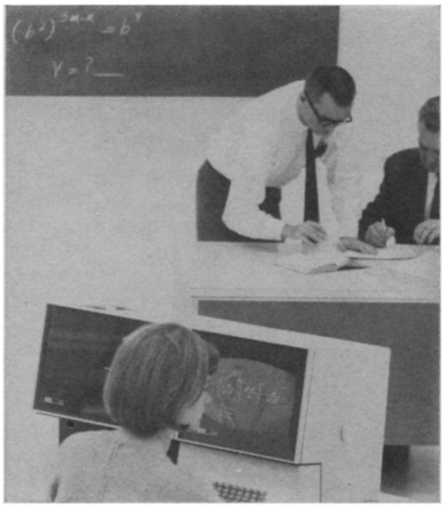
Unfortunately, computers are not as common as cars.

To make computers more available, the PSAC report recommends that the Federal Government give schools money to set up computer centers, perhaps putting up as much as three-quarters of the $414 million a year expected to be needed by 1971-72.

The Government money would not be granted to individual researchers, but to the college or university for facilities many students and researchers would use. This would be a switch

from Government's computer support programs now, which are more research oriented.

Cost of installing and operating computer facilities available to everyone on the campus would be about $60 per student per year, according to PSAC estimates. This is less than many schools now spend for college libraries and only a small part of the overall



Leigh Wiener

They must understand computers.

educational cost for each student every year.

Since colleges and universities are strapped for money, however, PSAC believes the Government should step in, because "it is in the national interest to have adequate computing for educational use in all our institutions of higher education by 1971-72."

The Committee also recommends that colleges be encouraged to share the cost of such services. The panel called for a faculty training program so all professors, whatever their disciplines, will know how to use the computer themselves as well as how to help their students.

"No matter what his specialty, the student must be given the opportunity of using computers in learning and doing," the committee concluded, noting that computers are used in the social sciences and in music and art, as well as in the more familiar "hard" sciences.

Some $13 million is being requested to start the program in the 1968 budget, now under Congressional scrutiny. The money was requested even before the PSAC report was finished, to enable the National Science Foundation to lay groundwork for its somewhat changed role.

NSF has for several years been funding a "modest" program in support of computer services in colleges and universities, ranging from the largest to relatively small institutions. However, most of these grants went to schools where computers were already available, and most, if not all, of the time on the machines was research oriented.

These grants went each year to only some 30 of the 400 institutions having computers.

Other Government agencies have also supported university computer programs, notably the Department of Defense and the National Institutes of Health. The DOD grants have traditionally been mission oriented. Those from NIH, however, have not been as closely oriented to health research in the past as they will be in the future.

New NSF grants during the next few years will be aimed at developing not only improvements in the computers and their necessary accessory equipment but also in methods of providing students easy and mistake-proof access to the computer.

Tight Lid on U-235 Production Method

The gas centrifuge method of producing enriched uranium emerged from its blanket of security briefly last week, but only to bury itself more deeply. The Atomic Energy Commission announced that even classified private research on the process would be halted, and further work would be under Government contract only.

The gas centrifuge received much publicity in 1960 when a West German inventor announced that he had solved the problems involved in making the device practical. If true, it was possible that high-grade fissionable uranium would be within the reach of any country that felt like investing in the machine and the doors to the nuclear club were wide open.

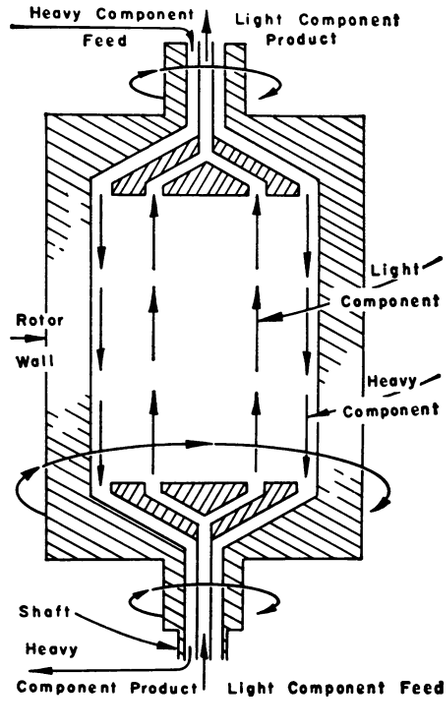
Following the publicity, then-AEC Chairman John A. McCone announced that the U. S. was also working on the centrifuge principle. But he said that the problems which had led this country to abandon that process during World War II, in favor of the gaseous diffusion system, had not yet been solved, and probably would take as long as eight years to overcome. A less technically advanced country would need even longer, he said.

Last week's AEC announcement did not indicate that the centrifuge had come of age yet. It will still be 10 years or more, said the AEC, before the centrifuge could compete economically with the gaseous diffusion method. But the long range potential for other nations is good enough so that the AEC doesn't want to contribute to the body of open knowledge. "The centrifuge," says an AEC spokesman, "has always been connected with the proliferation problem."

In principle, the centrifuge system is basically simple. Natural uranium contains less than one percent of U-235, which is the kind of uranium needed for fission. The rest is U-238, which is very slightly heavier but otherwise chemically and physically similar to its fissionable isotope.

The centrifuge whirls uranium hexafluoride gas at a rate of speed sufficient to throw the heavier isotope to the outside and leave the lighter gas in the center. The separated gases are drawn off in different directions, and the gas containing more U-235 can either be used as is or sent through another stage of separation.

The trouble is that the centrifuge has to move at enormous rates of



Centrifuge for uranium separation.

speed to separate the two isotopes. Laboratory models have been made to work, but large size machines that can handle commercial loads apparently put too much strain on bearings and other materials to hold up for any length of time.

The gaseous diffusion method also depends on the weight difference of the two isotopes. Molecules in a gas mixture at a given temperature have the same average energy, which depends