these: Should research be primarily targeted or left free to chart its own course? Should research be supported primarily through contracts, in which a goal of some sort is explicit, or should funding be primarily through grants, in which a specific goal is often implicit at best? Obviously, this is not an either-or situation, but the Administration's fondness for research by contract is unmistakable. A situation involving the National Cancer Institute is illustrative. The President agreed to the institute's request that its budget be supplemented by about $70 million, part of which would go to the cancer control program, the rest for research. Along with an OK to spend the allotted money came a very short string—all of the money for research should go to contracts, not grants, said an OMB directive. Nobody liked it. The institute director objected. So did the National Cancer Advisory Board, a presidentially appointed body. So did the National Cancer Panel, which is even higher than the board and speaks directly to the White House. But apparently their objections did not matter. The White House said it wanted contracts, not an argument. That was the way advice from scientists often was received in 1973.

Further evidence of the Administration's plain desire to keep a firm grip on things as biomedical scientists loose theirs turned up in a memo proposing that, fiscally speaking, the several national institutes of health be squeezed into one box on the management charts. A single NIH budget, presented to Congress as a package, appeals to the Administration's sense of managerial order. It hasn't happened yet, but 1973 was the first year influential people talked seriously about consolidating NIH. By next year, it will probably be a lot more than just talk.

All in all, it wasn't much of a year for biomedical science, but it was a great year for the OMB.

—BARBARA J. CULLITON

Science Policy: Détente, LDC's Add New Dimensions

When anyone mentions science policy to former presidential science adviser Edward E. David these days, he is likely to wince a little and remind them that the term covers both policy for science and science for policy. The distinction is important and is one that tended to get lost during the salad years of science in the early 1960's. Policy for science at the federal level means decisions which affect the funding of research and development and the training of scientific and technical manpower in universities, government agencies, and industry. Science for policy denotes the scientific and technical components of government policies which also involve economic, social, and political considerations. Energy policy and health policy are two current examples in which the science content is high.

The past year was not a vintage year for science policy, however defined. The buying power of the virtually static science budget was further eroded by inflation, and the spillover effects for science generally of military research and the space program appeared to be drying up. The Administration's determination to curb traditional fellowship and traineeship programs took its toll in 1973, and late in the year came the news that the Administration was rethinking the prevailing expansionary policy on the training of physicians.

Bad for scientists' morale was the decision to relegate the science adviser's post and the science advisory machinery in the White House to the National Science Foundation. This move carried a heavy symbolism for many scientists who felt that having one of their own in the White House was something like having a scientist as a gentleman of the bedchamber at the Sun King's Versailles.

The sensation of a fall from grace has grown familiar to the scientific community, but, more explicitly than in past years, critics place at least part of the blame on the scientists' own doorstep. The critics charge that the scientists' attitude has been that if policy for science is handled in a way favorable to the interests of the scientists, individually and institutionally, science for policy will somehow take care of itself. It has not worked out that way, and budget cuts are viewed as, in part, the recriminatory federal responses. The rift between university scientists and the last two Administrations, of course, has more complex causes—university reaction to the Vietnam war and differences in politics and personalities between university professors and the two most recent incumbents of the White House, certainly contributed. But it seems to be true that many of those at the top in the present Administration suspect the scientific community of egocentricity and feel that the science adviser had become an ambassador from academic science. This feeling seems to have been a major factor in the early exit of the first Nixon science adviser, Lee A. DuBridge. His successor, Edward E. David, worked hard—and some government insiders say effectively—to shatter the stereotype. But reportedly, when David met Nixon on the occasion of David's resignation, the President thanked him for his help and said that David had ably represented his community. That hurt.

As for the state of science for policy, the shortcomings have been brought home this year by the furors over energy, food, and transportation. Ironically, the analyses and recommendations that might have forestalled or buffered these problems were in the files. The difficulties now being encountered over energy supply and demand, for example, were rather fully forecast during DuBridge's tenure in the White House.

The failure to act on such recommendations can be traced, of course, to plenty of solid, practical reasons. The rivalry between Congress and the Executive, particularly when controlled by different parties, inhibits national commitments to projects with long-term goals and risks. The single-year appropriations rule is a decided hurdle to such projects. And the diversion of substantial amounts of money into future solutions of present problems is difficult to manage in the face of heavy demands for current expenditures when the budget is in deficit.

The atom bomb project and the moon landing program are often invoked as models for the massive deployment of manpower, money, and other resources; and in fact there are

plenty of advocates of some new Manhattan project or Apollo program to solve the energy crisis. The formula for such closely focused superprojects cannot be applied successfully to every big technological problem, even if the country could afford it. But it does not seem unreasonable to suggest that we should know more today, say, about the technology and economics of shale oil extraction than we do.

The last two Administrations have put increased emphasis on the use of science and technology to deal with national problems, and the Nixon Administration, especially, has kept reminding the scientific community by word and action of, so to speak, the bottom line. So far, however, the results in housing, transportation, education, and health, for example, have not been astonishing. In fairness, it should be noted that compared to most other nations, the U.S. science policy record is hardly abysmal. Given the resistances in the system, the performance is not a bad one. But up to now, U.S. science policy has operated in a setting that might be described as status quo plus growth. In the past year, however, the setting has been changing dramatically.

Energy the Catalyst

The chief catalyst in the change has been the energy problem, which was converted to a crisis by the oil boycott. It is possible, of course, that the Arabs will turn the oil back on and the United States will, figuratively, fill 'er up and drive on. For a while, at least. But the cumulative lessons of the crises of 1973 seem to be that the era of cheap food and cheap fuel, of waste as a way of life, is drawing to an end and that it is time to redraw our mental maps.

The implications go far beyond a modification of the one man, one car doctrine. It is part of the conventional wisdom that the United States is the archetype of the postindustrial society. In broad economic terms this means that the country is moving away from a heavy stress on manufacturing toward an emphasis on service-oriented and high-technology industry. American corporations have in several ways been shifting production operations to countries abroad where labor costs are lower and raw materials more accessible. As the process continues, the United States' role increasingly is as the source of capital, management techniques, and high technology. That the United States maintain its superior scientific and technical capabilities is seen as a necessity to American security and economic well-being. Route 128 outside Boston and "electronics gulch" on the San Francisco Peninsula would be the equivalent in the future of Detroit in the assembly-line era.

For the United States, the game plan seems to be working in such high technology areas as telecommunications, information processing, and the aircraft and pharmaceutical industries. Japan and the industrialized countries of Western Europe have leap-frogged industrially to the point where they are also investing heavily abroad. For some time the Common Market nations have been importing workers from the less developed countries around the Mediterranean to meet a shortage of labor. And the Japanese and Europeans have also begun to transfer manufacturing operations to the so-called LDC's (less developed countries). The multinational corporation has emerged as the chief midwife of the new system.

The logic of a north-south division, with the industrialized countries providing capital, managerial know-how, and a continuing flow of technology and the LDC's contributing labor, raw materials, and new markets is very tidy, but under stress the theory is already showing some flaws.

Most obviously, the Arab oil boycott has shown what can happen if the LDC's deny essential raw materials to the industrialized nations. The LDC's new appreciation of the elastic value of nonrenewable resources in pursuing both political and economic ends is likely to be a major factor in north-south relations from now on. Oil probably has a unique potency in the marketplace and at the conference table at this time, but the LDC's possession of substantial amounts, in some cases amounting to a monopoly, of the finite supplies of important raw materials, will grow more important.

Even before the melodrama of the oil boycott, the LDC's had begun to take united action in their own political and economic interests. At the 1972 Stockholm Conference on the Human Environment, the LDC's collectively made it clear that they were determined not to allow the industrialized countries to promote antipollution measures which would deter industrialization in the LDC's. At the Law of the Sea Conference the LDC's are evidently demonstrating a similar concern that the industrialized countries may use their superior technology to monopolize the resources of the sea and seabed. Further evidence of the LDC's sensitivity is the current United Nations study on the impact of multinational corporations on economic development and international relations.

Questions about multinational corporations are also being asked in the United States. The style of operation of the multinationals makes it difficult for national governments to control the outflow of technology. Within the Nixon Administration some officials lean toward a ban on the export of advanced technology, a view amounting to technological protectionism. The issue is unsettled and is an element in the current crucial debate over trade legislation, as well, of course, as in the implementation of détente with the Soviet Union.

Science and Diplomacy

The enhanced importance of science and technology in foreign policy is clearest in Soviet-American relations. Before détente, science figured prominently in diplomacy between the two countries, but the exchanges were more symbolic than significant; involving, as they did, relays of ballet companies, musicians, and individual scientists. The Soviets have always been intensely interested in U.S. technology, but what has changed, according to observers, is their new aggressiveness in pursuing it.

A further extension of science and technology into foreign policy came in Secretary of State Henry Kissinger's recent invitation to the Western European countries, Canada, and Japan to collaborate on a long-term, grand-scale attack on the energy problem which would include a major R & D effort.

In retrospect, this was a year when events made a compelling argument for a more effective science policy. The science policy machinery which was dismantled in 1973 was based on a relationship between government and the scientific community which was unsatisfactory on both sides. It is not clear that the reorganization early in the year provided more effective machinery or a better relationship, but 1973 certainly proved that both are needed.

—JOHN WALSH

Academies Together Again

The National Academy of Sciences and the National Academy of Engineering, who resolved to go their separate ways last spring, are on the way to a tighter union than existed before the split.

The councils of both academies in October voted unanimously for the proposed reunification, which will not be final until next spring, pending a vote by their respective memberships. NAS president Philip Handler says the new setup "comes very close to doing what we've been trying to do for 2 years." The personality of Robert Seamans, who succeeded NAE president Clarence Linder last spring, seems to be the main factor in the turnabout. Seamans does not exactly put it that way, but says his "instincts" as soon as he came on board were that both academies would be better off together, an instinct reinforced by most of the mail he has received from engineers since last spring.

Basically, the new arrangement is centered in the reorganization of the National Research Council. Hitherto, the NRC, including its division of engineering, has been devoted to NAS-originated study projects, and the NAE conducted independent advisory activities. The new NRC, now about two-thirds of the way through its reorganization, will contain four interdisciplinary "commissions" for the study of social problems and four "assemblies" for disciplinary research, one of which is to be an engineering assembly guided solely by engineers. Furthermore, the NRC's governing board, while still dominated by NAS representatives, will now have voting members from the NAE. The NAE's separate advisory activities will be terminated, although Seamans says in the future it will be conducting some private studies under the aegis of the NAE foundation, which was set up originally to help support a separate engineering academy.

What it all amounts to is that the NAS view of what constitutes a desirable relationship has won out. No doubt there is the feeling in some quarters that the old problems resulting from the junior status of the NAE will crop up again, but the word from the top is that everyone is happy.—C.H.

Court Order Opens Study Sections

Scientific decision-making with respect to individual research applications is being forced out from behind closed doors by the U.S. District Court for the District of Columbia. Traditionally, committees evaluating research applications meet in private, and the various documents they produce in the course of their evaluations are highly confidential.

No more. According to a ruling by Judge Gerhard Gesell, the Freedom of Information Act requires that peer review committees—often called study sections—conduct their business publicly. Specifically, Gesell ruled that the documents these committees produce be made public, but the effect of the ruling will probably be that the meetings themselves will have to be open to anyone who cares to sit in. The whole thing has left a lot of people feeling a bit panicky.

The Gesell ruling came in a suit that the Washington Research Project, Inc., brought against the Department of Health, Education, and Welfare. The plaintiffs wanted to know how decisions had been made regarding the disposition of 11 research grants within the National Institute of Mental Health for studying drug treatment of children with learning disorders. Government lawyers argued that provisions of the Freedom of Information Act, including those exempting trade secrets and internal memos from public disclosure, applied to grant reviews.

Gesell, who called the act itself an "imprecise and poorly drafted statute" that had not been written with its impact on scientific research in mind, said that the cited exemptions simply do not apply. In considering the case, Gesell said, ". . . the Court must construe the requirement of disclosure broadly and the exemptions narrowly in order to promote 'the clear legislative intent to assure public access to all government records whose disclosure would not significantly harm specific governmental interests.' " So much for secrecy in scientific decision-making.

In all likelihood, the government will appeal the decision.—B.J.C.

Notes on 1973

Anno Domini seventy three,
A red letter year for energy.
A good year both abroad and at home,
For Cassandra, Qaddafi, the Club of Rome
(The Club's computer wisemen quoth,
"We're closing in on the Limits to Growth").
Science continues on the spot,
Inflation is up, the budget is not.
'72 had hardly expired
When word came down that science was fired
From its Executive Office niche,
Given a somewhat shorter leash,
A berth in NSF instead,
And Stever, Guy, for David, Ed.
Who's really in charge? Oh, say can you see?
As usual, no doubt, it's OMB.

Now, with the Cold War half unthawed,
Our Pavlovian reflexes badly flawed,
It's hard to know just what to want,
Sakharov redux or détente.
And wasn't there something the Russians knew
To have our wheat and eat it too?
Of women's lib, enough to say
Ms. Chairman, Dixy Lee Ray.
For the denouement of Watergate
Apparently we'll have to wait.
On other news in '74,
At the risk of seeming a bore,
Let's hope for headlines with less punch,
For "crisis," perhaps, merely "crunch."
By the way, since there's no more holiday meeting*
To all a cordial New Year's greeting.

—J.W.

* AAAS