findings and the congressional unit made known that the study committee urged application of industrial management techniques to the Ranger program (*Science*, 27 Dec. 1963, p. 1636). The report was never made public, however, and it was never made clear which aspects of management were under fire.

More NASA criticism of JPL management after the Ranger VI failure brought to public attention what are essentially—in aerospace jargon—"interface" problems involving industry, NASA, JPL, and Caltech. What has developed could be an instructive case study in an increasingly important and touchy area of government-industry-university relations.

Some observers in and out of JPL trace the difficulties of the program for unmanned flight back to its beginnings. Plans were made in the late '50's which still strongly influence what JPL does, and these plans were made when there was no commitment to a manned landing on the moon. The manned and unmanned plans have never been meshed successfully, these observers say.

They add that NASA officials did not appreciate the complexity of the projected unmanned program and point to the fact that initial plans called for much more extensive operations than those undertaken.

Budget Problems

While the unmanned program was premised on straining the state of the art in space instrumentation, it is clear that many JPL scientists feel that the channeling of resources into the Apollo manned program has straitened the unmanned program.

Their argument adds up to a claim that the probability of success would be decidedly enhanced if more money and, therefore, more spacecraft were available to accomplish specific objectives. And, incidentally, unit costs would go down. Achieving what space engineers call "reliability" in a new system is difficult and usually involves many failures, they say, and they point to the early epidemic of misfortunes with earth satellite launches, which were much simpler operations than the Ranger and Mariner launches.

Comparison with the successful Mercury manned-satellite program is unfair, they suggest, because of the greater investment in Mercury and because of the greater demands imposed by a longer mission depending exclusively on instruments in a much smaller package.

Sensitivity to criticism within JPL arises in good measure from a sincere feeling that the difficulties and risks of the unmanned program are not sufficiently understood. Among faculty at Caltech there is some concern that criticism of JPL will reflect unflatteringly on Caltech, and this seems to have increased tension between JPL and Caltech a little.

University scientists concerned with the unmanned program seem generally to feel that JPL scientists are competent, but it is not difficult to find those who say that many NASA-JPL decisions are questionable. One Caltech faculty member pointed out that it would have been possible to get pictures of the moon with spacecraft much less complicated than Ranger. And another scientist, not from Caltech, said that, in the case of Ranger, "failures are to be expected but not failures without explanation." He criticised the failure to use telemetry to monitor power levels in Ranger VII so that it was "virtually impossible to tell what went wrong." This was not a matter of reliability, he said, but of "bad design."

Scientists in universities and the nonprofit institutions do not express great enthusiasm for the idea of overall management by industry of such projects as Ranger. They say that most corporations do not in fact have and cannot afford large groups devoted to basic research and that industry experience in imparting reliability to complex systems is based on production of large numbers of units, as in the case of missiles. This experience is not applicable to the unmanned program, they say.

NASA itself roundly criticized industry's performance last year in a stinging report on poor quality and low reliability of components delivered for the Mercury program, and Admiral Rickover has had the same sort of thing to say about industry's failure to meet the exacting specifications set for contractors on the Navy's nuclear program.

Industry, however, will get a broader test of its prowess, for the Surveyor spacecraft, the Rangers' successor, will be built by Hughes Aircraft, which will have a greater measure of management responsibility than any contractor to date.

NASA itself is working to develop a cadre of managers in its own organization, but first-class managers are proving hard to find for everybody, including industry, which can pay higher prices.

The result of what was first billed as a managerial crisis over Ranger is not likely to be clear-cut. JPL is seeking to strengthen its management corps, and NASA's reins on JPL and the lab's links to industry are likely to be tightened.

Meanwhile Ranger 7 is at Cape Kennedy and its TV cameras are at RCA in New Jersey, and everybody concerned is hoping that the next Ranger mission won't make the interface red.—JOHN WALSH

Population: New U.S. Interest in Offering Assistance Reveals Lags in Underdeveloped Nations

With "research into problems of population growth" now a duly legalized part of the foreign aid program, the Agency for International Development (AID) is beginning to grapple with one of the most curious paradoxes of population control—namely, that many of the countries that need it most are yet to rank it very high in their priorities of national concern.

In most cases, it is true, these countries have placed themselves formally and conspicuously behind population planning programs, and their national leaders have repeatedly issued expressions of alarm and demands for action. But anguished oratory and tables of organization are quite different from effective programs, and this is becoming increasingly apparent as the change in the American climate of opinion (*Science*, 20 Dec. 1963, p. 1554) makes it much easier for this country to offer assistance abroad. This situation is now demonstrating that it is difficult to give when the other party is not fully of a mind to receive.

Persons directly associated with the problem are not inclined to discuss it publicly, since many political and social sensitivities are involved in one nation's imploring another to limit its population growth. But within the U.S. government there is the feeling that the political leadership of many of the overpopulated and underdeveloped countries has simply not owned up to the gravity of their population problems.

Examples in support of this conclusion are not difficult to find. In one major nation, where the national leadership regularly produces admirable

statements on the need to come to grips with population problems, American pharmaceutical firms have encountered an incredible array of frustrations in their efforts to build contraceptive manufacturing plants. The government there, in an apparent blaze of ethnic resentment, has angrily refused permission for clinical testing of contraceptive materials intended for the difficult requirements of impoverished, rural populations. The proposals for plants have further become entangled in fights over government versus private enterprise, and, as an outcome, at least one major American firm has decided that there is no possibility of doing business in that country.

Again, in a nearby country where population pressures have reached the most grievous proportions, American aid officials have found that awareness of the problem and an eagerness to do something about it are apparent at the topmost levels of government but are yet to reach the levels where policy is supposed to be carried out. Seven months ago U.S. officials offered to provide trucks and other transportation to carry birth-control programs to rural areas; they are still waiting for a reply.

Finally, in India, the Indian Planning Commission allotted a total of $100 million for family planning in the 5-year period that began in 1961, but the pace of expenditure has, so far, been no more than $10 million a year. The money is available, according to persons familiar with the Indian program, but the government simply has not been able to develop the programs to spend it effectively. Meanwhile, health programs aimed at extending life are budgeted at nearly four times the full sum allotted for family planning. This is a decision which can readily be defended on humanitarian grounds, but, in the long run, the humanity of these priorities is seriously open to question.

To some extent the situations described arise from nothing more than the difficulties of running countries that are short of everything but people. Furthermore, those that could benefit from American assistance have not completely shaken off the impression that anything associated with birth control is anathema to the United States. This impression, amply nourished by well-publicized birth-control battles across this nation, was emphatically reinforced when President Eisenhower declared that population planning is none of the government's business. His statement left its mark on the underdeveloped countries, and it also left its mark on American foreign aid personnel, many of whom have witnessed enough twists, turns, and destroyed careers in foreign aid to be justifiably wary of cables from Washington announcing that birth control is suddenly respectable.

Within AID, efforts are now underway to impress foreign missions with the fact that, strange as it may seem, it is really true that the United States is eager to assist the underdeveloped nations with their population problems. Since the foreign aid act limits such assistance to "research," those nations seeking contraceptive materials are discreetly steered to private foundations and other nongovernmental sources. AID itself is ready, however, to offer advice and finance research on family planning techniques, educational programs, demographic studies, and related matters. In this connection, it has $80,000 for a newly authorized population branch; it is in the process of seeking a director for that office, and it is ready to spend more money out in the field once it has the assurance that the money will be well spent.

Meanwhile, the National Academy of Sciences has at last completed selection of the committee that it hopes will play a leading role in population planning matters. The committee, proposed last April in the Academy's study "The Growth of World Population," is headed by William D. McElroy, who is chairman of the Johns Hopkins biology department and a member of the President's Science Advisory Committee. Other members are: Bernard Berelson, of the Population Council; Ansley Coale, department of economics, Princeton; Ronald Freedman, of the University of Michigan population center; C. L. Markert, department of biology, Johns Hopkins; John Snyder, Harvard School of Public Health; and Howard Taylor, Columbia University College of Physicians and Surgeons.

If it is any consolation to the underdeveloped nations, the selection of the committee took considerably longer than was expected. Many of the persons approached for membership pleaded overfilled schedules, and it took a lot of looking and persuading to fill the roster.—D. S. GREENBERG

New MURA Problem: Holding Staff Together

Despite a political reprieve in Washington, it is possible that all the university presidents and congressmen may not be able to make MURA lively again.

Having been denied its long-planned nuclear accelerator (*Science*, 11 Nov. 1963), the MURA design group has been offered the consolation prize of eventually working in conjunction with Argonne National Laboratory, near Chicago. But the details of this arrangement are yet to be worked out, and, in the meantime, various high-energy accelerator centers are looking with interest at MURA's 60-man team of physicists, engineers, and technicians. At present, an informal moratorium prohibits piracy, but MURA officials are not optimistic about holding the group together. So far, no one has left or has indicated plans to leave, but it is now feared that the MURA story will end through slow erosion of its personnel. To counter this possibility, a seven-man committee, headed by John H. Williams of the University of Minnesota, is trying to work out MURA's future. "They're working to heal the wounds," Bernard Waldman, MURA director, said in referring to the old antagonisms between MURA and Argonne. "Right now, we're still in a state of shock over the decision against the accelerator, and I suppose we'll all feel better later on. But we have to face the possibility that the staff may dissolve."—D.S.G.

Foreign Research: NIH, Defense, Carrying Out Reductions of Aid for Work in Laboratories Abroad

A phased reduction is now under way in U.S. support of research in foreign laboratories. The cutbacks, which principally affect NIH and the Defense Department, were decreed last year to help reduce the gold drain, but they also coincide with a feeling that many of the countries receiving U.S.