New York Downstate Medical Center. During his lifetime, a severely retarded individual can cost health agencies $250,000 in special training and custodial care, Merenstein said. "The horror of it is that lead poisoning is a completely preventable disease. . . . When we used to have ten polio cases, the whole city rose up in arms, but when 30,000 kids are affected with lead poisoning, nobody notices."

The long-term solution to the problem is to remove the old leaded paint or to replace the houses. But paint removal is often expensive and, when done at all, often does not include removal from the ceiling or upper walls, social workers say.

In New York, several rent strikes have been organized after a lead-poisoning incident. "Since the City is not about to enforce the rules, the citizens have to take it upon themselves," said Wendel O. Richel, coordinator of a lead-detection project near New York. Such rent strikes can be particularly successful, Richel said, because "a landlord can always accuse the tenant of putting a hole in a wall, but he can't accuse him of putting lead in a building."

As a stop-gap measure, several communities have launched screening programs to detect lead early in young ghetto children. In Chicago, the City Board of Health has screened over 100,000 children since 1966. Henrietta Sachs, director of the lead-poisoning clinic, said that the number of high lead levels detected had dropped by roughly a half during each year of the program, and that the cases detected were less severe than might ordinarily have been expected before the screening program. By contrast, the New York City Health Department tested blood samples from only 5,000 children last year, and these were referrals from city hospitals and clinics, and not children tested as a result of an extensive neighborhood screening program. Community health groups have complained that the city was moving too slowly in establishing a screening program, especially after the city postponed a decision on a biochemical supply company's offer of 50,000 free lead testing kits until late in August, when the optimum testing season was closing. Felicia Oliver-Smith, director of the city's lead-poisoning program, explained that the city had doubts about the test's reliability and also suffered from a lack of technical manpower to handle a mass screening program. Several community groups complained that the test was the best available, at least for the summer of 1969. "The bureaucratic wheels are so rusty that they can't even move with free oil!" said one laboratory worker.

On the federal level, 19 congressmen have submitted a series of three bills to provide federal aid for testing programs and assistance in eliminating peeling paint from ghetto dwellings. The bills have not been scheduled for committee action and have received little general support, but many community leaders feel confident that they could deal with the problem even within the present legal framework.

At a national conference on lead poisoning, sponsored by the Scientists' Committee for Public Information and other groups, René J. Dubos of Rockefeller University said that "the problem is so well defined, so neatly packaged with both causes and cures known, that if we don't eliminate this social crime, our society deserves all the disasters that have been forecast for it."

—MARK W. OBERLE

Technology Assessment: NAS Panel Asks New Federal Mechanisms

The 1960's have seen an eruption of opposition, often by lone critics and groups of "outsiders," to technological innovations that threaten social or environmental damage as side effects. This opposition has been aimed at such targets as nuclear weapons testing, use of insecticides, development of a supersonic transport, the location of atomic power plants, and the building of highways. In Congress, the past few years have produced landmark legislation on environmental pollution and consumer protection.

The view that technological innovation can be a decidedly mixed blessing, therefore, has been gaining ground steadily. The new skepticism is sufficiently widespread by now that it comes as no great surprise to learn that technological assessment—the evaluation of the adverse along with the beneficial effects of innovation—is the theme of a National Academy of Sciences (NAS) report released Sunday.

Titled *Technology: Processes of Assessment and Choice*, the report was prepared by a panel on technology assessment created by the NAS Committee on Science and Public Policy (COSPUP). The request for the report came from the House Science and Astronautics Committee chairman, Representative George P. Miller (D–Calif.), doubtless with the encouragement of Representative Emilio Q. Daddario (D–Conn.), chairman of the subcommittee on science, research, and development, who is the chief congressional advocate of technological assessment. That the subject is of special interest to the academicians is proved by the fact that COSPUP chairman Harvey Brooks of Harvard chaired the technology panel* and left a strong imprint on the report.

The report is clearly influenced by the steady broadening in the definition of the "public interest" brought about by the events of recent years. But the panel concentrated mainly on the process of making technological decisions at the federal level and on suggesting ways to improve the apparatus for making such decisions.

Technological change in the United States has been governed primarily by the market mechanism. Damage done to individuals or adverse consequences

* Other members of the panel are Hendrik W. Bode, Harvard; Raymond Bowers, Cornell; Edward C. Creutz, Gulf General Atomic, Inc.; A. Hunter Dupree, Brown; Ralph W. Gerard, University of California, Irvine; Norman Kaplan, Northeastern; Milton Katz, Harvard; Melvin Kranzberg, Case Western Reserve; Hans H. Landsberg, Resources for the Future, Inc.; Gene M. Lyons, Dartmouth; Louis H. Mayo, George Washington; Gerard Piel, *Scientific American*; Herbert A. Simon, Carnegie-Mellon; Cyril S. Smith, M.I.T.; Morris Tanenbaum, Western Electric; Dael Wolfle, AAAS; Laurence H. Tribe, Harvard, executive director.

for society have often been ignored. The panel was naturally concerned with a search for objective means to establish what it calls "deleterious secondary consequences," or, to take a phrase from the economists, "external diseconomies." But its findings do not seem very encouraging. Even the cost-benefit analysis, recently so fashionable in government decision making, appears to hold little promise of providing an empirical mode of establishing social as well as money costs of technological change. There are even echoes of the British 19th-century utilitarians Bentham and Mill in the panel's discussion of an ethics of technology, but it sensibly put emphasis on the need, not for an abstract method of computing the general welfare, but for advances in economic, political, and legal theory to support the expanded definition of the public interest. The panel's basic view that technology assessment is a political as well as "scientific" process is expressed in this key passage of the report.

> Selections among alternative technologies require that choices be made among competing and conflicting interests and values. To the extent that those choices are made and enforced collectively rather than individually, they are essentially political in character and must therefore be the responsibility of the politically responsive branches of government and of those publicly accountable bodies that are specifically entrusted with regulatory responsibilities in narrowly circumscribed areas. The making of such choices is, in principle, indistinguishable from the resolution of many other conflicts that beset society. To entrust the resolution of all those conflicts to a single, all encompassing authority would be incompatible with representative government.

The panel's main business is the discussion of the federal government's decision-making process on technology, and the chapter on "Problems and pitfalls" provides a succinct, fair, and informative survey of the ground.

The Reaction Lag

At any level, government tends to react to approaching crisis too late for decisions to be made under optimum conditions. Jurisdictional limitations are chronic sources of conflict. Cloud seeding by one authority, for example, is likely to affect someone else's rainfall. One city's decision to treat or not to treat sewage before discharging it into a river will affect the cities downstream.

Competition, whether between companies or countries, is a prime influence on technological decisions. Put simply, it may be profitable to pollute and uneconomic not to. The view of the panel is this:

> The root of the matter is that no enterprise, private or public, can afford indefinitely to assume costs that its competitors will not likewise assume. The only solution lies in the direction of a mutual assumption of costs—either by contractual agreement, domestic or international, or by submission to externally imposed constraints that directly or indirectly compel all to assume costs that none could afford to assume alone.

For the panel, perhaps the most relevant objects of attention are the administrative agencies which regulate activities in technologically active areas, such as the Federal Aviation Authority (FAA), Atomic Energy Commission (AEC), Food and Drug Administration (FDA), and Federal Communications Commission (FCC). The problem, as critics complain, is that regulatory agencies tend to be wooed and almost inevitably won, by fair means or foul, by the industries they are commissioned to regulate. In some cases the agency is given a dual role of both promoting and regulating activities in a particular field—as in the case of the AEC—and the result is a functionally split personality. The chief remedy, the panel suggests, is a system of multiple assessment which, among other things, would in effect assure that assessors in the regulatory agencies were themselves assessed. The panel opts strongly for a pluralistic assessment system and, in the following passage from the report, sets the stage for its recommendations on what to do about the existing technology-assessment system in the federal establishment.

> It is primarily through the legislative and judicial branches that such incentives and pressures can receive the necessary direction and impetus, for it is Congress and the courts that can most readily become forums for the dissident and the disadvantaged in our society, and it is in the legislative chamber, acting as a committee of oversight, and in the courtroom, acting as an instrument of accountability, that the concerns for human values and a healthy environment can most vigorously be pressed upon a system otherwise notoriously loathe to move. The difficulty is that at this level, too, there exists no mechanism to integrate and focus the many disparate strands of concern and sources of pressure—to mold them into a powerful constituency for more responsible and responsive technology assessment. We have merely a spate of proposals in Congress, an occasional note of alarm from the Executive, and a few sporadic lawsuits brought by aroused citizens. Only when the energies represented by these diverse sources are orchestrated creatively and channeled continuously toward the tasks at hand will there be real hope of eventual progress.

The new mechanism which the panel backs is in fact a "network of mechanisms." No "mastermind" for technology assessment is thought desirable or possible. The panel urges that the mechanisms be subject to independent external criticism and be given the structural resilience to change with experience. The forms the new organizations would take are described rather tentatively.

On one major point, however, the panel is both explicit and adamant. The assessment organization should be insulated from policy-making power and responsibility. To preserve an essential neutrality it should "study and recommend, but not act."

Executive Assessment

The panel says it is essential that the Executive and Congress each have its own technology assessment apparatus. In the Executive, the prescription is for a new mechanism closely linked to the President. An expanded Office of Science and Technology is suggested, with technology assessment handled either in a separate section headed by a deputy director, or with the function distributed through an enlarged staff. Also called for is a Technology Assessment Division in the National Science Foundation, to fund both contracts for specific technology assessment studies and a program of grants to foster research in the field.

For Congress, the recommendations lose specificity. The panel feels that committee jurisdictional divisions and rivalries make it desirable that a new base for technology assessment activities be found. The suggested forms would be either a "joint" committee similar to the Joint Committee on Internal Revenue Taxation or a body serving Congress at large, as the Legislative Reference Service does. The panel says the congressional unit should also draw on the assessment resources of the Office of Science and Technology and the National Science Foundation.

The linkage to Congress and the legislative process would be essential, as the panel insists, but observers of Congress would question the practicality of some of the panel's proposals. Congressional collaboration in the use of Executive technology-assessment resources, for example, would involve what many legislators would regard as the unthinkable crossing of Constitutional lines. In

suggesting institutional forms, reformers might consider the model of the General Accounting Office, the Legislative branch's watchdog on spending, essentially a career organization which has earned both the confidence of Congress and a good measure of independence. If a technology assessment group were to be tied more closely to the committees, allegiance to the appropriations committees, which oversee the budget, would be worth considering.

The panel's concentration on federal decision making is fair enough considering its congressional commission and the fact that 50 percent of industrial R & D is financed by the federal government.

It is sure to be noted, however, that scant attention is paid by the panel to military technology. The panel does say that the military sector appears to harbor "the most glaring gap in our present technology assessment mechanisms." But the summary treatment is explained in terms of the difficulty of technological assessment in classified areas.

The panel's basic assumption is clearly that the benefits of technology outweigh the disadvantages, but that correctives to the decision-making process are urgently needed. A rival view sprouting on the political Left holds that man has become the servant of technology and that the government has failed in protecting the public. The panelists acknowledge that some people "would make modern technology the scapegoat of all social ills," but argue that this pessimistic view arises from an oversimplification of the reality, just as does the euphoric opposite view that technology is a guarantee of universal felicity.

The panel makes no comment on another strain of protest which holds that an educational and scientific elite is using technological decisions to achieve antidemocratic ends. This interpretation of class war through technology is discussed by John McDermott in an article, "Technology: Opiate of the Intellectuals," in the 31 July *New York Review of Books*.

The NAS report is rational, intelligent, optimistic. In essence, it prescribes as innovations an extension of the postwar pattern which brought university scientists into working contact with government as advisers, as researchers, and sometimes as upper-level civil servants. Although the alliance added new dimensions to the bureaucracy and proved generally satisfactory to both scientists and government, the record of government in guarding the public against the negative effects of technology has not been inspiring. The impact of society on technology in the 1960's has generally been gained through the efforts of superior muckrakers like Rachel Carson and Ralph Nader, or through the actions of indignant individuals or groups often campaigning in the tradition of Don Quixote. The panel seems not to have given very great weight to that experience.

An obvious analogy can be drawn between the problems of technology assessment at the federal level and the perennial problem of setting effective priorities for federal research and development. Both efforts have admirable goals, but neither so far has an effective constituency.—JOHN WALSH

APPOINTMENTS

Rocco A. Petrone, director of launch operations, John F. Kennedy Space Center, to director of the Apollo Program. . . . **M. Scott Carpenter**, former NASA astronaut, to president of the Helium Society. . . . **James H. McDermott**, director, water surveillance division, Federal Water Pollution Control Administration, to director, Water Hygiene Bureau, Environmental Control Administration (HEW). . . . **Eric A. Barnard**, professor of biochemistry, State University of New York, Buffalo, to chairman of that department. . . . **Glen E. Peterson**, professor of biology, University of Colorado, Boulder, to dean, College of Arts and Science, University of Nevada, Reno.

RECENT DEATHS

Elsie O. Bregman, 72; psychologist, formerly at the Institute for Educational Research, Columbia University; 24 July.

Fred D. Butcher, 71; retired State Department entomologist; 3 August.

Leland E. Call, 88; former dean of agriculture, Kansas State University, Manhattan; 18 July.

George E. Davis, 79; retired physicist with the New York Naval Shipyard; 2 August.

William Dubilier, 81; inventor of the mica condenser used in electronics; 25 July.

Emery T. Fibley, 90; vice president emeritus, University of Chicago; 24 August.

Elizabeth F. Focht, 49; radiation physicist, New York Hospital; 26 July.

Laurence Foster, 66; anthropologist, and professor of history and education, Lincoln University; 15 August.

Magnus I. Gregersen, 66; professor of physiology, Columbia University; 26 August.

Herbert S. Harned, 80; emeritus professor of chemistry, Yale University; 29 July.

Libbie H. Hyman, 80; zoologist and research associate with the American Museum of Natural History; 3 August.

Lessing A. Kahn, 50; research psychologist with the Defense Department; 16 July.

Agnew E. Larsen, 73; consultant on space research, Frankford Arsenal, Pa.; 16 August.

Robert R. Lechleitner, 46; professor of zoology, Colorado State University; 14 July.

Theodore D. McCown, 61; professor of physical anthropology, University of California, Berkeley; 17 August.

Philip M. McKenna, 72; former head of Kennametal, Inc. and founder of the Gold Standard League; 16 August.

Henry W. Meyerding, 84; former president of the International College of Surgeons; 27 August.

Giuseppe Previtali, 90; former associate professor of clinical medicine, Columbia University; 24 August.

Eugene C. Reinartz, 79; former commander, School of Aviation Medicine, Texas; 29 July.

Sophia M. Robison, 80; emeritus professor of sociology, Columbia University Graduate School of Social Work; 3 August.

Emanuel Schwartz, 68; associate clinical professor of medicine, Downstate Medical Center, New York; 17 August.

Margaret K. Seikel, 57; organic chemist, U.S. Forest Products Laboratory, Madison, Wis.; 30 July.

Sydney S. Spivack, 61; research sociologist, Princeton University; 26 July.

Sterling H. Tracy, 70; dean of liberal arts, Belknap College; 25 July.

Fordyce E. Tuttle, 66; physicist and consultant with the Raytheon Company; 5 August.

J. Walter Wilson, 73; professor emeritus of biology, Brown University; 10 May.