Technology Incentives Program: Success or a Phony Hard Sell?

A small program at the National Bureau of Standards that seeks to find ways to stimulate technological change has been drawing rave reviews from luminaries of the science policy world.

The program—known as the Experimental Technology Incentives Program (ETIP)—is based on the assumption that "virtually everything the government does influences or can influence the environment for technological change."

The program's philosophy, its adherents say, stands in marked contrast to traditional government efforts to foster innovation. The traditional approach is for the government itself to spend vast sums of money for research and development work that eventually produces a new technology (perhaps a supersonic transport, or a breeder reactor). If the technology is found, it is hoped that someone will then find a reason to use it. This is the so-called "technology-push" approach to innovation.

At ETIP, however, the emphasis is on finding ways to encourage the private sector to produce and disseminate needed new technologies. A series of experiments, many conducted jointly with other government agencies, is exploring whether changes in government procurement and regulatory policies, for example, can stimulate demand for new technologies or speed their application throughout the economy. Much of the effort is aimed at finding ways to identify and eliminate "roadblocks" that currently inhibit the private sector from producing innovations that would enhance the competitiveness of American products or help solve the nation's pressing social problems. This is the so-called "demand-pull" approach to innovation, and ETIP has been winning high praise for adopting this philosophy.

In a recent report to Congress, Robert Gilpin, professor of public and international affairs at Princeton University, singled out ETIP as one bright spot in a generally dismal record of government efforts to bring about innovation. He described ETIP as "one of the best conceived and potentially most important efforts being carried out in the government today." And he suggested that it would be "a step in the right direction" if all levels of government were infused with "the concept of coupling economy and technology policy which underlies" ETIP.

Similarly, Harvey Brooks, dean of engineering and applied physics at Harvard, who has been keeping tabs on ETIP because of personal interest, says he is "extremely positive on the program—it's a very innovative approach." Although he acknowledges that "a rigorous methodologist would fault the experiments because they don't control all the variables" (a difficult feat in the government environment), Brooks nevertheless gives ETIP high marks for "using indirect devices to foster R & D," an approach that he feels has been "greatly neglected."

Another booster of the program is Milton Harris, retired corporate executive and former board chairman of the American Chemical Society, who heads a panel of the National Academy of Sciences that has been evaluating ETIP. Harris says that he and his colleagues, whom he described as "tough guys from industry," were skeptical at first because "for the last dozen years or so, every time the economy slowed down, the scientists would see a new way to get money—they'd talk about the importance of science to economic growth and try to drum up trade for themselves." But ETIP, Harris concluded, is different. "It's an incredibly successful program—the first one that is trying to evolve new approaches. I'm most enthusiastic and I started out so cynical. There's really good support for it on our committee."

So great is the enthusiasm for ETIP that *Government Executive*, a trade magazine for the bureaucrats, featured it in a cover story in the July issue. "What is going on at ETIP is one of the most creative, common sense exercises Government has undertaken in a long time," the magazine enthused. "[I]t may well be the long sought answer to an economically and socially more responsive and effective government."

ETIP has even been discussed in such political power centers as the Vice President's office, the Domestic Council, the Office of Management and Budget, and the Congress—heady stuff for a program whose budget consists of only a few million dollars a year and which is buried in an obscure agency (the National Bureau of Standards), which in turn is buried in a department (Commerce) that attracts little high-level attention.

It was not always thus for ETIP. The program was first announced in President Nixon's 1972 technology message, but it got off to an abysmal start, running through three directors or acting directors in a short time. At one point it even received a public condemnation from no less an authority than Lewis M. Branscomb, former director of the Bureau of Standards. (Branscomb was out of the country and could not be reached for his evaluation of the subsequently revamped ETIP effort.) But ETIP's reputation improved after its current director, Jordan D. Lewis, former director of applied technology programs at Battelle Memorial Institute, Columbus, Ohio, took over in September 1973. An energetic, ambitious, 38-year-old physicist, Lewis has tirelessly touted the virtues of his program both inside and outside of government.

Overblown Claims?

There are some—even on his own staff—who complain that Lewis has oversold the program, that he is exaggerating its actual and potential achievements, that it is actually a rather modest set of experiments that are neither very revolutionary nor, in some cases, very well run.

Ironically, while ETIP's reputation with outsiders has been soaring upward, its own house has been seething with discontent. At one point last year the staff held a series of meetings to discuss its unhappiness with Lewis's leadership and by only a narrow margin voted down a proposal that they ask Lewis to resign. Two respected senior staffers—Harold Barnett, an economist from Washington University in St. Louis, and James Kottenstette, of the Denver Research Institute—became disaffected enough to resign.

Barnett told *Science* that, while the program embodies some "great ideas," it has been the subject of "a hard sell and a phony sell." He said that, while Lewis is "an extremely good salesman in the promoter sense," he so consistently exaggerates and overpromises that "eventually it's going to blow up and be terribly embarrassing." Barnett charged that the program has been "badly run," that Lewis has been abusive to staff members, that some of the experiments are poorly designed, with little attention paid to validation of what is causing what, and that some of the experimental records are in "quite bad shape." A major problem, in Barnett's opinion, is that Lewis seems to act more as an agent for change in the bureaucracy than as someone running an experiment. "If you see yourself as a change agent, you don't need good experimental records," he

explained. "You just find the right people to bring about the change."

Staff members who are still with ETIP told *Science* that, while they do not necessarily agree with everything Barnett said, there is much substance to his allegations, particularly those about management deficiencies and misrepresentations about what the program is accomplishing. But they contend that the internal difficulties have eased perceptibly in the past 3 months or so, and that the program does appear on the road to at least modest achievements. The program's most fervent backers believe the "hard sell" is both necessary and desirable—without it, they suspect, ETIP's impact would be negligible.

Though ETIP's official program plan was approved only 19 months ago, the program has already managed to win praise from some of the agencies it is assisting. Officials at those agencies seem pleased to have an outside group come in, help them institute changes that might otherwise be blocked by bureacratic rigidity, and pay a substantial chunk of the cost of experimenting with desirable changes. The typical mode of operation is that the ETIP staff will work closely with the agency's staff in designing an experiment acceptable to both, and ETIP will pay the "extraordinary costs" incurred by the agency to conduct the experiment.

One area of emphasis is government procurement policy, where ETIP has been working out experiments with the General Services Administration (GSA), the Veterans Administration, and state and local governments. The experiments seek to determine whether the government can stimulate technological change through its purchasing power by providing a market that would lessen the risks of introducing new products. Approaches under investigation include, among others, the use of performance specifications, which describe what a product should do without describing how it is to be made, thus giving manufacturers increased opportunity to innovate; life-cycle costing, which considers the total cost of operating and maintaining a product rather than simply its purchase price, thereby encouraging innovation in such areas as the conservation of energy that will be needed to operate a product; and value incentive clauses, which offer rewards to contractors who introduce cost-saving innovations in their products.

The experiments are too young to have actually resulted in the development of a new technology. But one experiment, in which GSA used life-cycle costing to buy 27,000 room air conditioners, resulted in the government obtaining units that require 21 percent less energy than the units purchased the previous year. A similar experiment in using life-cycle costing to buy 8000 water heaters led to energy savings and allowed a manufacturer to introduce technology into this country that he had previously been able to market only abroad.

Officials at GSA's Federal Supply Service told *Science* that ETIP has been "very useful" in helping them institute procurement changes that had long been discussed but never implemented. "Had it not been for ETIP, we would not be where we are now," said one key official.

Another focus of ETIP is government regulatory policy, an area in which ETIP has joint projects with some half-dozen federal agencies. An experiment conducted with the Nuclear Regulatory Commission, for example, sought to determine whether the time needed to devise standards could be cut by such simple devices as providing staff support to the panels of expert volunteers who formulate standards, and giving them the opportunity to meet for a solid week of work instead of the traditional 1- or 2-day sessions scattered throughout the year. ETIP claims to have cut standards development time from a year or longer to about a month, a speed-up that would reduce the uncertainty about standards that often inhibits innovation. An official of the commission reports that the new approaches could well affect the way standards are written in the future.

ETIP also has experiments aimed at more direct stimulation of civilian R & D and at assisting small business.

Much of the program is not directly related to technology—it is simply good management aimed at improving the environment for technological change. As Harris puts it: "I know its something good, but what the hell is it? It's really management dealing with technical subjects."

ETIP is still much too young to permit judgment of its impact. But if the program enjoys even a fraction of the success its supporters predict, it may well prove a major bargain.—PHILIP M. BOFFEY

Philip M. Boffey has rejoined the News and Comment staff. Boffey worked for *Science* from 1967 to 1971 when he resigned to conduct a study of the National Academy of Sciences which was published this year under the title *The Brain Bank of America.*

Medicine Without Frills: A Rural Hospital in Colombia

Apartadó, Colombia. In a remote area near Colombia's Atlantic coast, in a town whose very name means "far, far away," stands the Regional Hospital of Apartadó. Built in 1969 with government, university, and United Fruit Company funds, it is one of the best rural hospitals in Colombia. Yet its only x-ray machine has been broken for 2 years; it lacks hot water; and there is no laboratory equipment for elementary bacteriology and most blood chemistry.

Five years ago, Harvard Medical School began sending one student to the hospital for a clinical rotation every 2 or 3 months. As the student this past July and August, I carried with me a large suitcase of medical equipment and paid a stiff fee for room and board. In exchange, I experienced two of the most exciting and educational months of my time in medical school.

This fertile agricultural region was jungle and malaria-infested swamps until the United Fruit Company developed the banana industry in the 1960's. Although Apartadó did not even become a municipality until 1968, it is now a booming town of 28,000.

Reminiscent of our Old West, there are hundreds of prostitutes, machete fights in the saloons, and Leftist guerillas who swoop down from the hills to attack government targets. One Colombian doctor serving the required postgraduate rural year became nervous enough to acquire a pistol.

In 1969, the 28-bed hospital was inaugurated with an operating room, a modest laboratory, and academic affiliations with the medical school in Medellín, 200