Patenting Is a Growing Idea at Cornell

Cornell Chronicle
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For decades "patent" has been a dirty word among many university faculty in American higher education.

Things are beginning to change, however, at a number of the nation's leading research institutions.

Among the leaders of this relatively unnoticed revolution is Cornell, along with Stanford University, Massachusetts Institute of Technology, and the Universities of Wisconsin and Illinois.

Stanford, for example, announced last year that since 1970 its Office of Technology Licensing had distributed more than $750,000 to faculty inventors, their academic departments and the University general fund.

Cornell's own Department of Patents and Licensing has compiled figures going back nine years (when interest in patents picked up here) showing that the Cornell Research Foundation has received a total of $1 million from licensees of Cornell inventions. Most of the funds, $768,000, were paid to the inventors and to their departments for further research. The remainder was used for operating expenses of the University's expanding patent program.

Currently, CRF, a wholly owned subsidiary of the University, holds 92 U.S. patents and has applications pending in the United States on 24 others.

A question that arises is what is behind this gradual abandonment of the time-honored idea that the fruits of university research are part of the public domain?

An obvious answer, of course, is that given the financial plight facing higher education this kind of idealism goes out the window under the pressure of necessity.

The answer is not that simple, however, according to Theodore Wood, manager of the University's Department of Patents and Licensing, established in 1976. Before that time all University patent applications were turned over to Research Corporation in New York City, which performs this service for more than 300 institutions in the country. Establishment of the University's current program was based in part upon the recommendation of a study by the Cornell Class of 1922.

Speaking in his small office complex in 124 Day Hall, Wood said that in the 1960s certain departments in the federal government began to encourage universities to seek patents based on their research findings. While there never has been an official administration policy on encouraging use of the patent system, more and more federal departments are pursuing such a policy, Wood said.

Surprisingly, the greatest impetus has come from the Department of Health Education and Welfare. Norman J. Latker, patent counsel for HEW, has been a leading proponent of the patent system and the need for universities in particular to use it.

But why?

Latker and others, including Betsy Ancker-Johnson, former assistant secretary for science and technology, U.S. Department of Commerce, have argued publicly since the late 1960s that American business has fallen behind many European countries, not because it doesn't have new ideas for products but because too many of them never get developed and placed on the market. In their words American business is the victim of a growing "technology transfer gap" with most of the world's industrial nations.

They argue that by allowing new discoveries to enter the public domain immediately, private incentive to turn the ideas into marketable commodities is killed. It should be pointed out that a patented idea lasts 17 years in the U.S., then automatically enters the public domain.

As Wood says, "History shows that businessmen will seldom invest in an invention that is available to everyone."

Some argue that the "public domain idea" among faculty is a vestige of the pre-World War II university when the research effort on American campuses was relatively modest compared to today's standards. They also say it is related to "publish or perish" pressure. The patenting process can be drawn out and during that time the inventor feels constrained about publishing his or her research.

With the influx of billions of federal dollars in the past three decades, American research universities have become a major source of ideas and information needed for the future growth of American industry. University contributions have been crucial in the success of the space program and America's world leadership in electronics and computers.

Shifts in government research support, the increased emphasis on patents and licensing and the inevitable growth in inter-relations with industry mark what appears to be a new era in the evolution of university research.

The question of whether patent and licensing will ever become a substantial source of revenue for universities is still open. The figures now don't indicate it will be, according to Wood.

There are other realities, however, according to Thomas W. Mailey, who works with Wood as manager of industrial liaison in what is called Cornell's Technology Transfer Program.

"We must be constantly aware," says Mailey, "that we exist to help inventors and move new ideas and concepts from research to industry. This does not mean that our total effort is towards making money—it means our orientation should be towards maximum exposure of good new technology resulting from research at Cornell."

Both Wood and Mailey feel their work is a new variation on the public service commitment of the university as the state's Land Grant institution.

Wood, who retired in 1970 after 17 years as a patent executive with International Business Machines, Inc. says his patent work at Cornell is the most challenging of his career, which began as an examiner in 1946 with the U.S. Patent Office.

The overall technology transfer program is under the direction of W. Donald Cooke, vice president for research, with the assistance of Thomas R. Rogers, director of the Office of Sponsored Programs.

But if you have any patentable ideas, Wood is the man to see.

Martin B. Stiles

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THE NEW YORK TIMES, SUNDAY, JULY 25, 1971

Patents Adding To Earnings

By STACY V. JONES

WASHINGTON — American corporations, which own more than half a million "live" United States patents and an uncounted number issued by foreign governments, often find it profitable to license others to use at least part of their patented technology.

This technology, which may include machinery, integrated circuits and production techniques, may bring substantial earnings. The General Electric Company's report for 1970 lists earnings from royalties and technical agreements as $24.4-million. This includes a substantial amount gained from know-how — unpatented technical knowledge—and foreign patents.

A Patent Office study, published in 1957 by the Senate subcommittee on patents, showed General Electric to be the leading American patent owner at the end of 1955. No exact count has been made since, but the company is probably still in the lead.

Since G.E. was incorporated in 1892, it has received about 42,000 American patents, of which 14,466 were still in force last Jan. 1. At present, the company is receiving about 1,000 new domestic patents a year.

G.E. is seeking to license inventions that it has decided not to use; sharing the results of its research with small businesses in return for royalties that include a percentage of sales. A technology marketing operation, which has its headquarters at G.E.'s research and development center in Schenectady, N. Y., chooses about 100 patents a year that it thinks have good potential and publicizes them through a periodical, Business Opportunities. Subscribers can use it to advertise their own surplus inventions.

Other companies are also trying to increase their royalty income. The Westinghouse Electric Corporation says it believes in "maximizing" its patent licensing. The National Cash Register Company is realizing gains on "spin-offs" from basic research, such as business forms that do not need carbon paper. The Esso Research and Engineering Company, which holds most of the patents of the Standard Oil Company (New Jersey), is actively offering licenses on a variety of processes, including hydrorefining, fluid coking and plastic production methods.

In their published licensing policies, many large companies offer to grant nonexclusive rights on almost any invention, regardless of the competitive situation, in return for reasonable royalties. But some retain exclusive rights during the first two or three years after the patent is issued.

A company's licensing office must keep in mind the relationship of the patent's limited monopoly to the larger antitrust question. The freedom to license will be taken into account by the Senate Judiciary subcommittee on patents later this session, when it begins work on a pending bill for revision of the patent laws.

The International Business Machines Corporation, which holds about 6,250 live United States patents, receives about 550 new patents a year. For protection on its discoveries, I.B.M. relies partly on disclosure, which prevents others from patenting a published invention. The company files patent applications only on important inventions and puts the others into the public domain through the I.B.M. Technical Disclosure Bulletin. In 1970, about 2,200 inventions were published in this manner by I.B.M. If it changes its mind, I.B.M. can apply for a patent within a year after publication.

Other holders of a large number of patents, with the number of unexpired American patents held on a recent date and the approximate annual total of new patents being received include:

¶The General Motors Corporation: about 11,000 currently; 390 in 1970.

¶The Bell System: 9,690 on March 31; about 800 a year.

¶E. I. du Pont le Nemours & Co.: 8,854 on Jan. 1; about 600 a year.

¶The Phillips Petroleum Company: 6,056 on Jan. 1; 404 in 1970.

¶The RCA Corporation: 5,695 currently; about 300 a year.

¶The Standard Oil Company (New Jersey): 5,192 currently; 267 in 1970.

In all, there are now about 900,000 unexpired American patents. Domestic corporations own about 60 per cent and foreign corporations 10 per cent.

The proportion of American patents received by corporations has been gradually increasing over the years. This is the age of the payroll inventor whose contract provides that he assign to his employer the inventions he makes during working hours. About three out of four patents now go to corporations. Of the remaining one-fourth, most are owned by individuals, with a small proportion held by the Government, which employs its own inventors.

Few American companies assign balance-sheet values to their patents or report earnings specifically from them. A brokerage house has estimated the patent royalties of Phillips Petroleum at $12-million a year. In 1970 the company received 351 patents from 34 foreign countries.

Many American companies receive foreign patents on the same inventions they patent here, often in as many as 15 or 20 countries. The estimated number of foreign filings is 150,000 a year. Among the corporations owning substantial numbers of unexpired foreign patents are Westinghouse, with 13,045, and RCA, with 8,505.

The Soviet Union is in the spotlight just now on the foreign licensing stage. The International Intertrade Index of Newark is putting together a group of 10 American executives who will spend 10 days in Moscow studying Soviet inventions with a view toward manufacturing them under license in this country. Roger Tuthill, chief engineer of Airco Welding Products, Inc., Union, N.J., and several pharmaceutical specialists have signed up for the trip.

A Soviet delegation visited the Patent Office and American companies last spring to study the protection and licensing of inventions. Last month, William E. Schuyler Jr., Commissioner of Patents, and four members of the Licensing Executives Society, Inc., went to Moscow to explore opportunities in the Soviet Union for the licensing of American technology and American-owned Soviet patents.

The number of live American patents owned by domestic corporations has grown from 317,726 in 1955 to an estimated 540,000 today. There are signs that patent holdings abroad have increased at an even higher rate and that foreign licensing will take on added importance.

STRENGTHENING THE NATION'S RESEARCH AND DEVELOPMENT EFFORT[1]

The need for a more strategic approach.—It is clear that Federal investments in research and development have a far-reaching impact on economic and social progress. The implications go well beyond the contribution of research and development to specific programs such as defense, space, energy, health, environment, and transportation.

The scope and significance of research and development tends to be overlooked in the Federal budgetary process since it is scattered throughout the budget and since science and technology are often viewed as optional long-run approaches to the solution of specific problems which demand immediate attention. This view of research and development hinders the development of an overall—more strategic—approach to the resource allocation process.

A discussion about R. & D. must be a discussion about the future. Many of our goals can be attained by improved day-to-day management of existing programs or by more investment in using what we already know how to do. But nothing forces a government or a business to look to the future more than does the question: What should we do in R. & D.?

A major objective of this Administration has been and will continue to be, a more strategic approach to our total national research and development investment. To further this strategic approach, we must spend more of our talent and resources in more clearly understanding the research and development process, particularly in how it works in the context of a representative form of government and a free market economy. This budget proposes just that. In addition, the 1973 budget will move us ahead in several critical areas where our knowledge is sufficient to make wise investments in R. & D.

This budget accelerates our efforts to turn science and technology to the service of man through emphasis on solving important civilian problems, increases significantly our efforts in defense R. & D. to protect our national security, and strengthens the support of basic research to increase our stock of knowledge to draw on for the future.

Beyond these overall R. & D. thrusts in the budget, provision is made for a beginning in several important areas. This budget:

—initiates a series of experiments to find better ways to encourage private investment in research and development and to improve

[1] The term "research and development" covers the discovery and application of new scientific knowledge—including the design, testing, and evaluation of new materials, processes, products and systems. It includes, for example, basic research into the origin of the universe or on the workings of the human body as well as the design and development of a new military aircraft or the New York-to-Washington Metroliner demonstration project. It would not include, for example, the purchase of military aircraft for operational use, payments to Amtrak for operating or capital costs, or funds directly for the schooling of new scientists and engineers.

the application of R. & D. results. These experiments will be undertaken through joint university-industry cooperative efforts and through industrial and research associations—with special attention to small technological firms.

—draws more directly on the capabilities of those agencies that harnessed the atom and conquered space, AEC and NASA.

—strengthens the partnership between government and industry in R. & D. to create innovative technologies and new markets, thus providing new job opportunities, increasing the Nation's productivity and strengthening the U.S. position in international trade. For example, the Edison Electric Institute is developing a program of contributions for R. & D. from its member electric utilities. The Federal Government will encourage such activities through coordinated planning and cooperative R. & D. efforts with such groups. A similar arrangement is underway with the American Gas Association on coal gasification projects.

—provides an improved national capability to assess the importance of research and development to economic growth.

Through these and other efforts the Administration continues to improve the management of the Government to insure that our overall R. & D. effort is adequate, that our R. & D. programs are focused on top priority needs, that our considerable R. & D. capabilities are effectively utilized, and that the American people get a proper return on the dollars they invest in Federal research and development.

Fiscal year 1973 funding for Federal R. & D.—The Federal effort for the conduct of R. & D. will reach $17.8 billion in the 1973 budget, an increase of $1.4 billion, or more than 8%, over 1972.

Included within this total are significant increases in research and development to strengthen our national defense; to increase the emphasis of the space program on useful applications; to accelerate research and development to deal with key problems in health, transportation, energy, environment, and natural disasters; and to strengthen basic science.

The expansion of ongoing programs, together with new efforts that move us to a longer range R. & D. strategy, results in a total increase of more than $700 million for the civilian research and development effort—exclusive of defense and space—in 1973 or 15% over 1972. This makes for a 65% growth in civilian R. & D. since 1969, from $3.3 billion to $5.4 billion.

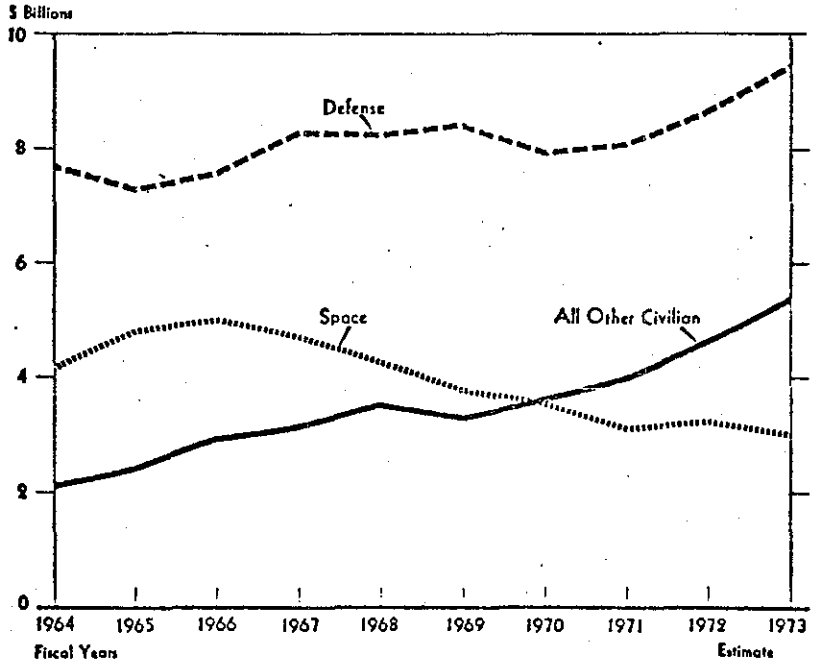
THE OVERALL FEDERAL R. & D. OUTLOOK

[Obligations for conduct of R. & D. in billions of dollars]

	1969	1972	1973
Defense, including AEC military-related programs	8.4	8.6	9.4
Space	3.8	3.1	3.0
Civilian programs	3.3	4.7	5.4
Total	15.5	16.4	17.8

Trends in Federal R. & D. are also depicted in the following chart.

Conduct of Research and Development — Obligations



Special efforts to strengthen civilian R. & D.—This budget includes special efforts to strengthen civilian R. & D. as illustrated in the following table:

RESEARCH AND DEVELOPMENT

[Obligations in millions]

Program objective	1972	1973	Percent increase
Abundant electrical power without pollution	$392	$480	22%
Fast, safe, pollution-free transportation	456	666	46
Reduction in the loss of human life and property from natural disasters	93	136	46
Effective methods of curbing drug trafficking and of rehabilitating drug users	50	60	20
Local demonstrations of effective emergency health care systems	8	15	88
Experimental incentives program	0	40	-------
Total of these categories	999	1,397	
Total 1973 increase	-------	398	40

This increase of about $400 million is the first stage in $2 billion of R. & D. over the next 5 years in these areas alone. These increases illustrate the efforts of the Administration to focus R. & D. on both short-run and longer range goals in areas of national concern.

Abundant electrical power without pollution.—A sufficient supply of clean electrical power is essential to economic growth and the quality of national life. A broad research and development program is crucial to the attainment of these goals—both in the short- and long-run—and particularly to balance environmental and energy needs.

In the 1973 budget, further effort will be devoted to the development of pollution control technologies in order to provide additional options for meeting air quality standards at lower costs. In 1973 there will also be further expansion of research and development programs identified in the Energy Message of June 1971. These programs include the fast breeder reactor for nuclear power, coal gasification, magneto-hydrodynamics, controlled thermonuclear fusion power, solar energy and mapping and basic assessment of the resources of the Outer Continental Shelf.

To reach further ahead in time—to provide more options for the future and to begin to draw more on the capabilities of the high technology agencies—the 1973 budget provides for research on advanced dry cooling towers and large scale energy storage batteries in the AEC, cryogenic power generation and transmission in the AEC and National Bureau of Standards, greater use of laser technology in fusion power research under AEC, and research by the Department of the Interior on the uses of low-B.t.u. gas produced—with less pollution—from coal.

Fast, safe, pollution-free transportation.—New and expanded research and development programs are needed to provide fast, safe,

pollution-free transportation. Technically advanced systems must be explored which are not only safer and more efficient but which reduce adverse environmental impacts.

Under the 1973 budget nearer term R. & D. programs will be initiated or expanded to attack the problem of truck and aircraft noise, develop more attractive and economical mass transit vehicles, and provide for safer automobiles.

In order to maintain our options for new transportation systems further in the future, work will be accelerated on personal rapid transit, which provides individualized, nonstop service for commuters; and new work undertaken on dual-mode systems for metropolitan areas which might combine the convenience of the automobile with the efficiency of a rapid transit system and on new tunneling technologies to reduce the cost of underground excavation for mass transit. Work on advanced air traffic control concepts, a short takeoff and landing (STOL) aircraft, and quiet aircraft engines will continue at higher levels to provide more efficient, safer air transportation with reduced environmental impact. In these more advanced fields of both ground and air transportation, the capabilities of NASA will assist in meeting R. & D. program objectives. Similarly the technical talent of AEC will be utilized in advanced work on tunneling.

Reduction in the loss of human lives and property from natural disasters.—Natural disasters take an unwarranted toll on human life and property. In 1969, 12,000 people died from fires and $2.4 billion of property was destroyed. While increased warning time has significantly reduced deaths from hurricanes, property damage has increased dramatically, to some $2.4 billion during 1965 through 1969.

The 1973 budget proposes acceleration of research efforts to diminish losses of lives and property from these and other hazards and natural disasters. Particular attention will be focused on research in hurricane modification to reduce damage from surface winds; on earthquake prediction—and ultimately control—and on engineering to design safer structures; and on fire research—including forest fires.

Effective methods of curbing drug trafficking and of rehabilitating drug users.—The June 1971 message to the Congress on Drug Abuse Prevention and Control recognized the need for a major effort to curb a problem that is assuming the dimensions of a national emergency. This message called for the creation of a Special Action Office for drug abuse prevention.

In keeping with this Administration action, research and development on new ways to curb drug trafficking and to rehabilitate drug users has been stepped up in both 1972 and 1973. For the coming fiscal year, the budget provides for an overall fourfold increase in research budgets of a number of agencies over the 2-year period since

1971. This includes funds for the Departments of Justice; Health, Education, and Welfare; Defense; Agriculture; and the Office of Economic Opportunity—for a multipronged attack on all phases of the drug problem.

Local demonstrations of emergency health care systems.—Vast sums of money are spent in this country on research in many aspects of health. One need that has yet to be properly addressed is the provision of adequate emergency medical service. Technologies are available. The problem is to pull together these technologies into a system which effectively links communication, transportation of victims, ambulance equipment and services, trained manpower, and emergency room hospital service.

Full-scale demonstration of such integrated emergency treatment systems—as planned in the 1973 budget—can be undertaken with relatively small amounts of added Federal funds to act as a catalyst.

Incentives to encourage economic growth through R. & D.—As part of the $400 million increase in special efforts to strengthen civilian R. & D., $40 million is provided for two new experimental programs to encourage economic growth through R. & D. The objective of these programs will be to broaden the application of research and development results, to improve productivity, and to stimulate private sector R. & D. efforts.

Over $14 million is included in the budget for the National Bureau of Standards for this purpose and $26 million for the National Science Foundation. The funds for the NSF will also provide for a national research and development assessment capability to improve understanding of the process of innovation and research application in American society.

Both agencies will experiment with a variety of approaches including joint research in university, industry and Government laboratories, shared cost research through industrial and research associations, demonstration of new technology applications in various sectors of the economy, and encouragement of small, innovative firms.

The division of responsibility between the National Bureau of Standards and the National Science Foundation will in part be determined by the different foci of current activities in the two agencies. The Foundation can be expected to emphasize university-industry relationships, research associations, special incentives—and longer range exploratory research. The National Bureau of Standards may emphasize shorter range research objectives—technological development and demonstrations with relatively immediate industrial application and efforts to broaden the application of useful technological advances. The Bureau will also emphasize its contacts with individual industrial firms and associations.

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San Jose Mercury News, Sunday, April 16, 1978

Gene-splicing research and the protest that fizzled out

By Susan Cohen
Staff Writer

THE headlines once pictured the possibility of worldwide epidemics, unleashed from the laboratories where recombinant DNA researchers were playing cut and paste with the basic units of heredity.

But even many of those who have cautioned against the proliferation of such research now disown those fantasies.

The fact is that the debate over the safety of the gene-splicing technique called recombinant DNA has gone as quiet as the laboratories where the work proceeds with little protest and, apparently, without incident.

In early March, the National Institutes of Health (NIH) granted Stanford University permission to issue licenses to private companies seeking to develop the technique for commercial use.

Congress has apparently abandoned attempts to set up a regulatory commission to oversee recombinant DNA research.

And the NIH, which writes and enforces the strict safety standards for gene-splicing done in federally funded projects, is now revising those guidelines.

"The momentum is now going towards taking away more and more of the restrictions on the research," says Nancy Pfund, a Stanford graduate student, who has represented the Sierra Club and other environmental groups worried about the use of recombinant DNA.

"The debate is still alive but it's shifting focus. Commercialization and the role of the public in scientific policy don't garner the sorts of headlines that 'Andromeda strains' do."

The scientists who originally warned of the potential hazards of their own research — then lobbied Congress to prevent legislation which might further tie their hands — say the debate has shifted because new evidence has laid the safety questions to rest.

Their critics claim Congress was wowed by the scientific muscle of those who lobbied against increased regulation.

But now that the work is proceeding, its commercial potential is raising another set of issues, among them one of the most difficult questions of all to answer: Just how should the public or can the public be involved in directing the often-awesome path of scientific progress.

Gene-swapping, gene-splicing, or more a scientifically, recombinant DNA, is an ability researchers acquired only recently. It allows scientists to take part of the DNA or dexoyriboncucleic acid which makes up the genetic blueprint for one organism and insert it into the genetic machinery of another.

Some of the potential stemming from such a technique was demonstrated just a few months ago when UC-San Francisco and City of Hope researchers inserted an artificial gene into a bacterium and directed it to make a hormone found in the human brain. The experiment was hailed as proof that recombinant DNA may be used to turn bacteria into factories, churning out useful medical substances, such as insulin, at man's command.

The possibilities of gene-splicing also extend to agriculture where years of breeding might be short-cut with a method to issue genetic commands.

"We share the firm conviction that this will be a billion dollar revolution and what we'll see 25 years from now will be astounding," predicts Dr. Ronald Cate, president of CETUS, a Berkeley firm already working at putting recombinant DNA to commercial use.

But soon after the technique was developed, the researchers themselves began to recognize its potential hazards. They invoked a voluntary moratorium on the work to discuss the issues and set up some safety procedures.

Among the worst scenarios they imagined was that a tumor-producing virus might be introduced to a common bacteria which might escape from the laboratory and infect nearby populations.

It is just such scenarios which have faded.

The NIH guidelines have banned the most risky of the experiments and set up stringent safety containment procedures for others.

New types of "disarmed" bacteria are being used in the experiments, cells which are unlikely to survive outside the laboratory.

And some experiments indicate that gene-swapping is not novel to nature, that organisms swap genes frequently without creating hazards.

"The recombination of DNAs is a very natural process," says Stanford associate professor of biochemistry Ronald Davis, one of about 15 researchers at Stanford now doing recombinant DNA experiments.

"If it's happening at a fairly high frequency in nature and we're not picking them up as dangerous, it indicates to me that they're not hazards," Davis says.

It was such evidence that Senator Edward Kennedy, D-Mass., cited last year when he dropped his sponsorship of a bill which would have set up something akin to the Nuclear Regulatory Commission to deal with recombinant DNA. It is also leading the NIH to revise the guidelines under which federally funded gene-splicing projects have been operating for

the last year and a half — probably to ease regulation of those types of recombinantion known to occur in nature.

When Congress started to consider the issue this year, the debate had been pared down to a bill which would extend the NIH guidelines to cover industry, at least for two years.

Setting up the same standards for industrial laboratories that university laboratories operate under makes sense to both recombinant DNA researchers and their critics.

The most controversial part of the House bill, which would also set up a study commission to examine the long-term uses of the new technology, is the clause which would reserve the right to regulate the field to the federal government.

The prestigious universities where the research is under way support the clause. The critics, who may have hopes for more restrictive legislation at the state or local level, have spoken out against it.

The critics also point to what they charge is a conflict of interest. Stanford University, which is seeking a patent on the recombinant DNA process developed by Dr. Stanley Cohen of Stanford and Dr. Herbert Boyer of UC-San Francisco, stands to make substantial royalties should commercial uses be developed during the life of the patent.

Although Cohen has waived his rights to the a percentage of the royalties, Boyer has set up his own company called Genotech to pursue commercial application of recombinant DNA.

Stanford has not issued any licenses to private firms so far and has made no decision on how it will go about doing so, according to vice president for public affairs Robert Rosenzweig. He lists possibilities that range from allowing anyone who applies to use the process without collecting royalties to granting an exclusive license to one firm.

"Down the road there are going to be lots of applications that will raise questions," Rosenzweig says, but he goes on, "in the short run the problems are going to be quite manageable."

Rosenzweig points out that NIH will require any firm receiving a license to comply with the federal guidelines, something private firms are not now required to do.

And, he goes on, it is only with the protection of a license that industry is willing to invest in developing a useable product from the results of publically funded basic research.

"Some people appear to think that's either novel or evil. I don't think it's either. That's the way things get done in this country," Rosenzweig argues.

But among those who disagree is Jonathan King, a biology professor at MIT who has been a leader of those criticial of the recombinant DNA researchers.

King is willing to concede now that "it's an important technology. It's a revolutionary technology. It can be done safely."

But he sees problems of both safety and ethics as the technique gets translated into commercial use.

"It's really a rip-off of the public interest. This was developed entirely out of public funds . . . the money should go back to the public trough," King charges.

"Every bit of recombinant DNA research was paid for by the sweat of the public brow. I don't think the trustees of Stanford should benefit from that."

King also fears that as industry, using recombinant DNA techniques, develops products and methods worth guarding as trade secrets, the research will become increasingly difficult to regulate.

"There's a direct conflict between public safety and private profit," he says. "It's impossible to have the stuff done safely in secret."

Adds Halsted Holman, a Stanford professor of immunology who has been critical of his Stanford colleagues on the recombinant DNA issue, "How much do we know about the health problems associated with recombinant research in industrial applications?"

So far, Holman says, "The evidence favors the experiments" which are being done in carefully monitored laboratories. "But as we get into more and more complicated recombinations that might change," Holman says.

The critics' main contention is that the technology is just too new to be sure about and too revolutionary to abandon caution.

Even beyond the immediate questions of safety, University of California at Santa Cruz Chancellor and former genetic researcher Robert L. Sinsheimer has suggested the work be restricted to a few facilities because of its long-range potential for tampering with heredity.

"With recombinant DNA our practice now far outpaces our theories and may carry us swiftly and unwittingly into new domains," Sinsheimer said in a speech last November.

"We may now have come to a time when we need to consider whether we ought to forego certain technologies, however alluring, as unsuited to the nature of mankind."

But recombinant DNA researchers dismiss the idea that their technique presents any special problems as it goes commercial or that restricting their research is the way to protect society from broad fears of genetic engineering.

"It's my belief at the present time and the belief of the other signers (of the moratorium) that the concerns that have been developed have been greatly overblown," says recombinant DNA pioneer Stanley Cohen.

"The experience and the reason for the shifting of the debate away from the safety question is that it's become clear that this

research has no more danger than any other research," he says.

Cohen believes safety procedures should be followed, as they are in other types of biological research, but he has argued heartily in Congress against any enactment of specific regulations into law.

"We don't have a salmonella research act of 1978 or a rabies research act of 1978, yet work in those areas is known to be hazardous," he points out.

Cohen, who has been criticized for using unpubished data as a weapon in the legislative arena, is just as eager to take a swipe at those who speak for more public participation in setting scientific policy.

"The public as I see it are public representatives and not self-proclaimed spokesmen for the public," he says. "When one says the public should be involved I would argue the public has been involved."

While government, through its funding processes, sets the basic directions of research, Cohen states, "The question is whether basic research itself should be directed in a day to day way by the public."

"It's very difficult for anyone, even for scientists, to know what direction the search for truth will take," he says. "Knowledge cannot be bad.Knowledge can only be good."

It is up to the public, Cohen acknowledges, to see that the knowledge resulting from basic research is put to good use. But he sees existing mechanisms to do this.

He tells the story of a critic who charged genetic engineering might someday be used to genetically alter an aggressive male by directing his cells to produce less of a particular male hormone. Cohen's reply was that a method already exists to accomplish the same end — castration — "but castration is not publically accepted."

But those who have fought against him on the recombinant DNA issue contend there must be better ways to allow the public to control its scientific future.

"I think the public interest is there but it hasn't found a way to express itself," says Nancy Pfund. "We're asking for the same rule of participation in basic science as in other sectors of our economy and society.

"That's the issue that's going to keep burning once this particular issue dies out," she says.

To which one recombinant DNA researcher replies: "They've overdramatized and scared the public and by scaring them you get them involved. Maybe the public doesn't want to get involved."

Vote postponed on faculty files

DALY CALIFORNIA 3/31/78

By TOM PECORARO
Staff Writer

SACRAMENTO — A last-minute lobbying effort against a bill guaranteeing UC faculty members access to confidential personnel papers forced postponement of hearings on the bill here yesterday.

Hearings have been postponed until the bill's backers can muster enough votes for passage.

UC administrators who oppose the bill earlier this week convinced Assemblymember Art Torres (D-Los Angeles) to withdraw his support for it.

And UC Regent Stanley Sheinbaum yesterday morning phoned from New Mexico during an Assembly Judiciary Committee hearing on the bill, urging committee member Maxine Waters (D-Los Angeles) to oppose it.

The bill, SB 251, sponsored by state Senator David Roberti (D-Los Angeles), would give faculty candidates for promotion and tenure access to confidential information about them — letters of recommendation and reports of faculty review committees. Only the names of reviewers would be deleted from the released information.

The bill also grants all UC employees access to non-confidential records, including teaching evaluations and pre-employment letters of reference.

UC administrators and faculty senates at several UC campuses have united in opposition to the legislation, arguing that it will undermine the confidential promotion and tenure review process they equate with UC's excellence in research.

The bill's opponents also say it is unnecessary. They point out that a bill granting all state employees access to personnel and confidential information kept about them was signed into law last year.

The bill, SB 170, allowed the university to provide either full texts of this confidential material with the names edited out or summaries of its substance. The university's new policy, enacted last September, allows only for summaries.

"It seems premature for the legislature to step in at this point. We don't know how well these procedures are working or how well they will work," said Harold Horowitz, UCLA vice-chancellor for faculty relations and chair of the committee that wrote the university's current personnel procedures.

Assemblymember Torres, lobbied by Horowitz earlier this week, emphasized this same point.

"If the university is, as he (Horowitz) assured me, making good faith effort to implement SB 170, it is not appropriate to introduce new legislation at this time," Torres said.

But supporters of Roberti's new bill contend that the university is violating the intent, if not the letter, of last year's law.

David Brody, statewide chair of the UC American Federation of Teachers, one of the principal groups backing SB 251, argued in testimony before the judiciary committee yesterday that by providing summaries only at the end of the tenure review process the university makes it impossible for candidates unfairly denied tenure to determine where they were wronged.

"The crucial thing is that people have the information they need to appeal their decision and be guaranteed due process," Brody said. "These aggregated summaries are virtually useless to a person who believes himself to be treated unfairly. Aggregated summaries make a mockery of due process."

The bill's supporters only have one more chance to present it in committee. Under California law, any bill that fails to win passage after being postponed three times is considered dead, and SB 251 has already been delayed twice.

"We're going to make every effort to find out what the legislators' concerns are and address them," Lori Snell, a legislative assistant to Senator Roberti said. "If it takes two or three weeks to set the date of the next hearing, fine. It's our last time around."

Science Report/White House views intense technology hunt as useful exercise, though few projects emerge

by Claude E. Barfield

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On Jan. 27, within a week after President Nixon delivered his State of the Union message and his fiscal 1973 budget to Congress, about two dozen White House staff members gathered at Washington's Hay-Adams Hotel to celebrate the end of a unique crash effort to plan new subsidies for high-technology development.

The party's guest of honor was William M. Magruder, who had led the drive to create what came to be known as the New Technological Opportunities Program.

The men and women who had worked for Magruder on a backbreaking schedule since early fall had prepared a gift for their boss. It was a toy airplane, in red plastic, piloted by the Red Baron, of Peanuts comic strip fame.

The baron was outfitted with schizophrenic headgear.

One-half of his helmet was painted black, with the letters SST outlined in white—symbolizing Magruder's unsuccessful campaign in 1970 to save the ill-fated program to develop a commercial supersonic transport aircraft.

The other half was white, and it was adorned with the acronym TOP, for Technological Opportunities Program.

Also painted onto the baron's helmet was a series of numbers ranging from 350 to 779—symbolizing the millions of dollars that had been contemplated at one time or another for the technology program next year.

It was a small plane, as befitted the program the Administration had approved. For after months of effort, after intensive review of dozens of imaginative and expensive proposals for new federal research and development subsidies, after hours and hours of consideration by the principal advisers to President Nixon, the Administration had decided, as Commerce Secretary Peter G. Peterson put it, that "we have to learn to crawl in this area before we can walk."



William M. Magruder and the symbolic toy airplane from his staff

That admission had formally been made a day before Magruder's party, at a Cabinet Room briefing led by John D. Ehrlichman, the President's top domestic affairs adviser. Ehrlichman notified the gathering that no big new programs would emerge in the coming fiscal year.

Yet Ehrlichman argued that even though the Administration had not approved expensive projects to develop new technology, Magruder's work had laid the base for a more rational approach to federal science policy.

Clearly, the new technological opportunities (NTO) exercise has increased the government's understanding of problems endemic to subsidizing research and development in domestic fields where private industry traditionally has held sway. It also has led to a new federal resolve to undertake experiments in R and D partnership between the government and the private sector.

In the long run, the Presidential "message to Congress on science and technology" that emerged from the Magruder effort may be viewed as an important first step in a government attempt to better apply the technological resources of the nation.

Program development: The drive to find new technological opportunities was launched last September, shortly after the Administration had instituted its wage-price freeze. Its goal was to identify ways in which the government could help stimulate technological innovations to solve critical domestic problems, thus improving the competitive position of the United States in world trade and utilizing the skills of unemployed scientists and engineers.

The program then seemed to hold out the promise to the scientific and technological community and to large U.S. industries of an important new partnership with the federal government and significant short-term payoffs in cash. It had high political overtones. The program "could become a key component in President Nixon's economic policies and in his bid for reelection," wrote John N. Wilford in *The New York Times*.

"In a real sense, science and technology are being enlisted as important components of the new economic policies," said Peterson at the time.

And in an October interview, David said he believed the program "will result in some of the most important opportunities for the scientific and technological community in years."

Magruder was appointed on Sept. 13 to coordinate the program, and a few days later he expressed caution about "overselling the program" but said that "I wouldn't have taken the job unless I had convinced myself that we could come up with something significant."

Working against a tight deadline—the technology package was supposed to be ready for announcement in the State of the Union message—Magruder in November abandoned his resolve not to build a sizable personal

R and D Coverage

This is the first of a two-part series on the evolution of the Nixon Administration's policies for science and technology. This report analyzes the Administration's drive last fall to produce a group of major new technological initiatives; the second report will describe the Administration's future plans in the area. *(For two earlier reports on the Administration's plans to stimulate research and development in the United States, see Vo. 3, No. 43, p. 2115, and No. 44, p. 2156.)*

staff and recruited nine program managers from the National Aeronautics and Space Administration to pull the package together.

The program managers inherited an ambitious wish list of proposals made to Magruder by federal agencies—a list that would have cost $1.5 billion in fiscal 1973 and $11 billion through fiscal 1977. Large new initiatives put forward to the White House included development of new nuclear power systems for commercial ships, development of offshore ports for deep-draft tankers, mapping and exploitation of the resources of the continental shelf, a speed-up in the AEC's program to use nuclear detonations to free natural gas from tight rock formations, a plan to fully develop high-speed rail transportation in the Northeast Corridor, an item-by-item analysis of the nutritional content of the nation's food supply, and a campaign against kidney diseases.

White House team: Four of President Nixon's top advisers made the final decisions on the NTO program: Ehrlichman, executive director of the Domestic Council staff; George P. Shultz, director of OMB; Peterson, then director of the Council on International Economic Policy; and Peter M. Flanigan, special assistant to the President.

The group wrestled with the proposals presented to them all during the month of December and spent several hundred man-hours trying to put together a package.

By Christmas, it was evident that they had failed. In the end, none of the large-scale projects was accepted, and the Administration also decided not to go for across-the-board R and D tax incentives for industry.

A much smaller, backup list was assembled by the OMB and word went out from the White House that no more could be expected in 1972.

President's message: On March 16, the President sent his long-awaited message on science and technology to Congress, a message originally supposed to cap the NTO campaign by announcing broad new policies and programs. With the failure of that campaign to produce sizable new initiatives, the document was anticlimactic.

Disappointment—Though billed as the "first Presidential message on science and technology in the nation's history," it failed to attract much notice, and indeed most press comments showed keen disappointment in its contents.

Thus, the headline in *Science*, the magazine of the American Association for the Advancement of Science, read: "White House Presents Vapid Technology Plan." And the magazine characterized the message as "little more than reshufflings of existing rhetoric and known policies" in "sad contrast to the optimistic hints that emanated from the Administration last summer and fall."

Daniel S. Greenberg, a keen if acerbic observer of federal science policy making, wrote in his *Science and Government Report:* "In form, content, and vision . . . it is a fairly pedestrian melange. . . ."

Speaking to the business community, *Business Week* similarly stated that the "Administration is admitting that it doesn't know how to formulate new technological programs or institute immediate incentives for strengthening industrial innovation."

Positive reaction—There are those who strongly disagree with the criticism leveled at the message on science and technology. "Much of the negative reaction is based on the very high expectations that were generated out of the Magruder operation," said William D. Carey of Arthur D. Little Inc. "They made a tactical error in trumpeting that drive and it leaves the message looking pretty weak."

Carey, a recognized authority on science policy who served as assistant director (human resources) of the Budget Bureau during the Johnson Administration, continued:

"That's too bad, because I think it's a very good message and an extremely significant document in the history of federal science policy making.

"In the first place, it begins to look at science and technology not merely from the cost side of government policy—but as a necessary and vital investment, a blue-chip investment. That represents a whole turnaround, and in that sense it could become as important a landmark as the 1946 Full Employment Act was for labor.

"Secondly, it seems to recognize the real problems of innovation and the barriers to the utilization of technology by society. . . .What it says finally is, 'OK, we can't solve the big problems at the moment, but let's try out a number of things.'"

Carey's opinion received strong support from John W. Davis, D-Ga., chairman of the House Science and Astronautics Subcommittee on Science, Research and Development. At hearings in April devoted to science, technology and the economy, Davis expressed the "deepest regret" that the message had not received more attention in the press and in Congress. "It is a very important document," he said, "and fully commanded the attention of the subcommittee and myself."

And Greenberg, while critical of the message, wrote on Feb. 15: "It is inviting to scoff at the mouse that has emerged from the mountain of task force papers, but it should not be doubted that some profound reorientation of the national R and D enterprise is now under way."

New programs: Though the Administration has lowered its sights in the federal R and D area, small but potentially important initiatives have been launched for the coming fiscal year.

The chief residue of the Magruder drive is the $37.5-million Experimental Incentives program announced in the President's fiscal 1973 budget. The program will be jointly administered by the National Science Foundation and the National Bureau of Standards. During the coming year, each agency will commission a number of small-scale pilot projects to experiment with a variety of partnership arrangements between the federal government on the one hand and private firms, universities, nonprofit research organizations and state and local governments on the other.

In addition, the NSF has been given $2.5 million to study the barriers to technological innovation in the United States.

The Administration has also proposed legislation to encourage the growth of small firms specializing in development of high-technology products. The legislation would liberalize government-loan programs for such companies and grant them favorable tax treatment and relaxed securities regulation. Further, the Administration is exploring other measures to aid commercial development of high technology—chiefly revisions in patent and antitrust policies.

The Administration as well has pinpointed five areas where it feels it can push ahead with a number of programs: energy, transportation, drug control and rehabilitation, and natural disaster control. The five general fields received most of the $700-million increase the Administration claims it

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has made in civilian R and D for fiscal 1973. These are areas in which R and D already is in a relatively advanced state, and they would have been slated for sizable increases regardless of Magruder's efforts. In addition, the increases will not finance any large-scale demonstration projects of the kind Magruder was studying.

Search for a strategy

The search for a new research and development program divides roughly into two periods of time: the five months from July to December when David's Office of Science and Technology and then Magruder and other officials performed the detail work of reviewing proposals from government agencies, and the time thereafter when top Presidential advisers became intimately involved in the decisions leading to policies outlined in Presidential messages in January, February and March.

Beginnings: The Administration's effort began on July 1, 1971, when Ehrlichman sent letters to 15 government agencies asking for technology proposals. Responses were forwarded to the OST, where David's staff began analyzing them immediately to assess their technological merit and to evaluate how they might contribute to the larger goals: solution of pressing domestic problems, favorable impact on the balance of trade and on employment of scientists and engineers.

It was not until after the appointment of Magruder as a special consultant to the President on loan to the Domestic Council that the NTO program moved into high gear.

At about the same time—in September—two interagency task forces were appointed to study elements of the NTO program, and they, like the OST, reported to Magruder, who had been assigned to coordinate the effort.



William D. Carey

One task force, headed by Ezra Solomon, a member of the Council of Economic Advisers, was instructed to explore ways of financing the initiatives as well as more general means of stimulating industrial R and D. The group had a December deadline.

The other task force, headed by the Treasury Department, was to report after six months to a year on the problems associated with transfer of technology among nations. It has just completed its study and will present its recommendations soon to the Federal Council for Science and Technology.

One additional step taken by Magruder after he assumed command was to elicit proposals for new technologies from private industry. Several hundred letters went out over his name to numerous trade associations and individual companies. This produced more than 1,000 ideas, but very few received thorough study.

Initiatives search: David chose Lawrence A. Goldmuntz, executive director of the interagency Federal Council for Science and Technology, to direct day-to-day operations in the OST's review of agency suggestions, and Goldmuntz, in turn, recruited two deputies from the Commerce Department: John B. Connolly and Harold Glaser.

Goldmuntz divided the OST staff into nine working groups, each with an assigned subject area. The area titles were flexible and changed several times during the operation, but generally they included transportation, communications for social needs, natural resources, urban-suburban development, health care, pollution, natural disasters, law enforcement and productivity.

In addition to its own in-house evaluation of agency proposals, the OST sought outside advice from blue-ribbon panels of scientists, economists and industrialists in each topic area. Magruder estimates that about 125 outside consultants came to the White House during October and November.

OST evaluation—It was in wrestling with the second set of questions about the technology proposals—their impact on domestic problems, international trade and employment of scientists—that the first major problems and delays occurred. "The schedule kept slipping," said Connolly, "and the reasons it did related directly to the difficulties of tying particular programs to our specified national goals. We found a great deal of disagreement in the government agencies and among the outside experts about how an R and D effort fitted into overall priorities."

Goldmuntz pointed out that in some areas disagreements started back in the blue-ribbon panels themselves. Transportation was a case in point. "Some railroad leaders on that panel," he said, "saw no reason for the federal government to get into the act with a subsidized R and D program. Their attitude was, 'I'm making money, and I'm doing fine without your help, thank you.' "

Problems with agencies—The OST team found, in addition, that the federal agencies that were supposed to contribute ideas exhibited a widely varying degree of interest in the project.

Some were highly enthusiastic and worked hard developing their proposals—the Transportation Department, for example. Other agencies submitted many ideas that either were insufficiently supported by data or which had already been rejected earlier by top policy officials; there were, for example, a whole series of proposals first made during the Johnson Administration for exploiting ocean resources, and a large number of suggestions for special-purpose airplanes. And some agencies, like the HEW Department, tried to be cooperative but never became very enthusiastic about the new technology program.

In the case of HEW, the initial suggestions for health and medicine initiatives had to be scrapped entirely and a new package was constructed between Dec. 1 and Dec. 15.



Peter G. Peterson

"It wasn't that they didn't want to cooperate," says Douglas R. Lord, who put together the final HEW set of proposals for Magruder, "but they did react against anything they thought smacked of 'technology for technology's sake.' "

Dr. Ian A. Mitchell, special assistant to the HEW assistant secretary for health and scientific affairs, said: "We were very interested and did back the proposals in the nutrition and food-safety areas—and some medical initiatives such as attack on kidney diseases and diabetes. But we felt there was a certain naivete in the NTO program about the application of technology to medicine. You have to prepare yourself with a lot of homework in each field before you can really know how to apply technology—in new devices or processes, for instance."

Budget cycle: Meanwhile, an intractable problem came more and more to the fore during October and November: coordination of the initiatives program with the inexorable deadlines of the fiscal 1973 budget cycle.

Department budget estimates are normally submitted to the OMB by Sept. 30—just when the Magruder operation was moving into high gear.

But government agencies were allowed the choice of submitting their technology proposals as part of their original baseline budgets or as separate packages outside those baselines. Most chose the latter route, and this added greatly to the burden of the OMB examiners.

Magruder would have preferred that the entire exercise be placed outside the cycle and on an independent time frame. However, he says, "It's difficult to get most government bureaucrats to conceive of an effort outside the budget-cycle framework; so we lost on that question."

Connolly said: "Bill fought hard against the decision to tie everything to the December end point. Because what it meant was that we were continually in a crisis situation regarding deadlines.

"Toward the end, we were killing those guys in the OMB, hitting them with more and more proposals every day. Poor Hugh Loweth was working practically a 24-hour day."

(Hugh F. Loweth, a staff member in the economics, science and technology division of the OMB, had been assigned to work full time with the Magruder operation.)

Program managers: In order to keep the program on schedule, Magruder had to begin to make his own presentations during the first week of December to the quartet of White House officials—Ehrlichman, Shultz, Peterson and Flanigan.

By the end of November, the situation within the NTO initiatives search was "chaotic," Goldmuntz said, and at this point Magruder reversed a decision he had made at the time of his appointment: he went out to recruit a staff of his own to assist him in the final weeks. "We were suddenly under the gun on the deadlines," Magruder said, "and things weren't moving fast enough. There were too many meetings and too much paper shuffling. I decided that I had to have a group of hardheaded systems-management specialists to get the program areas into shape for presentation to the top men in the White House."

"I needed a lot more help when we went forward in answering a series of tough questions the White House was bound to raise: why not have the private sector do this project, for instance; or what is the cost/benefit ratio on this; or if the government is going to get into this, how can we get the government out later?"

On Dec. 1, at Magruder's request, NASA assigned nine program managers to the NTO effort, and the National Science Foundation supplied an economist, Leonard L. Lederman, whose field of research centered in R and D, productivity and economic growth.

Promptly dubbed the "Little Magruders" by the other government officials with whom they worked, the group moved into 10 offices in the New Executive Office Building.

Each program manager was assigned to one or more of the loose subject areas already established by the OST staff, and each set out to apply the program-management techniques developed by the space and defense agencies to the inchoate group of proposals before them.

What the NASA team inherited was a list of proposals that was defensible from a technical standpoint but which lacked detailed analysis in two other important respects:

- program management analysis—how, by whom, on what timetable and with what resources would a program be developed;
- priorities—the relative priority of the various NTO proposals in relation to over-all national policies and to other R and D efforts.

The first task was the most important for the NASA team. Priority-setting—though attempted in a preliminary way by the team—ultimately had to be left to the quartet of White House officials.

***Function*—In** explaining how the NASA team was used, Connolly said:

Space Shuttle: The Biggest NTO?

Last fall, Administration officials were making much of their plans to direct federal research and development dollars away from space and defense, where they traditionally have been concentrated, and into efforts that could help solve domestic problems in areas such as health care and transportation.

But, ironically, with the failure of the White House efforts to develop a large package of civilian technology proposals, the biggest R and D item now planned by the Administration is the controversial space shuttle—a NASA project slated to cost $5.5 billion and to generate some 50,000 jobs in the aerospace industry in the next six or seven years. *(For background on the shuttle, see Vol. 4, No. 11, p. 539, and No. 17, p. 706.)*

President Nixon announced that the space shuttle had been given a full go-ahead on Jan. 5, just after the Administration had admitted that it was retreating from the ambitious goals it had set earlier in the NTO (new technological opportunities) program.

The space-shuttle program will have two effects that had been expected to come from the NTO program: it will funnel sizable amounts of federal money into high-technology industries and it will help reduce unemployment among scientists and engineers.

Inevitably suspicions of a trade-off arose. But the Administration flatly denies that the events are linked. Said Edwin L. Harper, assistant director of the Domestic Council staff: "I was at all the relevant meetings and the two programs were never discussed in terms of a trade-off. The timing of the space-shuttle decision had an independent history."

"Their function was not to help us force OMB and the top White House officials to say, 'Yes, we'll buy this or that program.' Rather, we wanted them to tell us what resources, money and manpower it would take if the Administration decided to go with a program; to answer questions about how you got from A to B to C."

Douglas Lord, who handled the health and nutrition proposals, corroborated. "Basically, what I tried to do," he said, "was to lay out the objectives of a particular technology and then put together a resource and management plan and a schedule for its development, as well as some kind of method of program evaluation as it went along."

Tension—Although the experience of the program managers varied in working with staff of the OST and the OMB, several said they felt that—for different reasons—they did not always have wholehearted support from either quarter.

Of the OST's cooperation, one said: "It's true that some of them resented us and thought we were trying to make a kingdom for Magruder." But, he added, "it didn't affect the effort we were both engaged in."

Of the OMB, Lord said that they "were busy and harried as hell. The work they did for us was top-notch. But I did have the feeling that they had been told that this operation had a lower priority than the regular budget negotiations."

Blue Book: The first-cut screening by Magruder, the OST staff and the outside consultants had produced a "wish list," as Magruder calls it, of all the new technological opportunities that could reasonably be candidates for the fiscal 1973 R and D budget. Magruder had collected them all together in a compendious volume called the Blue Book.

The projects listed at the highest point were valued at $1.49 billion in fiscal 1973, including about $810 million from federal general revenues and $680 million from a variety of sources: from federal trust funds—primarily the Highway Trust Fund—and from state and local governments and private industry under proposals for cost-sharing programs. The total runout costs of the list through fiscal 1977 including federal and other money amounted to about $11 billion.

A and B lists—Soon after the NASA group arrived, it was decided to divide the proposals in the Blue Book into two categories—a higher-priority set of proposals that seemed to have the best chance of survival, and lower-priority programs that would go on the back burner.

The program manager for the natural resources area, Robert N. Lindley, explained: "When I got a fix on my block of proposals I found that some just weren't well thought out, or the ideas hadn't yet matured, or a technology didn't seem to fit into any comprehensive resource management plan. So I tried to reconstruct a package that Bill could defend as a whole."

The natural-resources area was so complex and contained so many potential programs that Lindley recruited additional assistants from the Atomic Energy Commission, NASA, and the Commerce and Interior Departments. Also, he added a subpackage of energy proposals.

Changing numbers—During December, as Magruder, the OST and the NASA team worked over the programs, the dollar figures shifted constantly.

According to Magruder, the total funds for new obligational authority in fiscal 1973 dropped to about $656 million early in December, then rose to $779 million by the middle of the month and finally settled at $699 million. In addition to its final request of $699 million in new obligational authority, the NTO team also put in for about $300 million to be financed from trust funds and cost sharing.

The total runout costs of the final requests through fiscal 1977 came to $5.9 billion in new obligational authority and $8.6 billion with trust funds and cost-sharing programs added in.

Magruder cautions that "these numbers were never fixed for very long" and a "great deal of significance shouldn't be attached to the interim totals because we were constantly playing with new ideas and discarding ideas that at first had seemed attractive."

Another government official who worked on the program says flatly: "You ought to treat any figures you get from the NTO team with a great deal of skepticism. Particularly toward the end they were living in a dream world and basically playing out a charade. From the middle of December on, the handwriting was on the wall—there wasn't going to be any large-scale, highly visible program that would come out of this exercise."

White House negotiations

Ehrlichman, Shultz, Peterson and Flanigan formed the final screening committee for the entire NTO program and they in turn made the ultimate recommendations to the President, who seems—whatever his disappointment—to have accepted them entirely.

Two-track system: The first three weeks in December were hectic for all concerned with the initiatives program, and Magruder became the focal point of a two-track system. Even as the NASA team began their desperate effort to whip the initiative areas into shape, Magruder had to commence his own presentation to the four White House officials. He met some 15 times with the White House aides, the meetings often lasting three or four hours.

As the White House group wrestled with the pros and cons of the proposals before them, it became clear that the problems that had plagued the OST staff and the outside panelists carried through right to the top.

"It seemed to me," said one staff aide who attended the first of the White House briefings, "that they were staggered and overwhelmed with the amount of information and the complex public-policy implications of the programs before them."

"They couldn't give Bill much guidance throughout the meetings," said another staff aide, "because they were at sea themselves. So they kept peppering him with questions to go back and work out about this or that proposal."

There were frustrations for the program managers also. "The dual-track process," says Lindley, "did have an inhibiting impact. We'd get one program ready; Bill would go up with it and come back with a series of questions, which hit us as we were in the midst of preparing another proposal."

"A major difficulty for us," said Douglas Lord, "was that for obvious reasons we were not privy to the broad picture, the total budgetary strategy—in which areas, for instance, R and D funding had already been strengthened or conversely where it needed beefing up."

Magruder—In retrospect, Magruder defends the searching, skeptical questioning the proposals received. He says: "I emerged from the experience with real admiration for the checks and balances built into the decision-making process; the kinds of new pro-

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The Wish List: Big Ideas for New Technologies

At its high point in December, the White House list of possible new technological opportunities (NTOs) that the federal government could subsidize included programs valued at $1.49 billion in fiscal 1973, with runout costs of about $11 billion through fiscal 1977. Not all of the ideas on the list were presented by William M. Magruder, who managed the search for new technology initiatives, to higher officials in the White House. But the list below includes some of the large-scale initiatives that were considered seriously during December. None survived in the form or size in which it was presented, though some appear in the fiscal 1973 budget as drastically scaled-down pilot or experimental programs.

Nuclear ship: The proposal called for development of a nuclear-propulsion system of 120,000 horsepower for a large merchant ship or tanker. Development costs were $77 million.

Deep-water ports: Plans were put forward for the design of offshore terminals for deep-draft tankers. The cost of the offshore facility design would have amounted to $18 million through fiscal 1977.

Plowshare: The NTO leaders suggested that the AEC's Plowshare program for the peaceful uses of atomic energy be accelerated with stepped-up spending. Specifically, they wanted a multiple-detonation demonstration project to prove the commercial feasibility of freeing natural gas from tight rock formations within the next five years. The costs to the federal government through fiscal 1977 would have run to about $60 million.

Nutrition: The Agriculture Department proposed—and Magruder pushed hard for—an item-by-item analysis of the nutritional content of the nation's food supply. Agriculture officials argued that with the rapidly changing nature of the food supply—more and more processed foods, new fortification agents, frozen foods, and so forth—it has become almost impossible to establish guidelines for a proper diet.

Food safety: A complementary program, suggested by the HEW Department's Food and Drug Administration, would have identified and analyzed the effects of naturally occurring toxins in the food supply. It would have labeled hazardous substances, including cancer-producing components and those causing genetic defects. The two programs together would have cost $135 million through fiscal 1977.

Northeast Corridor: Full-scale development of high-speed rail transportation in the Northeast Corridor received high-priority consideration. It would have laid out a multi-million-dollar attack on a major transportation problem by straightening and modernizing railtracks in the East, refurbishing train stations along the routes and building parking facilities—all in an attempt to increase the use of rail transportation.

(Another transportation proposal that got serious consideration was computerization of freight-car handling.)

Continental shelf: Another idea was to map out and produce geophysical, geological and resource surveys of the continental shelf along the northeast coast and the Gulf of Alaska. These surveys and maps would have provided the basis for step two of the program: the beginnings of limited development of the mineral resources in these offshore areas.

Integrated modular utilities: One proposal was to assemble and demonstrate a technology that would have integrated sewage disposal, solid-waste disposal, power, heat and light into a single system. The integrated-utility system would have achieved major fuel-cost economies in cluster developments such as apartment buildings, garden apartments and office buildings. NTO leaders argued that by 1986, with a 25-per cent market penetration, this system could save $1 billion annually from lower fuel consumption.

Solid-waste disposal: A demonstration project for the recycling of solid wastes in a city of at least 500,000 was among the proposals. Chicago was actively discussed as a site.

Aviation: There were numerous proposals for development of specialized aircraft, particularly to deal with natural disasters and weather modification. Two aircraft were especially pushed: a helicopter for use against forest fires and an airplane specially outfitted for weather modification.

In addition, there were several suggestions for government leadership in developing planes for short- and medium-haul intercity flights.

Some of these proposals survived in the Defense Department budget; Defense was given extra money for programs that would convert readily to the NTO-suggested civilian needs.

Communications for social needs: Proposals to use electronics for social purposes cut across many program areas and included, in Magruder's words, "some of our most far-out and imaginative ideas."

The concept of a "wired city" was at the farthest reaches of the program. Under this system, individual citizens, through devices in their television sets, would be able to communicate directly with almost all urban social service agencies—including health, welfare and police-protection programs.

There were a number of proposals for development of computer software for domestic needs and programs.

High-priority consideration was given to developing computer software in education and health care, particularly in hospital administration.

Resource survey: In the natural resources area, a multi-million-dollar survey of the nation's mineral and industrial raw materials was proposed. NTO leaders pointed out that the nation will use as much raw material in the period 1976-2000 as it did in the entire 200 years previously.

They argued that an inventory was badly needed as a basis for policymaking.

Kidney disease: Late in the screening process, HEW presented a proposal for a major campaign against kidney diseases, comparable to the efforts the Administration has begun in the heart and cancer areas.

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Edward E. David

posals we were presenting had to be forced to give solid, in-depth justifications; and we received a fair hearing."

Government officials who worked with him during December, however, say that the sequence of events was a frustrating experience for Magruder. Says one career official, "Bill did think that on some programs the top guys were being unnecessarily cautious, and he kept chafing at their seeming inability to make up their minds."

"As a group," says Connolly, the NTO staff "may have been relatively naive; perhaps we had our own blinders on. Some of the projects seemed so obviously right for the country to do, we probably underestimated the barriers also associated with them."

Final list: Time ran out at Christmas. After almost a month of going around and around on the wide-ranging set of new technology programs and opportunities, the White House team gave up, lowered its sights and pulled back from all major new projects.

The OMB had begun, during December, to work on a more modest backup list that would, in the words of one government official, "illustrate with certain pilot programs the direction the government was moving to deal with a set of problems." The list contained no expensive, showcase new technology initiatives.

Soon after Christmas, a memo embodying these OMB recommendations went from Ehrlichman's office to the principals involved in the NTO program, saying in effect, "Here's the list. Bulletproof it." "Bulletproof," in the parlance of the White House staff, means analysis of a proposal or program for all possible problems and complications for the President.

Reaction—There was "a certain amount of dismay" among the NTO staff members when the final list was revealed, says Lindley.

"It did seem arbitrary and not to follow our recommendations," says another initiatives program manager. "Some proposals not high on our priority list survived, and some that we pushed hardest disappeared."

Residue—The Administration says that the fiscal 1973 budget contains a $737-million increase in civilian research and development funds.

There is some disagreement, however, even among Administration officials, about how much of this money is directly attributable to the NTO program.

One career bureaucrat who worked on the program said: "If you could really take a scalpel and pare down to the bone on the R and D increase, you'd find no more than about $125 million that came from Magruder's proposals."

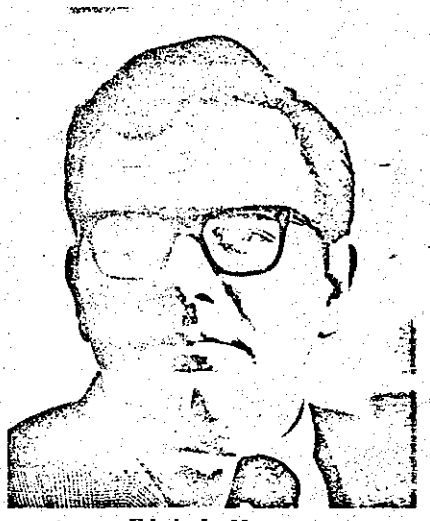
Magruder maintains, and his claim is supported by the OMB, that about $400 million of the $737 million represents additional funds from the NTO recommendations.

Among others, he cites increases in the following areas as resulting from the NTO analysis: emergency health care, development of high-speed delivery electronic mail; coal gasification; models for regional air pollution surveillance; advanced personal rapid transit systems; earthquake prediction; fire research and an integrated modular utility system for cities.

In addition, he says that about $150 million was added to the Defense Department budget for aviation projects that hold promise for civilian use, including a short-take-off-and-landing prototype aircraft; a new turbofan jet engine with a 20,000-pound thrust for commercial short-haul planes; a prototype heavy-lift helicopter; a vertical-take-off-and-landing prototype aircraft; and a microwave guidance system for aircraft landing in all weather conditions.

The total money issue is complicated because much of the NTO-related increase went to programs already planned or being funded by the government, and it is difficult to separate out that portion of the increase which resulted from the normal budget negotiations and that portion that emerged from the Magruder operation.

What seems to be the case, though, is that at the end of the budgetary



Edwin L. Harper

process, the Administration had two sets of figures: those associated with an increase of about $300 million from the regular negotiations and about $400 million from the NTO effort. The two columns were "collapsed together," in the phrase of one OMB official, and thus the NTO programs and regular increases completely lost their separate identities.

Economic incentives: The Administration's decision to draw back and launch no spectacular technological demonstration projects was paralleled by a determination not to propose any of the wide variety of options available for stimulating industrial R and D.

On Aug. 15, when he announced the wage-price freeze, President Nixon had specifically directed the Secretary of the Treasury "to recommend to the Congress in January new tax proposals for stimulating research and development of new industries . . . ."

Tax incentives were explored in depth as a means to stimulate industrial R and D by the NTO task force led by Solomon of the CEA, which included representatives from the OMB and from the Commerce, Justice and Treasury Departments. Despite the President's August mandate, the group recommended against tax reforms.

Although officials who worked on tax-reform proposals will not talk about the ideas they considered, Magruder said the economic-incentives proposal most seriously discussed was a 7-per cent tax write-off for R and D expenditures.

"The tax write-off would have cost the government several billion dollars in revenue," Magruder said, "and the problem we faced was that there are no methods of quantifying accurately the

social and economic benefits to be obtained from this loss. Treasury put the onus of responsibility on us to make that case, and we found that there weren't tools available to prove it."

David corroborated Magruder's explanation in testimony before the House Subcommittee on Science, Research and Development on April 12. The reason that proponents of tax incentives lost, he said, was that they "were unable to carry the burden of proving that their proposals would, in fact, accomplish the desired end and that the net effect after restructuring the laws . . . would be a positive benefit. Their proposals were made without adequate evidence of cost-effectiveness, economic tradeoffs and the reallocation of private and public resources."

(Neither Solomon nor Alan K. McAdams, who performed much of the CEA staff work on the tax proposals, would respond to questions about the NTO group's reasoning. "I'm tired of having the press quote members of this Administration as being at odds with each other," Solomon said. "You can just say that the forces and arguments against tax incentives won out over the forces and arguments for them.")

Harper: When the retrenchment occurred all along the line, Ehrlichman quietly asked his assistant, Edwin L. Harper, to pick up the pieces—to work out with the OMB a means of folding the surviving NTO programs into the 1973 budget and to devise explanations of the NTO program's results.

Harper is assistant director of the Domestic Council. His behind-the-scenes takeover of the NTO program fulfilled the prediction of one former Domestic Council staff member, William E. Kriegsman, now at Arthur D. Little Inc. Kriegsman, who had major responsibility for science policy before he left the council last June, said in October that "Magruder's conspicuous position constitutes an anomaly in the way the council usually works" and that "sooner or later, a relatively anonymous staff aide will reappear to handle the political decisions."

Harper maintains that there is today no single Domestic Council staff member who performs Kriegsman's duties. Harper says, however, that he keeps Ehrlichman informed on matters of importance in the field of science and technology.

David: With the shutdown of Magruder's operation, the President's science adviser moved back to center stage as the chief Administration spokesman on science policy—and on the NTO program.

Beginning with the Jan. 22 budget briefing, David has fielded all questions concerning the NTO program and presented the Administration's official position regarding the aim and results of the Magruder operation.

The official line, as presented by David at the Jan. 22 briefing was that "the NTO program was but one of a number of inputs to the budget" and it "would be difficult if not impossible to separate out its contribution from that of other inputs."

Significantly, the science adviser was already speaking of the NTO effort in the past tense, and he would comment no further on the program. Also significant was Magruder's conspicuous absence from the budget briefing, as well as his absence six weeks later from the press briefing before the President's special message on science and technology went up to Congress.

In a recent interview, David referred to the NTO experiment as a "fruitful and necessary exploratory effort." Similarly, Harper told *National Journal* that the NTO program had been aimed only to "stir things up, to generate some new ideas, to get things moving."

Like David, Harper is reluctant to admit that at one time the Administration hoped to come up with a package of large-scale new technology programs that the government might fund entirely or stimulate through tax incentives, loans or cost-sharing arrangements.

Reasons for retreat

In interviews with participants in the NTO program and with knowledgeable outside observers who followed it closely, four factors were most often cited as central to the failure of the Administration effort to produce a profound and immediate turnaround in the nation's R and D policies:

- the choice of Magruder to lead the drive;
- the timetable and organizational framework for the NTO program;
- the severe shortage of money for any new federal projects in fiscal 1973;
- and most important, the complexity of the problems associated with mounting a host of major new technological initiatives.

Magruder: Magruder's appointment produced mixed feelings from the beginning, and today estimates of his assets and liabilities vary greatly.

The NASA program managers who helped him have high praise for his talent and drive. For example, George W. Cherry, who worked on the transportation package, said: "He probably had an impossible task, but I think he came as close as anyone could to pulling it off."

Some government administrators of science and technology programs also found much that was positive in his leadership. Said one career official who worked closely with Magruder on the program: "The image of Magruder as a mindless SST and aerospace advocate is unfair and inaccurate. I was amazed at how much information he assimilated after he took over the program, and with his good sense in evaluating programs."

And Lewis M. Branscomb, who until May 6 was director of the National Bureau of Standards, stated: "It seems to me that Magruder did as competent a job as possible in translating the defense and space mode of operations to domestic R and D problems . . . . I suspect that the deficiencies stem from this defense/space approach rather than from Magruder's own leadership capabilities."

There are others, however, who trace many problems associated with the NTO program to Magruder, and to the difficulty he had in getting along with career bureaucrats.

Said one official who worked with him: "He's an able and dedicated guy, but he managed to irritate a helluva lot of people while he was here . . . . He's so goddamned aggressive. We kept telling him to hide his aggressiveness, and for a time he did. But he doesn't suffer fools gladly; and when the pressure was on, he just couldn't keep himself from going for guys' throats."

A second member of the NTO operation said: "Bill can be pretty blunt, and undoubtedly some people didn't like the way he operated. He got to be seen as a threat to a lot of people. He kept pushing into everyone's program area, and that can be deadly. My own guess is that as time went on he rubbed even Domestic Council guys like Harper and (John C.) Whitaker the wrong way."

The official added: "Not all of the animosity and foot-dragging was his fault by any means. This was a crash program, and there just weren't enough hours of the day to soothe everybody's feelings . . . . He walked into a system

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that had been functioning certain ways for years; and at almost every step he was bound to trample on long-established relations between government agencies."

"It would have taken the finesse of a Vatican diplomat to have kept everyone happy with the conditions we worked under," said Goldmuntz.

Magruder's visibility—Magruder's visibility and his public statements about the scope of the NTO program are also a source of contradictory debate.

From September on, reporters around Washington complained about his inaccessibility. Magruder says that he remained to the end reluctant to grant interviews, and did so only after the White House asked him to correct misinformation that was coming from unsupported rumors.

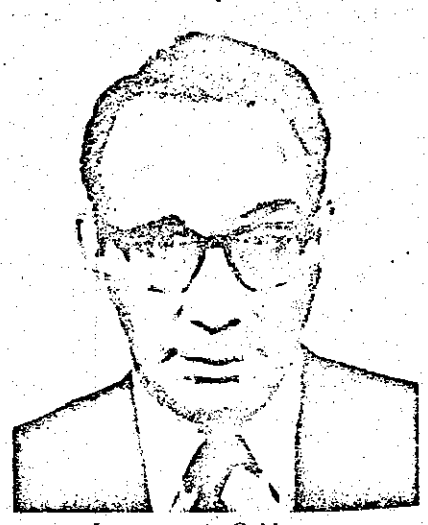
Yet, according to several officials who had access to the principals involved, Magruder's statements and speeches—few though they were—became a great source of worry to the White House, particularly as it became evident that no major initiatives were going to result.

Says one official: "Jesus Christ, there was Magruder in December still talking about the hundreds of government bureaucrats working on the proposals and the thousands of industry suggestions that were pouring in and holding out the promise of a huge government contribution. At the same time they were getting nowhere in the White House meetings.

"Peter Flanigan went up the wall when his contacts in the business community told him that hopes from that sector were rising astronomically. He knew they were bound to be dashed, and that the whole program might explode in the Administration's face and become a big political liability."

Deadlines, organization: The severe time constraints Magruder faced were a factor in the difficulty he had in pulling a technology package together, and they also contributed to the bureaucratic strains already present.

It was because time was running short that Magruder recruited his staff of program managers, and at the time Magruder emphasized that they were "brought in strictly on a temporary, six-week basis." Nonetheless, there were persistent rumors around the Executive Office Building and in the government agencies that this group would form the nucleus of a permanent NTO staff.



Lawrence A. Goldmuntz

Despite Magruder's denials, these suspicions caused problems for the NTO operation. Said John Connolly: "We got great cooperation from them, but it is true that agency bureaucrats are much more institutionally than program-oriented. One of the first questions we always got—either directly or implicitly—was: 'How does this fit in with our own programs and who's going to be in charge?' "

Goldmuntz also said he thought that talk of institutional change at the White House level to guide the technological initiatives was a disturbing factor.

Budget: In October, just as the NTO drive was gathering momentum, OMB officials already were predicting that it would be very difficult to break out money for new programs in fiscal 1973 because the President's new economic policies would contribute to big budget deficits.

Indeed, projections for the fiscal 1972 budget deficit—now estimated at nearly $39 billion—weighed heavily on the NTO program.

The budget considerations gave particular force to a traditional OMB policy question that came up again and again in the December screening sessions: if this program is really economically sound, why not let the private sector carry the ball?

"They hit us frequently with concern about overtaking the private sector," says Goldmuntz. "On some programs I think we had good answers to that question, but often we didn't have time to develop them in depth."

Flanigan—Peter Flanigan likewise said it was not money but policy determinations that controlled most of the cuts. He told *National Journal:* "What happened was that from a very long list of possible new technology initiatives, a certain group was chosen. If anybody thought that all of the possible initiatives should have been chosen, then of course the list is shorter than it would have been. But initiatives weren't cut for budgetary reasons, but rather on the basis of what was an appropriate activity for the federal government."

Changed climate—Peterson acknowledged, in addition, that a general change between September and December in the trend of economic thinking within the Administration affected year-end decisions on the amounts of money that should be committed to the program.

The NTO effort was launched in the midst of a flurry of bold policy decisions by President Nixon aimed at dampening inflation, redressing the adverse balance of trade and settling the unstable international monetary situation.

In September, there were high hopes of a quick turnaround on a number of economic problems. By December, when the final decisions on the NTO proposals were made, the climate had changed substantially.

The Administration found that many of the problems it had attacked—currency, inflation, balance of trade—did not admit to short-term solutions. "This knowledge did affect us," said Peterson. "We did think in the summer that we could do more and do it quickly. By December, we were determined to go slow and keep our feet on the ground."

Complexity, lack of knowledge: More important than any other factor in causing the Administration to back away finally from major new technological initiatives and costly incentive policies was the growing realization by key figures that they really knew very little about the nature of the technological-innovation process.

Looking back on the NTO operation, Secretary Peterson says: "What became clear was that we needed to know a lot more about the management of the R and D sector; and that until we gained this knowledge, we'd better be very cautious." "I know that some of the people who worked on the NTO program were disappointed, and thought we could have moved ahead faster," Peterson added. "But I didn't think we should jump into anything before we knew where we were going."

Science adviser David echoed Peter-

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son's judgment: "One thing we learned was that you don't start at the top and work down—you start at the bottom and work up." And Raymond L. Bisplinghoff, deputy director of the NSF said simply: "That exercise verified that we do not know how to make major interventions by the federal government in the R and D sector."

Goldmuntz, David—Goldmuntz, who was at the fulcrum of the initiatives screening process, pointed out that those programs which survived were those "most isolatable from any complicating social, economic, or political factors."

"Almost all of the big programs, that went up to the White House were freighted with social or institutional or political or structural complications," he said. "As the developers of the programs, we probably underestimated them, but the White House team had to factor them in carefully."

David made much the same point when he noted that "one of the things many of us had driven home more clearly than before was that R and D is not the whole story—you've got to take into account customs, mores, politics, existing structures and a whole host of other things when you attack a technological issue."

Examples—Goldmuntz gave several specific examples of what he meant. "Take the development of high-speed rail transportation in the Northeast Corridor, for instance. We pushed that pretty hard, and who can argue that it shouldn't be a high-priority item? But in analyzing that proposal the White House also had to take into account the fact that there are several thousand government jurisdictions involved, that the Penn Central is not the most popular railroad in the country today, that it might get athwart union work rules—and well, a number of complicated issues like this came up."

"Much the same kind of thing occurred with our ideas in the communications for social needs area," he said. "We put forward a number of communications proposals in the welfare and health areas. But we quickly got caught in a crossfire between the Corporation for Public Broadcasting, the Office of Telecommunications Policy and the cable TV interests. The policy questions were just too complex."

And so it went with other programs. The AEC's Plowshare program to free natural gas from rock formations with nuclear detonations rated high, but environmental animosity meant that the Administration couldn't touch it in an election year. The offshore port for deep-draft tankers, similarly, would have faced substantial opposition from the Governors of the Middle Atlantic and Northeastern coastal states, off whose shorelines the facility probably would be built. And a large program for an integrated urban utilities system would have raised opposition from unionized municipal workers.

Presidential options—The White House also came to realize that some of the technology proposals would have pushed the Administration further along than it wanted to go in certain policy areas at the moment.

"The name of the game around here is to keep the President's options open," says an OMB staff member. He cited the offshore port project as one in which "the technological commitment would have had substantial implications for oil policy, national security and the entire natural resources policy." *(For a report on the policy implications of offshore oil terminals, see Vol. 3, No. 49, p. 2389.)*

"You just can't expect any Administration to box itself in with a whole group of these long-term policy commitments," he said.

Overview

Whatever their reaction to the concrete results that emerged from the NTO operation, most government officials who worked with the program say that it was an important exercise because it sensitized agency personnel and top political officers in the White House to the opportunities and the problems involved in government policy toward R and D.

Argued Goldmuntz: "There were some disappointments for those of us who worked on the program, but we did show that there are real opportunities for R and D investment. And it's not pork barrel—these are proposals that will call for substantial commitment of resources but which can make real improvements in the quality of life in American society."

And a career OMB official who has major responsibilities for science funding said: "The political officers in the OMB began for the first time to understand the complexity of the R and D process—its complicated relationship to such things as balance of trade, productivity and jobs. It was really exciting to see those guys learn what they learned and come to the conclusions that they did, when the outcome was so uncertain."

Departments: Bureaucrats in charge of R and D planning for the civilian departments likewise considered the exercise worthwhile.

Harold B. Finger, assistant secretary for research and technology at the HUD Department told *National Journal:* "The educational process was important for those at the top who have to set priorities and timetables. Here at HUD we wrestle with the outer parameters of R and D problems all the time—with the conflicting social, institutional and political questions that form barriers to technological innovation.

"But I think elsewhere there has been an attitude of impatience, a desire for dramatic, clear and immediate results. A lot of people now know there's no reason to expect this—that trying to get short-term fixes will only complicate the solution to long-term problems."

Alfonso B. Linhares, a technology specialist at the Transportation Department, said that Secretary John A. Volpe and Robert H. Cannon Jr., the assistant secretary for systems development, "are very anxious to continue the intense review process we went through on the NTO proposals as a part of our regular program analysis. . . . We also learned a helluva lot more about how the OST, OMB and White House types think—what criteria they seem to consider important on R and D projects."

The briefing: One of those who attended Ehrlichman's Jan. 26 briefing described the affair as "an elaborate funeral and burial ceremony."

But others were impressed by favorable reviews the exercise was given by key policy officials present.

Said one: "Ehrlichman pointed out that the Administration had been wrestling with the massive issues associated with R and D for three years; and though it might not seem that we had accomplished much, we had given them more insight into their problems than any other exercise they had tried."

Surveying the results of his efforts Magruder said: "I'm satisfied that we served the top decision makers in at least bringing the conflicts and hard questions out into the open. . . . Beyond that, as John Ehrlichman told us at the farewell briefing, the operation gave the Administration a whole credenza of projects whose time will come sooner or later."

COMPARATIVE STATISTICS FOR FISCAL YEAR 1971 FOR THE MAJOR R & D AGENCIES OF THE EXECUTIVE BRA

	DHEW	AEC	ARMY	NAVY	NASA	AIR FORCE	INTERIOR	USDA
AGENCY R & D BUDGET IN MILLIONS	1,443	1,319	1,801	2,244	3,272	3,070	245	294
1. NUMBER OF AGENCY PATENT ATTORNEYS (INCLUDING AGENTS)	3	47	79	96	33	37	8	7
2. TOTAL NUMBER OF INVENTION DISCLOSURES RECEIVED	279	1,502	1,675	1,954	2,475	1,475	154	162
3. INVENTION DISCLOSURES REQUIRING A DETERMINATION OF GOVERNMENT INTEREST AND/OR PATENTING.[b] EMPLOYEE	60	19	843	960	159	204	76	152
CONTRACTOR	166	1,448	526[c]	760[c]	2,130	881[c]	78	10
TOTAL	226	1,467	1,369	1,720	2,289	1,085	154	162
4. NUMBER OF INVENTION REPORTS PROCESSED PER ATTORNEY (3 ÷ 1)	75	31	17	18	69	29	18	23
5. TOTAL PATENT APPLICATIONS FILED.	38	245	428	747	274	203	73	150
6. NUMBER OF PATENT APPLICATIONS FILED PER PATENT ATTORNEY (5 ÷ 1)	13	5.2	5.4	7.8	8.3	5.5	9.1	21
7. PERCENTAGE OF ITEM 3 ABOVE ON WHICH PATENT APPLICATIONS WERE FILED. (5 ÷ 3)	17%	17%	31%	44%	12%	19%	48%	92%
8. NUMBER OF DETERMINATIONS GIVING GREATER RIGHTS IN IDENTIFIED INVENTIONS.	28	6	6	7	75[d]	0	1	0
9. NUMBER OF R & D CONTRACTS WITH PATENT CLAUSES	1,964	220	1,425	2,223	1,291	3,591	258	151
10. NUMBER OF R & D GRANTS WITH PATENT CLAUSES	10,231	0	212	3	336	378	241	0

a. The DHEW Patent staff is currently handling all of the VA's and AID's patent problems in cases related to the Department s ho
b. Disclosures in which the contractor has exercised its first option to retain title based on a contract clause providing this item which explains the difference in totals between items 2 and 3.
c. Substantially all of these disclosures represent inventions in which the contractor had a first option to retain title, but e that these inventions had no substantial commercial potential.
d. These determinations were handled by the NASA "Inventions and Contributions Board", not by the NASA patent staff.

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March 9, 1978 263-2831

Dr. Frank Press, Director
Office of Science & Technology
Policy
The White House
Washington, D. C. 20500

PATENT BRANCH, OGC
DHEW

MAR 16 1978

Dear Dr. Press:

This letter is sent to you on behalf of the Society of University Patent Administrators to voice the collective and individual concern which members of our Society have regarding a fundamental consideration in the approach to a uniform government patent policy.

Advocates of the title-in-the-government approach to such policy in their sweeping recommendation have drawn no distinction between basic, applied and developmental research. In so doing they have not and apparently are unwilling to take into account the different risk factors involved in and appropriate to these various kinds of research effort.

A member of our Society, Mr. Willard Fornell of the University of Minnesota, has prepared a short paper which addresses that issue with some particularity. Since that issue has not to our knowledge been addressed in any detail in previous discussion with, or in written material submitted to, your office with regard to your consideration of an Administration position on government patent policy your careful review of the attached copy of Mr. Fornell's paper is respectfully urged and solicited.

Please note that the paper "Analytical Basis for The University Position on H. R. 8596" sent to you with our letter of March 1, 1978 is referenced by Mr. Fornell.

Very truly yours,

Howard W. Bremer
President, Society of University
Patent Administrators

HWB:rw
Enc.
bc--Mr. Willard Fornell
SUPA Officers & Trustees

Politics & Economics:

Do They Prevent the Meaningful Use of Aerospace Technology?

see page 62

Highlights:

1—Politics and economics prevent almost absolutely the meaningful application of aerospace technology to non-Defense, NASA and AEC programs.

2—The present lack of carefully defined commitment is what begins to produce an indecisive drift in the use of technology. This country runs on the advocacy process.

3—U.S. industry can no longer afford the high cost of R&D to meet national needs. Other countries subsidize.

PUBLIC CRITICISM in recent years of waste and inefficiency have combined with almost static Federal funding appropriations to hamper the meaningful push for technological growth in military, space research and even nuclear power programs. In several significant cases lately – military aircraft developments, earth mapping satellites, manned orbiting laboratories, command/control systems – potential long-term technological advance has been sacrificed to short-term demand from higher Federal authority that year-to-year expenditures be held down.

But, though these political and economic pressures make progress more difficult for research and development in the Defense Department, National Aeronautics & Space Administration (NASA) and the Atomic Energy Commission (AEC), politics and economics prevent almost absolutely the meaningful application of aerospace technology to non-Defense, NASA and AEC programs.

Potentially, the aerospace industry's opportunities to spin-off its military and space research and development (R&D) expertise into other Government programs are almost limitless. "Laboratory-sized demonstrations" have proved this well enough to the unbiased observer. In fact, though the industry R&D and systems management experts have been working on the challenge – in some cases for more than a decade – they have run into a large, complex and frustratingly obstinate array of Government roadblocks. Not the least of these is a general Government lack of understanding about and appreciation for just what kinds of incentives will trigger industry into significant action.

In the vernacular of industry, applying technology to the significant solution of civil government problems, e.g. pollution control, improved health care and education, law enforcement, urban renewal, transportation modernization, preservation of natural resources, even modernization of Government business practices, themselves, is not so much an R&D problem as it is a marketing problem. The root causes of the problem lie in the imperceptive, often antiquated, political and economic practices of the Government, itself.

Since World War II, the United States has spent some $200 billion on research and development, about 80 percent of it efforts. For most of that period to date, the general public and their mirror image, the Congress, approved those expenditures almost without question, except here and there on an individual project that ran into development difficulty. Even then, implied in the criticism was a feeling of public urgency that the program must succeed.

In the last half-dozen years, faced with burgeoning domestic crises and frustrated over the trends of the war in Southeast Asia, that endorsement has turned to criticism and condemnation. Moreover, political opportunists (some of them in very high places in Government) were quick to seize on this change of attitude and exploit it to their own parochial ends.

Among the once-unimaginable indictments leveled at aerospace technology: it was a major reason for pollution; its high cost was being paid for with national neglect of the needs of people; while people starved, technology returned nothing on the investment in it, except some inspiring television entertainment during an *Apollo* trip to the moon. College professors, many of whom should have known better, used self-imposed cancellation of Federal R&D grants as a political weapon to protest Administration policies and practices in Southeast Asia. The numbers of young people seeking a college engineering degree dropped.

The Nation's Foundation

Through this emotion-charged atmosphere ran one simple charge which had some substance to it. The charge: if the U.S. can put a man on the moon, why can't it manage to improve vastly the decaying environment and quality of life of its own citizens? Implied in that tion that the Nation could. More importantly, the challenging question became a kind of focal point which attracted the attention of the practitioners and managers of aerospace technology.

In simpler terms, while headline hunters were garnering attention by criticizing, more thoughtful statesmen were taking a careful look at the substance of the debate. Their conclusion, or possibly more appropriately a long-understood conclusion they just took more trouble to explain to people today, is that technological advance is an essential element in getting control of most of the domestic ailments noted earlier.

Indeed, if melded into an appropriate, perceptive, imaginative politico-economic management system, technology in heavily applied doses is probably the only way out of most of these environmental enigmas. Proof enough is around to support that truism.

For one thing, technological advance is the foundation on which this Nation's economic growth and national security rests. And without the latter, a nation has neither the taxable industrial base to pay for social welfare grants nor conceivably even a nation to have social problems in. For another thing, the press documents daily, in effect, that a growing population with increasing personal ambitions wants more and more Government service while showing increasingly a reluctance to pay any more for it.

One escape valve, possibly the most important one other than determination, is through technology. Already, aerospace-developed technology has proven, in a time of generally rising prices, that it can reduce the cost of communication. It and the systems

are demonstrating they can cut the cost of operating a government's bureaucracy by 10 percent a year or more while providing more immediate, more personalized attention to the public. Similarly, application of military systems to law enforcement and health care are proving they can provide more and better performance in those functions with, if not a reduced cost, at least no cost increase. The list documenting such potential is almost endless.

Finally, short of a drastic reduction in the Nation's standard of living, the country really seems to have little choice but to make meaningful use of its aerospace technology. Population growth alone demands it. With roughly six percent of the world's population, the U.S. uses approximately 40 percent of the world's irreplaceable resources. The Nation must import 27 or the 36 basic substances considered necessary for a modern industry.

In effect, American industry, let alone American security, rests in part on a fragile set of agreements with other nations and in part on a favorable balance of world trade. Technology can ease the vital importance of importing essential resources by finding alternatives (in energy sources, for instance) to current U.S. heavy dependence on others for these necessary materials. And high technology, mostly aerospace, or aerospace-derived, products are the Nation's primary competitive exports – though lately, through Government ineptness, even that is now in serious jeopardy.

Interrelated Answers

With all that going for it, why then isn't aerospace technology being applied to domestic ills, civil government problems, economic and export expansion, and general improvement in the quality of U.S. life with the same zeal, determination and commitment with which it was poured into aircraft developments, into the missile race, the space race?

There is no simple answer to that. If there were one, at least one as simple as the anti-technologists like to suggest there is, it probably never would have become even a legitimate question. But there is a collection of interrelated answers, and most of the basic ones center around governmental politics and economics. They are probably best explained by contrasting what *is* in Defense and NASA with what *is not* in the rest of Government.

Much has been proclaimed in recent years about a "reordering of priorities" away from investments predominantly in military programs and toward expenditures on the Nation's so-called "human resources." So far, that has meant primarily just that the Defense tage of the Federal budget and grants have increased – primarily under old and already proven ineffective programs – to the civil section.

If domestic problems centered around only a lack of funds, why do public complaints about education, health care, transportation, urban decay and crime continue to increase now that the funding has increased? Federal, state and local spending has increased by more than 150 percent in these areas on an annual average compared to 1964. Schools get more money and teachers go on strike. Medicare is set up and retired people stage marches on Washington, D.C. Law enforcement budgets go up and citizens go buy their own guns. And all the while, people complain about constantly increasing taxes.

Can We Afford It

Applied aerospace technology is not the whole answer; but to the extent that it can provide part of the answer, it must have some direction. Nothing like the total national commitment to the space race or the missile race exists in the civil sector.

Against the background of obviously limited resources, is pollution control more important or less important than modernized transportation? And if more important, which part is, air or water, industrial or community, automobile or garbage disposal? Does improved health care rate more attention than urban decay or is education more important than either of them? And where does law enforcement fit on the list? How much will it cost to get a handle on 80 percent of the problem and can we afford it? Can we afford it for all of them or only half of them, and, if the latter, which ones need attention first?

Battelle predicts a $30.1 billion expenditure for R&D in 1972, an eight percent increase over the estimated $27.8 billion spent in 1971 and the largest percentage increase since the mid-1960s. Almost $16 billion of that will be spent by the Federal Government; $12.7 billion by industry; the remainder by colleges, universities and (so-called) not-for-profit institutions. The Federal Government as it always has, will tend to use its $16 billion on forward-looking, high-risk projects; industry on nearer-term development of marketable products.

Though a lack of priorities is not the whole cause, the present lack of carefully defined commitment is what begins to produce an indecisive drift in the use of technology. This country runs on the advocacy process. And, lacking a clear delineation of who stands where in the hierarchy, projects and programs contest eagerly and energetically on Capitol Hill for funding – and end up, other. Probably the best example of that is whatever happened to the promise a few years ago that the National Oceanographic and Atmospheric Agency (NOAA) would, in its way, do even more for the Nation technologically and economically than NASA has already done? The potential is still there but the national priority clearly isn't.

An Ominous Development

The meaningful use of aerospace technology suffers, too, from the fact that it has established no national policy regarding the importance of technological advance. Such a policy is implied in NASA's charter and in that of the National Science Foundation (NSF). But evidence is hard to find that such a policy is understood and accepted in the votes of Congress and the comments of Press and Public.

The high value of technology is understood in Europe, in Japan and even in many underdeveloped parts of the southern hemisphere as well as in Russia and China. Largely following a U.S. pattern of a generation ago, those nations pour a steady and ever-increasing percentage of their national resources and government budgets into underwriting industrial high-technology programs.

Such a policy in the U.S. would aid significantly in eliminating the short-term, up-and-down kind of funding this Nation has been experiencing over the past 20 years. Moreover, specific programs and projects fitted into such a policy would run far less risk of being wiped out just as they were scheduled to begin returning significantly on the investment.

Do other Governments have more perception than the U.S. Government? Foreign governments, for instance, are underwriting – at a cost of some $4 billion – their industries' development of a whole fleet of commercial aircraft, from supersonic transports to air buses. That's two-thirds to 100 percent, depending on the aircraft model, of the total R&D cost. Are they spending scarce monies just to achieve the status symbol of technological prowess? No. They're going after a conservatively estimated $30 billion in aircraft sales.

Where U.S. industry once could afford, by itself, to compete against the combination of foreign government and foreign industry, it can afford the risk no longer. It is an ominous development not just for U.S. aerospace leadership but for the welfare of the whole country. Yet, as witness the cancellation of the U.S. supersonic transport development, Government politicians are project-oriented, not policy oriented.

With all due respect to the Federal Procurement Regulations, a third obstacle to applying aerospace technology

contest with a mixed bag of rules, ordnances and laws. They exist and conflict at all Federal, state and local levels. They are in a constant state of evolution; or, lorded over with politics locally, they resist change as the Rock of Gibraltar resists erosion.

Defense/NASA/AEC have evolved a sophisticated – some say too sophisticated – collection of procurement regulations and "laws" called directives through which, among other things, they set up viable relationships with the industrial creators of aerospace technology. The rules take into account the long lead times, incremental financing

space technology marketeers, to a splintered fragmented market.

Each of these feudal empires has a vote on any aerospace-type system it might be one of the benefactors of. And much like a veto in the United Nations, a "no" vote by any one of the informal and unorganized "committee" amounts to suspension of the project. To aerospace industrialists used to dealing with what they thought were the procurement complexities of Defense, NASA and AEC, this civil government bureaucratic snarl often looks truly horrendous. And is.

In the U.S. today, there are some

racy. Another effective marketing tool has been to get a system sold in one local government area, demonstrate and prove its value and then publicize its merit elsewhere on the competitive pride basis of "You could have this, too, if you only would. . ."

Related to the above and, for that matter, to the negative portrait anti-technologists have drawn around aerospace technology, is another obstacle. Civil government, especially at the State and local levels, suffers from a lack of trained, experienced personnel accustomed to utilizing technology and dealing with the industry that can deliver it.

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The Marketing Logjam

Though Defense and NASA funding has been curtailed, it's still in the megabuck range. In the reordering of priorities, nothing like the R&D funding cut out of those budgets was transplanted as R&D to the other agencies. And local governments can't begin to replace the attractive size to industry of the Federal R&D carrot. Current result of this, most often coupled with the above outlined "human nature" of local governments, is that high-powered aerospace technology firms are often successful in a local community where their own plants are located, and largely unsuccessful selling the same proven system anywhere else.

The biggest frustration here is that what works in a hospital in Oakland will work just as effectively in Bridgeport, Conn.; the police command/control system that is excellent in Illinois ought to be almost as good, anyway, in Alabama; the education system that solves a retarded-children problem in New Orleans will handle just as efficiently the same chore in Seattle. Geography, obviously, is not a restrictive factor.

But industry, by itself, just can't break that marketing logjam without the investment of considerable amounts of risk capital it doesn't have and the utilization of considerable amounts of commercial-type marketing expertise which it doesn't have, either. The answer, almost obviously, is for the Federal Government to aggragate the market.

FAA's Effective System

It has begun to take some steps in this direction, particularly in the Department of Transportation and the Law Enforcement Assistance Agency. The technique amounts to a form of revenue sharing. In simplest terms, at the Federal level, all or most of the R&D costs on a particular system are paid for; the system is developed; implanted in a local community, and other governments from across the land are invited to come take a look.

The local government officials are under no pressure to buy the system, too; but frequently the Federal sponsoring agency will offer a powerful incentive: they will offer to pay upwards of two thirds the cost of the local government will put up the other one third.

Another way to aggregate the market, is employed by the Federal Aviation Administration. It not only buys, manages and sees to the installation of systems to handle the national air traffic control problem; it also sets the standards by which all local airports must operate. Result: industry knows at the start of development that a system built for Dallas-Ft. Worth purchase, it if meets the Federal standards, is just as saleable in Phoenix, Los Angeles, or Cleveland.

Still, to a large extent, the meaningful utilization of aerospace technology to cope with local civil problems is, even under these circumstances, mostly a one-at-a-time, piecemeal evolution of locally tailor-made (and therefor very expensive) products. There is at least one way to speed up the evolution: centralize and aggregate the market even more than it already is now. And that is possible.

Incentive to Industry

Specifically, with all the technological and systems management expertise the Federal Government can reach easier than local governments can touch, Washington should be able, for instance, to announce a major national health care improvement program; hire a contractor, as part of that, to develop a complete "turnkey" diagnostic system; estimate how many hospitals and clinics will buy this "optimum" system; contract for that many; develop and produce them — and then accept the responsibility for selling them to the local government customers.

Same could be done, at least for the study and prototype models, on a series of "optimum" transportation systems for, say, four or five different sizes of cities; and for education systems; or law enforcement systems; or, in all these programs, for key component elements. The incentive to industry, obviously, is that the dollars involved, not only for R&D but the production potential, would put any one of these projects on a scale with Defense/NASA expenditures. The advantage to local government is that what they give up in a precisely tailor-made system they get back in the economies of mass production. And, in the long run, the same economies should accrue indirectly to the Federal Government — on top of which, in this way they would be making a kind of revolving fund investment rather than an outright expenditure grant.

Underscoring all the above is another attitudinal, nee political, problem. Defense and NASA have a different operating heritage than civil government in their relationship to industry. The military and space programs have bought and pushed technology for their own use (except in the case of management systems to streamline their internal operations). Rather, they are buyers for a third party user — local government and the general population.

For all the reasons noted earlier, that complicates the decision-making problem enormously. It means persuasion and not instruction, selling and not ordering. It also means, theoretically, developing a partnership with industry; creating, basically, a kind of civil-industrial complex. That has to be difficult for agencies with a heritage of having regulated industry rather than working with it, particularly in light of what the "military-industry complex" syndrome has done to the image of Defense and even NASA and AEC.

It is an attitudinal roadblock more than anything else. The answer to it is, to a large extent, inherent in finding answers to the six obstacles outlined earlier. And that answer is, in turn, a comparatively simple thing to state. Basically, it adds up to saying: "Get involved in your own local government environment." The attitudinal problem can be overcome best and quickest and most effectively when the practitioners of aerospace technology become the active, energetic, provocative promoters of their own present products and future capability. This problem has existed too long and is also soluable.

What to Do

The ways to do that are not all awesomely mysterious, only largely unpracticed by aerospace technologists in the past. There is no single magic technique but, in fact, several methods equally and collectively effective in institutionalizing public discontent about what is and provoking public demand that local governments acquire what aerospace technology can make possible. Join the PTA, run for local political office, attend city council meetings, take the mayor or the editor of the local paper to lunch: in a word, get involved with local government.

The obvious objective: be a marketeer, promoter, communicator, agitator of the technologically possible, and in the process show the potential customer that you are not the overpaid propagator of incomprehensibly sophisticated witchcraft but simply another concerned, taxpaying citizen who happens to have more knowledge than the average hear about how to solve problems.

The days of the mystique of technology are numbered if not, in fact, over. To the pragmatist, they have lasted too long and are indeed over. The human problems of this Nation have already been solved, in many instances, but the job of publicizing those solutions — where they exist — has already begun. Where in the past it was the time of the technician, now it is the time of the taxpayer.



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PATENT BRANCH, OGC

JUN 28 1973

Cooperative R & D

Reluctant but Necessary Alliance for Industry and Universities.

STORIES of industrial research centers that use PhDs as clerks and universities that get massive grants to study the sex life of some obscure insect must be filed, along with penny candy and a good nickel cigar, as memories of days not likely to return.

When money was plentiful, a few years back, R&D programs multiplied like rabbits. With the 70s came the cost crunch, foreign competition, and the real bite of inflation. Now industry says: We need new technology but we can't afford to develop our own. Universities say: We have the ability to create new technology, but no one to finance it. And the Government says: We want more practical utilization of the R&D money we spend.

The need to get these parties together, with their matching abilities and needs, seems obvious. Some universities and research centers have had long-standing, mutually profitable relationships with industry. But, in many cases, the business man and the scholar have been aloof and occasionally antagonistic.

"We are like two independent nations that suddenly realize that we need each other to survive," as one sales manager puts it. Such attitudes are, in part, the result of industry and university research programs that flourished with their own independent goals. If a university program came up with something that happened to interest industry, fine. This was an interesting fringe benefit, but certainly not the goal of "pure science." Industry, too, erected its own barriers to cooperation. The axiom was, "It is easier to rediscover it in our own labs than search for it somewhere else." Besides, there is also the NIH factor.

As one professor said, "Industry may be too dumb to know they have an R&D problem—or they're afraid to admit it. I've never had a request from industry stating a specific problem or been asked what the university had to offer."

Similar gripes come from the other side: "Even when we set specific parameters for what we want, university researchers wander all over the place. Our experience is that they can't give us what we ask for."

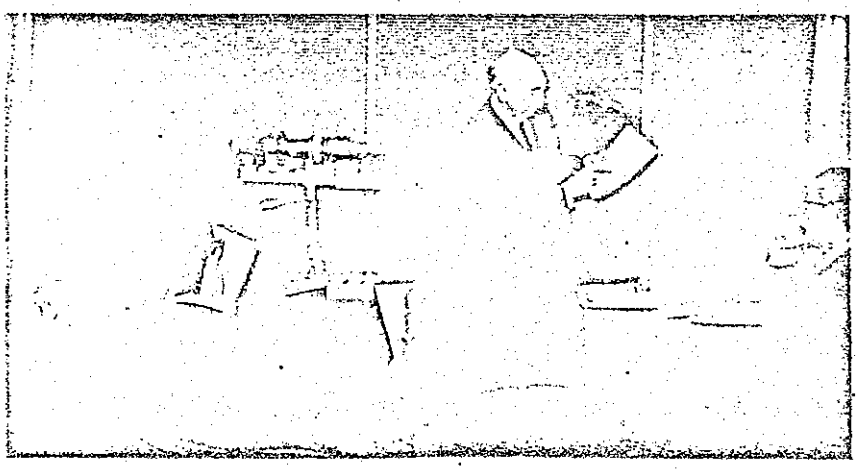
Harsh words and, in some cases, true. But the economic realities of the R&D picture are causing new alliances to form.

In the background is the Government which finances, directly or indirectly, much of the research done in the U. S. It is now Government policy to get more of its R&D back into the economy in the form of useful products. The sometimes-successful Technology Utilization program of NASA is an example.

Although the Government officially backs such a program, many observers feel that any kind of meaningful exchange of technology must occur without Government control. "The Government must act like a government, regardless of its announced policy," says one engineer familiar with the difficulties of dealing with federal programs, "so we can't expect them to guarantee one section of the economy the protection needed to encourage significant investment."

Meeting of Giants

The necessity for resolving specific differences and common problems was clearly pointed



Industry gets a look at what university researchers have to offer in the way of potential new products. This demonstration, by the University of Missouri, was one of many given at a recent forum sponsored by Dr. Dvorkovitz & Associates, of Ormond Beach, Florida.

"Many of the research institutes are qualified to start with ideas and proceed through the development of product prototypes; they seldom get the opportunity, however, to "do the whole job," usually because they can't find an industrial sponsor who will trust them enough to leave them alone . . . and because industrial sponsorship for most new product/process possibilities can almost never be obtained to cover the costs of idea-to-prototype R&D."

Thomas P. Evans
Director of Research
Michigan Technological University

out at a recent event at the Illinois Institute of Technology in Chicago. Dr. Dvorkovitz and Associates, one of the nation's more successful "technology brokers," sponsored a meeting which brought together top men from university research centers and industry. Despite the newness of the idea, and some cautious attitudes, the success of the exchanges is illustrated by a few statistics from the meeting.

Attending were 282 representatives from U. S. and foreign business and governments, mostly decision-making executives. The 225 companies involved represented more than $100 billion in annual sales. On the university side were 93 representatives from 35 institutions.

After introductory speeches, the event became a kind of flea market of technology. Each university or technical institute represented held a brief session in which it presented information on a few of its existing projects. The information was usually salted with just enough data to hook an interested listener: e.g., *"Batter, zinc chlorate, operates at 300 C on pressurized gas. A laboratory version has delivered 1.4 v. The inventor sees the battery as a potential vehicle power source."* A few developments were described in detail, complete with diagrams and slides.

Presentations were followed by a question and answer session about the item and usually included comments on the university's patenting or licensing policy.

Results were mixed:

"That's very interesting, but your man is about 10 years behind the state of the art."

Or, "That's a simple idea that's been around for years," which was met with the cutting rebuttal, "It may be simple, but we hold a patent on it." When an idea hit home, there was a scurry of note taking and card exchanging.

Concurrent with the sessions was a "technology boutique" in which each university had a booth where industry representatives could privately discuss ideas and ask questions. Said one university research head proudly displaying a fist full of cards, "I got more serious contacts in one afternoon than I could in a year of personal visits."

Dr. Dvorkovitz and Associates plans to hold a similar conference next February.

What are the Problems?

A filtering of the comments from the meeting gives a few ideas on the problems of cooperative R&D. The first task is for the "right" people to get together. In large corporations, the person with the power to make the necessary decisions is often hidden in the vast network of executives with confusing titles. On the university side, the opposite is often true. A research center may have a weak or nonexistent personnel structure for fielding and acting on proposals from industry.

Those universities that have begun only recently to seek

"The difficulty of collaboration is compounded when those who now perform essential parts of a function refuse to modify their operations to meet the needs of the whole system. (I am not excluding the Federal Government as one of the principals who must modify its operations.) These vested interests constitute by far the most serious institutional barriers to socially important innovations. Ordinarily, the principals can't be ordered to collaborate. Nor will they do so unless they see something in it for themselves."

Norman J. Latker
Chief of Patent Branch
Department of Health, Education, and Welfare

markets for their technology are faced with a number of new decisions. Said one researcher: "We are only now discovering the entire marketing game. We need patent procedures. We need to establish information protection procedures, and we need to consider liability. Normally we can't find trained people in our own staffs to handle these problems and have to buy outside help."

In such exchanges, industry would naturally like a new product to come as a neatly wrapped package. "We want a low-risk item that can be commercially developed within six months," is the rule-of-thumb one company applies. That doesn't happen too often, but such happy situations can be more frequent if cooperation begins early in an program. Universities must have research programs with goals that are attractive to industry yet satisfy their own scientific standards.

—Robert B. Arons

How important patents? defensive or offensive use.
If used offensively very important.

1. Ideas are product of NIH
2. These ideas are not finished products
3. We either develop them or industry does. NORM
4. These ideas will not sell themselves — must be sold — they are fragile and if not coddled will die — The thought that publishing is going get invention made is incorrect.
5. PMA report — everything touched by ours Govt's belongs to Govt. — Drug inventions
6. $250,000 to get NDA — industry needs protection.
7. Res. Triangle case. — controls in contract.
8. Dennis Case — Grantee development depends on University — maybe we should be providing services that Research Corp. does? — NASA does — our inventions much more important.
9. Dr. Kolsbow Case - Employee
10. Dr. Speedsman case - Employee needs NDA — can we give rights?
11. 8.2(b) + 8.2(d) — dead? (
12. How do we force issue?
13. AVCO + AMF

of funding 12 years ago as "underinvestment in the future" and a "loss of the U.S. empire in science and technology." For more than a decade, says Price, "academic research in science and technology has been running effectively at half speed compared with the world growth rate of a 6% per annum increase in scientific and technological activity. Many of the other most developed nations of the world have followed our lead a few years later, but still, relative to the rest of the world, the United States is falling back at about 3% per annum. It is this loss in our 'scientific and technical empire' [I make an analogy with the loss of British empire which I experienced in my youth] which makes itself felt in the adverse balance of our dominant high technology international trade and thereby devalues the dollar in the world exchanges.

"In 1967, at peak, the United States was about 33% of all world science and technology across the board. The decline, due to saturation at the previously mentioned 3% per annum, has been producing a 1% fall in our share of the world's science and technology every year and we are now, so far as I can make a guesstimate, only about 25% world science. Since the United States has only about 7% of the world population, one can express these figures by saying that at peak in 1967 we had about five times the average share of world affluence or per capita GNP. It is now, in 1978, about 3½ times the average and unless heroic measures are taken we will have been reduced to only about double the world average before the year 2000 A.D."

Before taking such "heroic measures," Price thinks that a useful first step would be to "disaggregate" the basic science budget which is now combined with other items, including technology purchases and civil service science, to form a "dangerously misleading aggregation." Then he would treat the basic science budget to "moderate increases instead of decline." He sees the 11 percent boost requested for basic research in the Carter budget as helpful but not sufficient. What academic science needs, he says, is funding over perhaps a 10-year period to make up for the cuts it has suffered. To do this would require an increase of 16 percent a year in the academic science budget and, if funds were provided to compensate for a 6 percent inflation rate, Price calculates a 22 percent increase would be in order.

These would be heroic measures indeed, but Price insists that the choice is between such action or rapid decline.

Price's bid for support of basic science was not subjected to questioning by either legislators or his fellow panelists because he departed immediately after giving his testimony. Price, a versatile academic whose interests and expertise range from the development of scientific instruments to the wilder shores of science policy, was scheduled to chair a session on "Science and the Ism's of the 20th Century," set for the same hour.

Challenges to Price's views seem predictable from those who feel that improvement of U.S. performance in industrial innovation is the main problem for science policy today and that heroic increases in the basic research budget are not the way to solve it. Senate staff members say that Senator Adlai Stevenson III found Price's paper provocative, and Price's analyses have a way of getting noticed in academia, so there could be a delayed reaction.

—JOHN WALSH

Patent Policy Changes Stir Concern

Acting on recommendations that date as far back as 1971, the General Services Administration (GSA) has amended federal procurement regulations to permit universities to get a larger share of the commercial benefits of federally financed research.

The new regulations were based primarily on suggestions by a subcommittee of the Federal Council for Science and Technology that greater incentives are needed for universities to pursue commercialization of their research. The GSA regulations would provide this incentive by encouraging federal agencies to allow universities to retain possession and control of their federally financed discoveries; universities, in turn, would be encouraged to license these discoveries to private industry.

Specifically, the regulations provide for a standard agreement between federal agencies and universities, known as an Institutional Patent Agreement (IPA). "The agreements permit . . . institutions, subject to certain conditions, to retain the entire right, title, and interest in inventions made in the course of their contracts" with the federal government.

Such agreements are in common use by federal agencies now, but each may have a slightly different form. The GSA regulations require that all new IPA's, meaning any written or rewritten after the effective date of 20 March, must follow a single standard.

Moreover, the standard specified in the regulations is different from the IPA's being used now in several respects, according to several federal patent officials.

1) The new IPA can be used to cover research funded through contracts as well as grants.

2) The new IPA increases the period of exclusive control that a university can give to a licensee from 3 years after the initial marketing of a product to 5 years after the initial marketing.

3) The time that a licensee spends trying to get a federal regulatory agency to approve the product will be exempted from the time limits on exclusive marketing.

4) It permits universities to affiliate with for-profit patent management companies, which are organized to promote the licensing of university discoveries to private industry.

5) It removes the ceiling on the amount of royalties from a discovery that can be returned to the researcher who invented it, essentially allowing each university to set its own policy on the amounts.

Although this patent policy is intended to facilitate the transfer of research results from laboratory to marketplace, there is some concern on Capitol Hill that it goes too far in the direction of allowing profit-making firms to benefit from federally funded research. Also of concern is a provision that could pressure researchers to withhold publication pending patent filings. Senator Gaylord Nelson (D–Wis.), chairman of the Small Business Committee, hopes to hold hearings before the policy goes into effect next week. If that cannot be done, he intends to ask the Office of Management and Budget to delay implementation until hearings can be scheduled.—R. JEFFREY SMITH

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BIOMEDICAL R&D: SCIENTISTS NEED MORE SAY

Federally sponsored biomedical research needs more stable funding and needs to be left more completely in the hands of scientists, concludes a prestigious Presidential review panel after a 15-month study.

The seven-member President's Biomedical Research Panel was set up early last year to evaluate the impact of federally funded research on biomedical and behavioral sciences. Its report is, in a sense, a review of the system from within, for although none of the members are full-time federal employees, five are physicians affiliated with university medical schools. The chairman, Dr. Franklin D. Murphy, is a corporate executive who was formerly dean of a medical school, and the remaining member is chairman of the three-member President's Cancer Panel, which oversees many of the activities of the National Cancer Institute.

With the right support, the panel sees medical researchers as capable of learning to control or prevent all human diseases. Meeting this goal will require steady, hard work for several decades, the panel says. It cannot be done by any sort of crash program. "What is needed now is some sort of settling down for the long haul," the panel believes. "Most of all, the scientific enterprise needs stability and predictability. It does not require growth and expansion at the rate achieved in the 1950's and 1960's, but it cannot survive being turned on and off."

The panel looked mainly at the planning, policy making, and advisory mechanisms within the National Institutes of Health and the Alcohol, Drug Abuse & Mental Health Administration, the two major institutions responsible for federal support of biomedical and behavioral research. In almost every case, the panel calls for more scientific control.

For instance, on the matter of developing research budgets, the panel believes that Congress and the Office of Management & Budget have been making too many science decisions without "strong scientific guidance." This guidance could come from the new Presidential science adviser, whose staff should include in a senior position an eminent biomedical and behavioral scientist. A strong NIH director would be another source of advice. And the panel recommends expanding the President's Cancer Panel to oversee all NIH institutes.

NIH's peer review system for determining which research proposals receive funding wins high praise from the panel. Calling it one of the most valuable management tools used by NIH, the panel says the system "advances the scientific enterprise with predictable efficiency and therefore gives the taxpayer more for his dollar." As to the charge sometimes heard that the system fosters elitism, the panel finds this charge has some merit but this trait is actually beneficial since "selection on the basis of excellence is elitist."

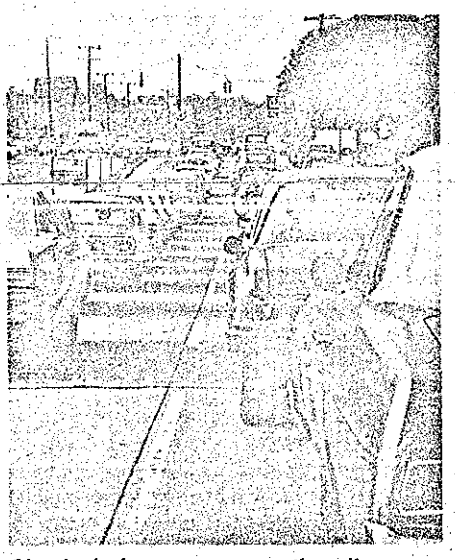
In fact, the panel is more concerned that Congressionally mandated public exposure of peer review proceedings and of preliminary scientific data from federally supported projects will be detrimental to advancing scientific excellence. It calls for amending the Public Health Service Act to allow both peer review hearings and preliminary data from research projects to remain confidential. □

Auto sulfate hazard less than predicted

Roadside accumulation of sulfate emissions from cars equipped with catalytic exhaust converters is apparently less than previously believed. This finding by General Motors researchers casts doubt on earlier Environmental Protection Agency predictions that there might be a potential hazard from sulfate emissions.

The GM findings come from a study conducted jointly by EPA and GM last October at the company's Milford, Mich., test track. Data were presented two weeks ago to a House Science & Technology Subcommittee. In the study GM scientists compared sulfate emissions measured at the test track with predictions based on EPA's "worst case" mathematical model. Designed to simulate traffic density on a so-called "1985 freeway" (by 1985 most cars are expected to have catalytic converters), the test used a total of 352 catalyst-equipped cars, including vehicles from Ford, Chrysler, and American Motors. Test cars ran on unleaded fuel containing 0.03% sulfur, the U.S. average for unleaded motor fuel.

Catalytic converters, however, have been criticized for producing potentially unacceptable levels of sulfates by oxidizing sulfur normally found in gasoline, just as the converters oxidize unburned hydrocarbons and carbon monoxide to water and carbon dioxide. Under unusual meteorological conditions such as temperature inversions and light winds, a fleet of largely catalyst-equipped cars might produce high sulfate concentrations along heavily traveled roads. EPA initially believed the sulfate question serious enough to be a health hazard for individuals with respiratory disease, but it later backed away from that position.



Air turbulence apparently disperses sulfate emissions from autos

Based on the GM tests, says Charles S. Tuesday, technical director of General Motors Research Laboratories, "it has been found that in driving of typical high-density freeways, the sulfate emission rate is considerably lower than EPA's early estimates. Furthermore, there is evidence that the amount of sulfate emitted decreases substantially as the vehicle accumulates mileage." What this means, Tuesday says, is that actual amounts of sulfate emissions from individual vehicles on crowded

was no sound of effort to pronounce a truth of such nature; no tone of truth or falsehood; only indifference.

The prosecutor handed him a sheet of paper. "Is this the agreement you signed?"

Keating held the paper in his hand. "Yes."

"Is that Howard Roark's signature?"

"Yes."

"Will you please read the terms of this agreement to the jury?"

Keating read it aloud. His voice came evenly, well drilled. Nobody in the courtroom realized that this testimony had been intended as a sensation. It was not a famous architect publicly confessing incompetence; it was a man reciting a memorized lesson. People felt that were he interrupted, he would not be able to pick up the next sentence, but would have to start all over again from the beginning.

He answered a great many questions. The prosecutor introduced in evidence Roark's original drawings of Cortlandt, which Keating had kept; the copies which Keating had made of them; and photographs of Cortlandt as it had been built.

"Why did you object so strenuously to the excellent structural changes suggested by Mr. Prescott and Mr. Webb?"

"I was afraid of Howard Roark."

"What did your knowledge of his character lead you to expect?"

"Anything."

"What do you mean?"

"I don't know. I was afraid. I used to be afraid."

The questions went on. The story was unusual, but the audience felt bored. It did not sound like the recital of a participant. The other witnesses had seemed to have a more personal connection with the case.

When Keating left the stand, the audience had the odd impression that no change had occurred in the act of a man's exit; as if no person had walked out.

"The prosecution rests," said the District Attorney.

The judge looked at Roark.

"Proceed," he said. His voice was gentle.

Roark got up. "Your Honor, I shall call no witnesses. This will be my testimony and my summation."

"Take the oath."

Roark took the oath. He stood by the steps of the witness stand. The audience looked at him. They felt he had no chance. They could drop the nameless resentment, the sense of insecurity which he aroused in most people. And so, for the first time, they could see him as he was: a man totally innocent of fear.

The fear of which they thought was not the normal kind, not a response to a tangible danger, but the chronic, uncontrolled fear in which they all lived. They remembered the misery of

the moments when, in loneliness, a man thinks of the bright words he could have said, but had not found, and hates those who robbed him of his courage. The misery of knowing how strong and able one is in one's own mind, the radiant picture never to be made real. Dreams? Self-delusion? Or a murdered reality, unborn, killed by that corroding emotion without name —fear—need—dependence—hatred?

Roark stood before them as each man stands in the innocence of his own mind. But Roark stood like that before a hostile crowd—and they knew suddenly that no hatred was possible to him. For the flash of an instant, they grasped the manner of his consciousness. Each asked himself: do I need anyone's approval?—does it matter?—am I tied? And for that instant, each man was free—free enough to feel benevolence for every other man in the room.

It was only a moment; the moment of silence when Roark was about to speak.

"Thousands of years ago, the first man discovered how to make fire. He was probably burned at the stake he had taught his brothers to light. He was considered an evildoer who had dealt with a demon mankind dreaded. But thereafter men had fire to keep them warm, to cook their food, to light their caves. He had left them a gift they had not conceived and he had lifted darkness off the earth. Centuries later, the first man invented the wheel. He was probably torn on the rack he had taught his brothers to build. He was considered a transgressor who ventured into forbidden territory. But thereafter, men could travel past any horizon. He had left them a gift they had not conceived and he had opened the roads of the world.

"That man, the unsubmissive and first, stands in the opening chapter of every legend mankind has recorded about its beginning. Prometheus was chained to a rock and torn by vultures—because he had stolen the fire of the gods. Adam was condemned to suffer—because he had eaten the fruit of the tree of knowledge. Whatever the legend, somewhere in the shadows of its memory mankind knew that its glory began with one and that that one paid for his courage.

"Throughout the centuries there were men who took first steps down new roads armed with nothing but their own vision. Their goals differed, but they all had this in common: that the step was first, the road new, the vision unborrowed, and the response they received—hatred. The great creators—the thinkers, the artists, the scientists, the inventors—stood alone against the men of their time. Every great new thought was opposed. Every great new invention was denounced. The first motor was considered foolish. The airplane was considered impossible. The power loom was considered vicious. Anesthesia was considered sinful. But the men of unborrowed vision went ahead. They fought, they suffered and they paid. But they won.

"No creator was prompted by a desire to serve his brothers, stated or borrowed. It belongs to single, individual men. That for his brothers rejected the gift he offered and that gift which it creates is the property of the creator. Men learn from destroyed the slothful routine of their lives. His truth was his one another. But all learning is only the exchange of material. only motive. His own truth, and his own work to achieve it in No man can give another the capacity to think. Yet that his own way. A symphony, a book, a picture, a philosophy, an capacity is our only means of survival.

airplane or a building—that was his goal and his life. Not "Nothing is given to man on earth. Everything he needs has those who heard, read, operated, believed, flew or inhabited the to be produced. And here man faces his basic alternative: he thing he had created. The creation, not its users. The creation, can survive in only one of two ways—by the independent work not the benefits others derived from it. The creation which of his own mind or as a parasite fed by the minds of others. gave form to his truth. He held his truth above all things and The creator originates. The parasite borrows. The creator faces against all men. nature alone. The parasite faces nature through an inter-

"His vision, his strength, his courage came from his own mediary.
spirit. A man's spirit, however, is his self. That entity which is "The creator's concern is the conquest of nature. The para-
his consciousness. To think, to feel, to judge, to act are func- site's concern is the conquest of men.
tions of the ego. "The creator lives for his work. He needs no other men. His

"The creators were not selfless. It is the whole secret of their primary goal is within himself. The parasite lives second-hand.
power—that it was self-sufficient, self-motived, self-generated. He needs others. Others become his prime motive.
A first cause, a fount of energy, a life force, a Prime Mover. "The basic need of the creator is independence. The reason-
The creator served nothing and no one. He lived for himself. ing mind cannot work under any form of compulsion. It can-

"And only by living for himself was he able to achieve the not be curbed, sacrificed or subordinated to any consideration
things which are the glory of mankind. Such is the nature of whatsoever. It demands total independence in function and in
achievement. motive. To a creator, all relations with men are secondary.

"Man cannot survive except through his mind. He comes on "The basic need of the second-hander is to secure his ties
earth unarmed. His brain is his only weapon. Animals obtain with men in order to be fed. He places relations first. He de-
food by force. Man has no claws, no fangs, no horns, no great clares that man exists in order to serve others. He preaches
strength of muscle. He must plant his food or hunt it. To plant, altruism.
he needs a process of thought. To hunt, he needs weapons, and "Altruism is the doctrine which demands that man live for
to make weapons—a process of thought. From this simplest others and place others above self.
necessity to the highest religious abstraction, from the wheel to "No man can live for another. He cannot share his spirit just
the skyscraper, everything we are and everything we have as he cannot share his body. But the second-hander has used
comes from a single attribute of man—the function of his altruism as a weapon of exploitation and reversed the base of
reasoning mind. mankind's moral principles. Men have been taught every pre-

"But the mind is an attribute of the individual. There is no cept that destroys the creator. Men have been taught depen-
such thing as a collective brain. There is no such thing as a dence as a virtue.
collective thought. An agreement reached by a group of men "The man who attempts to live for others is a dependent.
is only a compromise or an average drawn upon many indi- He is a parasite in motive and makes parasites of those he
vidual thoughts. It is a secondary consequence. The primary serves. The relationship produces nothing but mutual corrup-
act—the process of reason—must be performed by each man tion. It is impossible in concept. The nearest approach to it in
alone. We can divide a meal among many men. We cannot reality—the man who lives to serve others—is the slave. If
digest it in a collective stomach. No man can use his lungs to physical slavery is repulsive, how much more repulsive is the
breathe for another man. No man can use his brain to think concept of servility of the spirit? The conquered slave has a
for another. All the functions of body and spirit are private. vestige of honor. He has the merit of having resisted and of
They cannot be shared or transferred. considering his condition evil. But the man who enslaves him-

"We inherit the products of the thought of other men. We self voluntarily in the name of love is the basest of creatures.
inherit the wheel. We make a cart. The cart becomes an auto- He degrades the dignity of man and he degrades the con-
mobile. The automobile becomes an airplane. But all through ception of love. But this is the essence of altruism.
the process what we receive from others is only the end product "Men have been taught that the highest virtue is not to
of their thinking. The moving force is the creative faculty achieve, but to give. Yet one cannot give that which has not
which takes this product as material, uses it and originates the been created. Creation comes before distribution—or there will
next step. This creative faculty cannot be given or received, be nothing to distribute. The need of the creator comes before

the need of any possible beneficiary. Yet we are taught to admire the second-hander who dispenses gifts he has not produced above the man who made the gifts possible. We praise an act of charity. We shrug at an act of achievement.

"Men have been taught that their first concern is to relieve the suffering of others. But suffering is a disease. Should one come upon it, one tries to give relief and assistance. To make that the highest test of virtue is to make suffering the most important part of life. Then man must wish to see others suffer—in order that he may be virtuous. Such is the nature of altruism. The creator is not concerned with disease, but with life. Yet the work of the creators has eliminated one form of disease after another, in man's body and spirit, and brought more relief from suffering than any altruist could ever conceive.

"Men have been taught that it is a virtue to agree with others. But the creator is the man who disagrees. Men have been taught that it is a virtue to swim with the current. But the creator is the man who goes against the current. Men have been taught that it is a virtue to stand together. But the creator is the man who stands alone.

"Men have been taught that the ego is the synonym of evil, and selflessness the ideal of virtue. But the creator is the egotist in the absolute sense, and the selfless man is the one who does not think, feel, judge or act. These are functions of the self.

"Here the basic reversal is most deadly. The issue has been perverted and man has been left no alternative—and no freedom. As poles of good and evil, he was offered two conceptions: egotism and altruism. Egotism was held to mean the sacrifice of others to self. Altruism—the sacrifice of self to others. This tied man irrevocably to other men and left him nothing but a choice of pain: his own pain borne for the sake of others or pain inflicted upon others for the sake of self. When it was added that man must find joy in self-immolation, the trap was closed. Man was forced to accept masochism as his ideal—under the threat that sadism was his only alternative. This was the greatest fraud ever perpetrated on mankind.

"This was the device by which dependence and suffering were perpetuated as fundamentals of life.

"The choice is not self-sacrifice or domination. The choice is independence or dependence. The code of the creator or the code of the second-hander. This is the basic issue. It rests upon the alternative of life or death. The code of the creator is built on the needs of the reasoning mind which allows man to survive. The code of the second-hander is built on the needs of a mind incapable of survival. All that which proceeds from man's independent ego is good. All that which proceeds from man's dependence upon men is evil.

"The egotist in the absolute sense is not the man who sacrifices others. He is the man who stands above the need of using others in any manner. He does not function through them. He

is not concerned with them in any primary matter. Not in his aim, not in his motive, not in his thinking, not in his desires, not in the source of his energy. He does not exist for any other man—and he asks no other man to exist for him. This is the only form of brotherhood and mutual respect possible between men.

"Degrees of ability vary, but the basic principle remains the same: the degree of a man's independence, initiative and personal love for his work determines his talent as a worker and his worth as a man. Independence is the only gauge of human virtue and value. What a man is and makes of himself; not what he has or hasn't done for others. There is no substitute for personal dignity. There is no standard of personal dignity except independence.

"In all proper relationships there is no sacrifice of anyone to anyone. An architect needs clients, but he does not subordinate his work to their wishes. They need him, but they do not order a house just to give him a commission. Men exchange their work by free, mutual consent to mutual advantage when their personal interests agree and they both desire the exchange. If they do not desire it, they are not forced to deal with each other. They seek further. This is the only possible form of relationship between equals. Anything else is a relation of slave to master, or victim to executioner.

"No work is ever done collectively, by a majority decision. Every creative job is achieved under the guidance of a single individual thought. An architect requires a great many men to erect his building. But he does not ask them to vote on his design. They work together by free agreement and each is free in his proper function. An architect uses steel, glass, concrete, produced by others. But the materials remain just so much steel, glass and concrete until he touches them. What he does with them is his individual product and his individual property. This is the only pattern for proper co-operation among men.

"The first right on earth is the right of the ego. Man's first duty is to himself. His moral law is never to place his prime goal within the persons of others. His moral obligation is to do what he wishes, provided his wish does not depend *primarily* upon other men. This includes the whole sphere of his creative faculty, his thinking, his work. But it does not include the sphere of the gangster, the altruist and the dictator.

"A man thinks and works alone. A man cannot rob, exploit or rule—alone. Robbery, exploitation and ruling presuppose victims. They imply dependence. They are the province of the second-hander.

"Rulers of men are not egotists. They create nothing. They exist entirely through the persons of others. Their goal is in their subjects, in the activity of enslaving. They are as dependent as the beggar, the social worker and the bandit. The form of dependence does not matter.

"But men were taught to regard second-handers—tyrants, emperors, dictators—as exponents of egotism. By this fraud they were made to destroy the ego, themselves and others. The purpose of the fraud was to destroy the creators. Or to harness them. Which is a synonym.

"From the beginning of history, the two antagonists have stood face to face: the creator and the second-hander. When the first creator invented the wheel, the first second-hander responded. He invented altruism.

"The creator—denied, opposed, persecuted, exploited—went on, moved forward and carried all humanity along on his energy. The second-hander contributed nothing to the process except the impediments. The contest has another name: the individual against the collective.

"The 'common good' of a collective—a race, a class, a state—was the claim and justification of every tyranny ever established over men. Every major horror of history was committed in the name of an altruistic motive. Has any act of selfishness ever equaled the carnage perpetrated by disciples of altruism? Does the fault lie in men's hypocrisy or in the nature of the principle? The most dreadful butchers were the most sincere. They believed in the perfect society reached through the guillotine and the firing squad. Nobody questioned their right to murder since they were murdering for an altruistic purpose. It was accepted that man must be sacrificed for other men. Actors change, but the course of the tragedy remains the same. A humanitarian who starts with declarations of love for mankind ends with a sea of blood. It goes on and will go on so long as men believe that an action is good if it is unselfish. That permits the altruist to act and forces his victims to bear it. The leaders of collectivist movements ask nothing for themselves. But observe the results.

"The only good which men can do to one another and the only statement of their proper relationship is—Hands off!

"Now observe the results of a society built on the principle of individualism. This, our country. The noblest country in the history of men. The country of greatest achievement, greatest prosperity, greatest freedom. This country was not based on selfless service, sacrifice, renunciation or any precept of altruism. It was based on a man's right to the pursuit of happiness. His own happiness. Not anyone else's. A private, personal, selfish motive. Look at the results. Look into your own conscience.

"It is an ancient conflict. Men have come close to the truth, but it was destroyed each time and one civilization fell after another. Civilization is the progress toward a society of privacy. The savage's whole existence is public, ruled by the laws of his tribe. Civilization is the process of setting man free from men.

"Now, in our age, collectivism, the rule of the second-hander

and second-rater, the ancient monster, has broken loose and is running amuck. It has brought men to a level of intellectual indecency never equaled on earth. It has reached a scale of horror without precedent. It has poisoned every mind. It has swallowed most of Europe. It is engulfing our country.

"I am an architect. I know what is to come by the principle on which it is built. We are approaching a world in which I cannot permit myself to live.

"Now you know why I dynamited Cortlandt.

"I designed Cortlandt. I gave it to you. I destroyed it.

"I destroyed it because I did not choose to let it exist. It was a double monster. In form and in implication. I had to blast both. The form was mutilated by two second-handers who assumed the right to improve upon that which they had not made and could not equal. They were permitted to do it by the general implication that the altruistic purpose of the building superseded all rights and that I had no claim to stand against it.

"I agreed to design Cortlandt for the purpose of seeing it erected as I designed it and for no other reason. That was the price I set for my work. I was not paid.

"I do not blame Peter Keating. He was helpless. He had a contract with his employers. It was ignored. He had a promise that the structure he offered would be built as designed. The promise was broken. The love of a man for the integrity of his work and his right to preserve it are now considered a vague intangible and an unessential. You have heard the prosecutor say that. Why was the building disfigured? For no reason. Such acts never have any reason, unless it's the vanity of some second-handers who feel they have a right to anyone's property, spiritual or material. Who permitted them to do it? No particular man among the dozens in authority. No one cared to permit it or to stop it. No one was responsible. No one can be held to account. Such is the nature of all collective action.

"I did not receive the payment I asked. But the owners of Cortlandt got what they needed from me. They wanted a scheme devised to build a structure as cheaply as possible. They found no one else who could do it to their satisfaction. I could and did. They took the benefit of my work and made me contribute it as a gift. But I am not an altruist. I do not contribute gifts of this nature.

"It is said that I have destroyed the home of the destitute. It is forgotten that but for me the destitute could not have had this particular home. Those who were concerned with the poor had to come to me, who have never been concerned, in order to help the poor. It is believed that the poverty of the future tenants gave them a right to my work. That their need constituted a claim on my life. That it was my duty to contribute anything demanded of me. This is the second-hander's credo now swallowing the world.

"I came here to say that I do not recognize anyone's right

to one minute of my life. Nor to any part of my energy. Nor to any achievement of mine. No matter who makes the claim, how large their number or how great their need.

"I wished to come here and say that I am a man who does not exist for others.

"It had to be said. The world is perishing from an orgy of self-sacrificing.

"I wished to come here and say that the integrity of a man's creative work is of greater importance than any charitable endeavor. Those of you who do not understand this are the men who're destroying the world.

"I wished to come here and state my terms. I do not care to exist on any others.

"I recognize no obligations toward men except one: to respect their freedom and to take no part in a slave society. To my country, I wish to give the ten years which I will spend in jail if my country exists no longer. I will spend them in memory and in gratitude for what my country has been. It will be my act of loyalty, my refusal to live or work in what has taken its place.

"My act of loyalty to every creator who ever lived and was made to suffer by the force responsible for the Cortlandt I dynamited. To every tortured hour of loneliness, denial, frustration, abuse he was made to spend—and to the battles he won. To every creator whose name is known—and to every creator who lived, struggled and perished unrecognized before he could achieve. To every creator who was destroyed in body or in spirit. To Henry Cameron. To Steven Mallory. To a man who doesn't want to be named, but who is sitting in this courtroom and knows that I am speaking of him."

Roark stood, his legs apart, his arms straight at his sides, his head lifted—as he stood in an unfinished building. Later, when he was seated again at the defense table, many men in the room felt as if they still saw him standing; one moment's picture that would not be replaced.

The picture remained in their minds through the long legal discussions that followed. They heard the judge state to the prosecutor that the defendant had, in effect, changed his plea: he had admitted his act, but had not pleaded guilty of the crime; an issue of temporary legal insanity was raised; it was up to the jury to decide whether the defendant knew the nature and quality of his act, or, if he did, whether he knew that the act was wrong. The prosecutor raised no objection: there was an odd silence in the room; he felt certain that he had won his case already. He made his closing address. No one remembered what he said. The judge gave his instructions to the jury. The jury rose and left the courtroom.

People moved, preparing to depart, without haste, in expectation of many hours of waiting. Wynand, at the back of the room, and Dominique, in the front, sat without moving.

A bailiff stepped to Roark's side to escort him out. Roark stood by the defense table. His eyes went to Dominique, then to Wynand. He turned and followed the bailiff.

He had reached the door when there was a sharp crack of sound, and a space of blank silence before people realized that it was a knock at the closed door of the jury room. The jury had reached a verdict.

Those who had been on their feet remained standing, frozen, until the judge returned to the bench. The jury filed into the courtroom.

"The prisoner will rise and face the jury," said the clerk of the court.

Howard Roark stepped forward and stood facing the jury. At the back of the room, Gail Wynand got up and stood also.

"Mr. Foreman, have you reached a verdict?"

"We have."

"What is your verdict?"

"Not guilty."

The first movement of Roark's head was not to look at the city in the window, at the judge or at Dominique. He looked at Wynand.

Wynand turned sharply and walked out. He was the first man to leave the courtroom.

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ROGER ENRIGHT bought the site, the plans and the ruins of Cortlandt from the government. He ordered every twisted remnant of foundations dug out to leave a clean hole in the earth. He hired Howard Roark to rebuild the project. Placing a single contractor in charge, observing the strict economy of the plans, Enright budgeted the undertaking to set low rentals with a comfortable margin of profit for himself. No questions were to be asked about the income, occupation, children or diet of the future tenants; the project was open to anyone who wished to move in and pay the rent, whether he could afford a more expensive apartment elsewhere or not.

Late in August Gail Wynand was granted his divorce. The suit was not contested and Dominique was not present at the brief hearing. Wynand stood like a man facing a court-martial and heard the cold obscenity of legal language describing the breakfast in a house of Monadnock Valley—Mrs. Gail Wynand—Howard Roark; branding his wife as officially dishonored, granting him lawful sympathy, the status of injured innocence, and a paper that was his passport to freedom for

OTHERS ARE SAYING...

Please check why these cures are being withheld

Ignoring Cancer

If the federal department of Health, Education and Welfare (HEW) really wants a breakthrough in cancer research, it's discovered a unique way of showing it.

The department, over the last two years of Joseph Califano's regime, has become a bottleneck for new discoveries which could hold the promise of early detection — and control — of cancer.

But HEW is hung up on who should retain patent rights over such discoveries — the government or the scientists who develop the pioneering techniques.

Unable to make up its mind, HEW thus prevents the clinical testing of such discoveries by companies that would ultimately manufacture and distribute the compounds.

In this limbo, scientists lose interest as their discoveries languish. And manufacturers turn to other pursuits, leaving the various products unconfirmed as to their value and in short supply if they do have merit.

Two examples have recently come to light.

Two government-funded scientists at opposite ends of the world discovered revolutionary techniques for treating cancer.

In Israel, Dr. Michael Sela found an early detection blood test for breast and digestive-tract cancer.

At the University of Arizona, Dr. Sydney Salmon discovered a simple lab test for cancer that can be conducted in test tubes rather than on patients, thus eliminating painful drugs.

HEW lawyers, apparently arguing that hospital costs will go up if the patents are privately held, won't clear the way for testing while the debate rages.

Now, it can be argued that the scientists are being selfish in pursuit of the profit motive.

It also can be argued that politics is taking precedence over science.

The one irrefutable fact is that something has become lost in the test of wills — the commitment to human life and the preservation of it through cancer-fighting chemicals.

Surely, the government's investment in these discoveries becomes lost as time drags on and more patients die and other techniques come to the fore.

So why the impasse?

Sen. Robert Dole, R-Kansas, made this very serious charge the other day: "HEW has decided to pull the plug on development of biomedical research. They have decided to withhold potential cures and revolutionary new diagnostic techniques for treating such diseases as cancer, arthritis, hepatitis and emphysema."

Is it really too difficult to put priorities where they belong — on human life?

Is it beyond human vision to devise a way whereby government could recover its investment while at the same time rewarding the scientist or the pharmaceutical company for their daring and discovery?

Certainly, to shut and lock the door on such cancer breakthroughs serve neither the cause of science or compassion or profit.

Sensing this, no doubt, and prodded by Senator Dole, Califano the other day ordered a number of potential cures freed for further testing and distribution.

That is the least that an afflicted public should expect.

Cancer poses enough frustrations and heartaches without the HEW adding one, even fractional, delay in delivering treatment to the sick.

—Morning Star, Rockford

the small society

TEXT

PATENT, TRADEMARK & COPYRIGHT JOURNAL

PRESIDENT'S MESSAGE TO CONGRESS MARCH 16, 1972, ON SCIENCE AND TECHNOLOGY, INCLUDING FACT SHEET

THE WHITE HOUSE

TO THE CONGRESS OF THE UNITED STATES:

The ability of the American people to harness the discoveries of science in the service of man has always been an important element in our national progress. As I noted in my most recent message on the State of the Union, Americans have long been known all over the world for their technological ingenuity -- for being able to "build a better mousetrap" -- and this capacity has undergirded both our domestic prosperity and our international strength.

We owe a great deal to the researchers and engineers, the managers and entrepreneurs who have made this record possible. Again and again they have met what seemed like impossible challenges. Again and again they have achieved success. They have found a way of preventing polio, placed men on the moon, and sent television pictures across the oceans. They have contributed much to our standard of living and our military strength.

But the accomplishments of the past are not something we can rest on. They are something we must build on. I am therefore calling today for a strong new effort to marshal science and technology in the work of strengthening our economy and improving the quality of our life. And I am outlining ways in which the Federal Government can work as a more effective partner in this great task.

The importance of technological innovation has become dramatically evident in the past few years. For one thing, we have come to recognize that such innovation is essential to improving our economic productivity -- to producing more and better goods and services at lower costs. And improved productivity, in turn, is essential if we are to achieve a full and durable prosperity -- without inflation and without war. By fostering greater productivity, technological innovation can help us to expand our markets at home and abroad, strengthening old industries, creating new ones, and generally providing more jobs for the millions who will soon be entering the labor market.

This work is particularly important at a time when other countries are rapidly moving upward on the scientific and technological ladder, challenging us both in intellectual and in economic terms. Our international position in fields such as electronics, aircraft, steel, automobiles and shipbuilding is not as strong as it once was. A better performance is essential to both the health of our domestic economy and our leadership position abroad.

At the same time, the impact of new technology can do much to enrich the quality of our lives. The forces which threaten that quality will be growing at a dramatic pace in the years ahead. One of the great questions of our time is whether our capacity to deal with these forces will grow at a similar rate. The answer to that question lies in our scientific and technological progress.

As we face the new challenges of the 1970's, we can draw upon a great reservoir of scientific and technological information and skill -- the result of the enormous investments which both the Federal Government and private enterprise made in research and development in recent years. In addition, this Nation's historic commitment to scientific excellence, its determination to take the lead in exploring the unknown, have given us a great tradition, a rich legacy on which to draw. Now it is for us to extend that tradition by applying that legacy in new situations.

In pursuing this goal, it is important to remember several things. In the first place, we must always be aware that the mere act of scientific discovery alone is not enough. Even the most important breakthrough will have little impact on our lives unless it is put to use -- and putting an idea to use is a far more complex process than has often been appreciated. To accomplish this transformation, we must combine the genius of invention with the skills of entrepreneurship, management, marketing and finance.

Secondly, we must see that the environment for technological innovation is a favorable one. In some cases, excessive regulation, inadequate incentives and other barriers to innovation have worked to discourages and even to impede the entrepreneurial spirit. We need to do a better job of determining the extent to which such conditions exist, their underlying causes, and the best ways of dealing with them.

Thirdly, we must realize that the mere development of a new idea does not necessarily mean that it can or should be put into immediate use. In some cases, laws or regulations may inhibit its implementation. In other cases, the costs of the process may not be worth the benefits it produces. The introduction of some new technologies may produce undesirable side effects. Patterns of living and human behavior must also be taken into account. By realistically appreciating the limits of technological innovation, we will be in a better position fully to marshal its amazing strengths.

A fourth consideration concerns the need for scientific and technological manpower. Creative, inventive, dedicated scientists and engineers will surely be in demand in the years ahead; young people who believe they would find satisfaction in such careers should not hesitate to undertake them. I am convinced they will find ample opportunity to serve their communities and their country in important and exciting ways.

The fifth basic point I would make concerning our overall approach to science and technology in the 1970's concerns the importance of maintaining that spirit of curiosity and adventure which has always driven us to explore the unknown. This means that we must continue to give an important place to basic research and to exploratory experiments which provide the new ideas on which our edifice of technological accomplishment rests. Basic research in both the public and private sectors today is essential to our continuing progress tomorrow. All departments and agencies of the Federal Government will continue to support basic research which can help provide a broader range of future development options.

Finally, we must appreciate that the progress we seek requires a new partnership in science and technology -- one which brings together the Federal Government, private enterprise, State and local governments, and our universities and research centers in a coordinated, cooperative effort to serve the national interest. Each member of that partnership must play the role it can play best; each must respect and reinforce the unique capacities of the other members. Only if this happens, only if our new partnership thrives, can we be sure that our scientific and technological resources will be used as effectively as possible in meeting our priority national needs.

With a new sense of purpose and a new sense of partnership, we can make the 1970's a great new era for American science and technology. Let us look now at some of the specific elements in this process.

STRENGTHENING THE FEDERAL ROLE

The role of the Federal Government in shaping American science and technology is pivotal. Of all our Nation's expenditures on research and development, 55 percent are presently funded by the Federal Government. Directly or indirectly, the Federal Government supports the employment of nearly half of all research and development personnel in the United States.

A good part of our Federal effort in this field has been directed in the past toward our national security needs. Because a strong national defense is essential to the maintenance of world peace, our research and development in support of national security must always be sufficient to our needs. We must ensure our strategic deterrent capability, continue the modernization of our Armed Forces, and strengthen the overall technological base that underlies future military systems. For these reasons, I have proposed a substantial increase for defense research and development for fiscal year 1973.

In this message, however, I would like to focus on how we can better apply our scientific resources in meeting civilian needs. Since the beginning of this Administration, I have felt that we should be doing more to focus our scientific and technological resources on the problems of the environment, health, energy, transportation and other pressing domestic concerns. If my new budget proposals are accepted, Federal funds for research and development concerning domestic problems will be 65 percent greater in the coming fiscal year than they were in 1969.

But increased funding is not the only prerequisite for progress in this field. We also need to spend our scarce resources more effectively. Accordingly, I have moved to develop an overall strategic approach in the allocation of Federal scientific and technological resources. As a part of this effort, I directed the Domestic Council last year to examine new technology opportunities in relation to domestic problems. In all of our planning, we have been concentrating not only on how much we spend but also on how we spend it.

My recommendations for strengthening the Federal role in science and technology have been presented to the Congress in my State of the Union Message, in my budget for fiscal year 1973, and in individual agency presentations. I urge the Congress to support the various elements of this new Federal strategy.

(1) We are reorienting our space program to focus on domestic needs -- such as communications, weather forecasting and natural resource exploration. One important way of doing this is by designing and developing a reusable space shuttle, a step which would allow us to seize new opportunities in space with higher reliability at lower costs.

(2) We are moving to set and meet certain civilian research and development targets. In my State of the Union Message, my Budget Message and in other communications with the Congress, I have identified a number of areas where new efforts are most likely to produce significant progress and help us meet pressing domestic needs. They include:

-- Providing new sources of energy without pollution. My proposed budget for fiscal year 1973 would increase energy-related research and development expenditures by 22 percent.

-- Developing fast, safe, pollution-free transportation. I have proposed spending 46 percent more in the coming fiscal year on a variety of transportation projects.

-- Working to reduce the loss of life and property from natural disasters. I have asked, for example, that our earthquake research program be doubled and that our hurricane research efforts be increased.

-- Improving drug abuse rehabilitation programs and efforts to curb drug trafficking. Our budget requests in this critical area are four times the level of 1971.

-- Increasing biomedical research efforts, especially those concerning cancer and heart disease, and generally providing more efficient and effective health care, including better emergency health care systems.

(3) We will also draw more directly on the capabilities of our high technology agencies -- the Atomic Energy Commission, the National Aeronautics and Space Administration and the National Bureau of Standards in the Department of Commerce -- in applying research and development to domestic problems.

(4) We are making strong efforts to improve the scientific and technological basis for setting Federal standards and regulations. For example, by learning to measure more precisely the level of air pollution and its effects on our health, we can do a more effective job of setting pollution standards and of enforcing those standards once they are established.

(5) I am also providing in my 1973 budget for a 12 percent increase for research and development conducted at universities and colleges. This increase reflects the effort of the past 2 years to encourage educational institutions to undertake research related to important national problems.

(6) Finally, I believe that the National Science Foundation should draw on all sectors of the scientific and technological community in working to meet significant domestic challenges. To this end, I am taking action to permit the Foundation to support applied research in industry when the use of industrial capabilities would be advantageous in accomplishing the Foundation's objectives.

SUPPORTING RESEARCH AND DEVELOPMENT IN THE PRIVATE SECTOR

The direction of private scientific and technological activities is determined in large measure by thousands of private decisions -- and this should always be the case. But we cannot ignore the fact that Federal policy also has a great impact on what happens in the private sector. Thus influence is exerted in many ways -- including direct Federal support for such research and development.

In general, I believe it is appropriate for the Federal Government to encourage private research and development to the extent that the market mechanism is not effective in bringing needed innovations into use. This can happen in a number of circumstances. For example, the sheer size of some developmental projects is beyond the reach of private firms particularly in industries which are fragmented into many small companies. In other cases, the benefits of projects cannot be captured by private institutions, even though they may be very significant for the whole of society. In still other cases, the risks of certain projects, while acceptable to society as a whole, are excessive for individual companies.

In all these cases, Federal support of private research and development is necessary and desirable. We must see that such support is made available -- through cost-sharing agreements, procurement policies or other arrangements.

One example of the benefits of such a partnership between the Federal Government and private enterprise is the program I presented last June to meet our growing need for clean energy. As I outlined the Federal role in this effort, I also indicated that industry's response to these initiatives would be crucial. That response has been most encouraging to date. For example, the electric utilities have already pledged some $25 million a year for a period of 10 years for developing a liquid metal fast breeder reactor demonstration plant. These pledges have come through the Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association. This effort is one part of a larger effort by the electrical utilities to raise $150 million annually for research and development to meet the growing demand for clean electric power.

At the same time, the gas companies, through the American Gas Association, have raised $10 million to accelerate the effort to convert coal into gas. This sum represents industry's first year share in a pilot plant program which will be financed one-third by industry and two-thirds by the Federal Government. When it proves feasible to proceed to the demonstration stage, industrial contributions to this project will be expected to increase.

APPLYING GOVERNMENT-SPONSORED TECHNOLOGIES

An asset unused is an asset wasted. Federal research and development activities generate a great deal of new technology which could be applied in ways which go well beyond the immediate mission of the supporting agency. In such cases, I believe the Government has a responsibility to transfer the results of its research and development activities to wider use in the private sector.

It was to further this objective that we created in 1970 the new National Technical Information Service in the Department of Commerce. In addition, the new incentives programs of the National Science Foundation and the National Bureau of Standards will seek effective means of improving and accelerating the transfer of research and development results from Federal programs to a wider range of potential users.

One important barrier to the private development and commercial application of Government-sponsored technologies is the lack of incentive which results from the fact that such technologies are generally available to all competitors. To help remedy this situation, I approved last August a change in the Government patent policy which liberalized the private use of Government-owned patents. I directed that such patents may be made available to private firms through exclusive licenses where needed to encourage commercial application.

As a further step in this same direction, I am today directing my Science Adviser and the Secretary of Commerce to develop plans for a new, systematic effort to promote actively the licensing of Government-owned patents and to obtain domestic and foreign patent protection for technology owned by the United States Government in order to promote its transfer into the civilian economy.

IMPROVING THE CLIMATE FOR INNOVATION

There are many ways in which the Federal Government influences the level and the quality of private research and development. Its direct supportive efforts are important, but other policies -- such as tax, patent, procurement, regulation and antitrust policies -- also can have a significant effect on the climate for innovation.

We know, for instance, that a strong and reliable patent system is important to technological progress and industrial strength. The process of applying technology to achieve our national goals calls for a tremendous investment of money, energy and talent by our private enterprise system. If we expect industry to support this investment, we must make the most effective possible use of the incentives which are provided by our patent system.

The way we apply our antitrust laws can also do much to shape research and development. Uncertain reward and high risks can be significant barriers to progress when a firm is small in relation to the scale of effort required for successful projects. In such cases, formal or informal combinations of firms provide one means for hurdling these barriers, especially in highly fragmented industries. On the other hand, joint efforts among leading firms in highly concentrated industries would normally be considered undesirable. In general, combinations which lead to an improved allocation of the resources of the nation are normally permissible, but actions which lead to excessive market power for any single group are not. Any joint program for research and development must be approached in a way that does not detract from the normal competitive incentives of our free enterprise economy.

I believe we need to be better informed about the full consequences of all such policies for scientific and technological progress. For this reason, I have included in my budget for the coming fiscal year a program whereby the National Science Foundation would support assessments and studies focused specifically on barriers to technological innovation and on the consequences of adopting alternative Federal policies which would reduce or eliminate these barriers. These studies would be undertaken in close consultation with the Executive Office of the President, the Department of Commerce and other concerned departments and agencies, so that the results can be most expeditiously considered as further Government decisions are made.

There are a number of additional steps which can also do much to enhance the climate for innovation.

1) I shall submit legislation to encourage the development of the small, high technology firms which have had such a distinguished pioneering record. Because the combination of high technology and small size makes such firms exceptionally risky from an investment standpoint, my proposal would provide additional means for the Small Business Investment Companies (SBICs) to improve the availability of venture capital to such firms.

a. I propose that the ratio of Government support to SBICs be increased. This increased assistance would be channeled to small business concerns which are principally engaged in the development or exploitation of inventions or of technological improvements and new products.

b. I propose that the current limit on Small Business Administration loans to each SBIC be increased to $20 million to allow for growth in SBIC funds devoted to technology investments.

c. I propose that federally regulated commercial banks again be permitted to achieve up to 100 percent ownership of an SBIC, rather than the limited 50 percent ownership which is allowed at present.

d. To enhance risk-taking and entrepreneurial ventures, I again urge passage of the small business tax bill, which would provide for extending the eligibility period for the exercise of qualified stock options from 5 to 8 or 10 years, reducing the holding period for non-registered stock from 3 years to 1 year, and extending the tax-loss carry-forward from 5 to 10 years. These provisions would apply to small firms, as defined in the proposed legislation.

2) I have requested in my proposed budget for fiscal year 1973 that new programs be set up by the National Science Foundation and the National Bureau of Standards to determine effective ways of stimulating non-Federal investment in research and development and of improving the application of research and development results. The experiments to be set up under this program are designed to test a variety of partnership arrangements among the various levels of government, private firms and universities. They would include the exploration of new arrangements for cost-sharing, patent licensing, and research support, as well as the testing of incentives for industrial research associations.

3) To provide a focal point within the executive branch for policies concerning industrial research and development, the Department of Commerce will appraise, on a continuing basis, the technological strengths and weaknesses of American industry. It will propose measures to assure a vigorous state of industrial progress. The Department will work with other agencies in identifying barriers to such progress and will draw on the studies and assessments prepared through the National Science Foundation and the National Bureau of Standards.

4) To foster useful innovation, I also plan to establish a new program of research and development prizes. These prizes will be awarded by the President for outstanding achievements by individuals and institutions and will be used especially to encourage needed innovation in key areas of public concern. I believe these prizes will be an important symbol of the Nation's concern for our scientific and technological challenges.

5) An important step which could be of great significance in fostering technological innovations and enhancing our position in world trade is that of changing to the metric system of measurement. The Secretary of Commerce has submitted to the Congress legislation which would allow us to begin to develop a carefully coordinated national plan to bring about this change.

The proposed legislation would bring together a broadly representative board of private citizens who would work with all sectors of our society in planning for such a transition. Should such a change be decided on, it would be implemented on a cooperative, voluntary basis.

STRONGER FEDERAL, STATE AND LOCAL PARTNERSHIPS

A consistent theme which runs throughout my program for making government more responsive to public needs is the idea that each level of government should do what it can do best. This same theme characterizes my approach to the challenges of research and development. The Federal Government, for example, can usually do a good job of massing research and development resources. But State and local governments usually have a much better "feel" for the specific public challenges to which those resources can be applied. If we are to use science and technology effectively in meeting these challenges, then State and local governments should have a central role in the application process. That process is a difficult one at best; it will be even more complex and frustrating the States and localities are not adequately involved.

To help build a greater sense of partnership among the three levels of the Federal system, I am directing my Science Adviser, in cooperation with the Office of Intergovernmental Relations, to serve as a focal point for discussions among various Federal agencies and the representatives of State and local governments. These discussions should lay the basis for developing a better means for collaboration and consultation on scientific and technological questions in the future. They should focus on the following specific subjects:

1) Systematic ways for communicating to the appropriate Federal agencies the priority needs of State and local governments, along with information concerning locally-generated solutions to such problems. In this way, such information can be incorporated into the Federal research and development planning process.

2) Ways of assuring State and local governments adequate access to the technical resources of major Federal research and development centers, such as those which are concerned with transportation, the environment, and the development of new sources of energy.

3) Methods whereby the Federal Government can encourage the aggregation of State and local markets for certain products so that industries can give government purchasers the benefits of innovation and economies of scale.

The discussions which take place between Federal, State and local representatives can also help to guide the experimental programs I have proposed for the National Science Foundation and the National Bureau of Standards. These programs, in turn, can explore the possibilities for creating better ties between State and local governments on the one hand and local industries and universities on the other, thus stimulating the use of research and development in improving the efficiency and effectiveness of public services at the State and local level.

WORLD PARTNERSHIP IN SCIENCE AND TECHNOLOGY

The laws of nature transcend national boundaries. Increasingly, the peoples of the world are irrevocably linked in a complex web of global interdependence -- and increasingly the strands of that web are woven by science and technology.

The cause of scientific and technological progress has always been advanced when men have been able to reach across international boundaries in common pursuits. Toward this end, we must now work to facilitate the flow of people and the exchange if ideas, and to recognize that the basic problems faced in each nation are shared by every nation.

I believe this country can benefit substantially from the experience of other countries, even as we help other countries by sharing our information and facilities and specialists with them. To promote this goal, I am directing the Federal agencies, under the leadership of the Department of State, to identify new opportunities for international cooperation in research and development. At the same time, I am inviting other countries to join in research efforts in the United States, including:

-- the effort to conquer cancer at the unique research facilities of our National Institutes of Health and at Fort Detrick, Maryland; and

-- the effort to understand the adverse health effects of chemicals, drugs and pollutants at the new National Center for Toxicological Research at Pine Bluff, Arkansas.

These two projects concern priority problems which now challenge the whole world's research community. But they are only a part of the larger fabric of cooperative international efforts in which we are now engaged.

Science and technology can also provide important links with countries which have different political systems from ours. For example, we have recently concluded an agreement with the Soviet Union in the field of health, an agreement which provides for joint research on cancer, heart disease and environmental health problems. We are also cooperating with the Soviet Union in the space field; we will continue to exchange lunar samples and we are exploring prospects for closer cooperation in satellite meteorology, in remote sensing of the environment, and in space medicine. Beyond this, joint working groups have verified the technical feasibility of a docking mission between a SALYUT Station and an Apollo spacecraft.

One result of my recent visit to the People's Republic of China was an agreement to facilitate the development of contacts and exchanges in many fields, including science and technology. I expect to see further progress in this area.

The United Nations and a number of its specialized agencies are also involved in a wide range of scientific and technological activities. The importance of these tasks -- and the clear need for an international approach to technical problems with global implications -- argues for the most effective possible organization and coordination of various international agencies concerned. As a step in this direction, I proposed in a recent message to the Congress the creation of a United Nations Fund for the Environment to foster an international attack on environmental problems. Also, I believe the American scientific community should participate more fully in the science activities of international agencies.

To further these objectives, I am taking steps to initiate a broad review of United States involvement in the scientific and technological programs of international organizations and of steps that might be taken to make United States participation in these activities more effective, with even stronger ties to our domestic programs.

Finally, I would emphasize that United States science and technology can and must play an important role in the progress of developing nations. We are committed to bring the best of our science and technology to bear on the critical problems of development through our reorganized foreign assistance programs.

A NEW SENSE OF PURPOSE AND A NEW SENSE OF PARTNERSHIP

The years ahead will require a new sense of purpose and a new sense of partnership in science and technology. We must define our goals clearly, so that we know where we are going.

And then we must develop careful strategies for pursuing those goals, strategies which bring together the Federal Government, the private sector, the universities, and the States and local communities in a cooperative pursuit of progress. Only then can we be confident that our public and private resources for science and technology will be spent as effectively as possible.

In all these efforts, it will be essential that the American people be better equipped to make wise judgments concerning public issues which involve science and technology. As our national life is increasingly permeated by science and technology, it is important that public understanding grow apace.

The investment we make today in science and technology and in the development of our future scientific and technical talent is an investment in tomorrow--an investment which can have a tremendous impact on the basic quality of our lives. We must be sure that we invest wisely and well.

RICHARD NIXON

THE WHITE HOUSE, March 16, 1972.

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THE WHITE HOUSE

FACT SHEET

MESSAGE ON SCIENCE AND TECHNOLOGY

BACKGROUND

The Message being sent to Congress today is the first Presidential Message on Science and Technology in the nation's history.

Scientific research and development account for some $27 billion worth of goods and services in this country. Approximately $17.8 billion worth will be paid for by the Federal government.

As the President pointed out in the State of the Union Message, the nation has a special bent for science and technology and our ability to harness it for the purposes of man. He is presently evolving a long term strategy "outlining ways in which the Federal Government can work as a more effective partner in this great task."

That strategy's key elements are:

- The maintenance of strong, sensible research and development programs in space and defense;
- The application of our scientific and technological genius to domestic opportunities;
- The stimulation--in an area in which we lack full understanding--of the processes of research and development through both public and private sources;
- The employment of our technologically-oriented agencies in support of agencies with social missions;
- The focusing of our resources on clear targets where breakthroughs are most likely.

Accordingly, the President has asked for $17.8 billion in the FY '73 budget for Research and Development, an increase of $1.4 billion (more than 8 percent) over FY '72. He has also asked for more than $700 million in new money for civilian R&D programs, a growth of 65 percent--from $3.3 billion to $5.4 billion--in civilian sector R&D since 1969.

Today's Message to the Congress resulted from continuing studies by the Office of Science and Technology, the White House R&D arm; special studies by the Domestic Council to identify new areas amenable to technological opportunities; recent consultations with industry, academic, business, scientific and other professional groups; thorough soundings of major Federal agencies and departments; and ongoing reviews of R&D related issues by White House task groups.

THE MESSAGE IN BRIEF

The President calls for new actions, relationships and legislation designed to enhance research and development in all sectors--government, universities and private industry--with the Federal government playing a catalytic role wherever possible.

The President today proposes actions aimed at enhancing the application of the nation's R&D capacity to civilian needs. "We must appreciate that the progress we seek requires a new partnership in science and technology--one which brings together the Federal government, private enterprise, state and local governments and our universities and research centers in a coordinated, cooperative effort to serve the national interests," he told the Congress.

As part of a multi-faceted approach to such efforts, he pointed out that:

"Even the most important breakthrough will have little impact on our lives unless it is put to use--and putting an idea to use is a far more complex process than has often been appreciated.

"We must see that the environment for technological innovation is a favorable one," one without "impediments of excessive regulation, inadequate incentives or other barriers . . .

". . . We must realize that the mere development of a new idea does not necessarily mean that it can or should be put into immediate use . . . By realistically appreciating the limits of technological innovation we will be in a better position fully to marshal its amazing strengths.

"Creative, inventive dedicated scientists and engineers will surely be in demand in the years ahead . . . I am convinced that they will find ample opportunity to serve . . .

". . . We must continue to give an important place to basic research and to exploratory experiments . . . Basic research in both the public and private sectors is essential to our continuing progress tomorrow. All departments and agencies . . . should support basic research so as to provide a broader range of future options."

The President recognizes that the Federal government is in a position to exert substantial leverage on the entire R&D enterprise since it employs 45-50 percent of the R&D personnel and finances 55 percent or more of all R&D.

ACTIONS ANNOUNCED IN THE MESSAGE

Actions to stimulate support for R&D and innovation in the private sector:

- The development of plans for a more active patent filing and licensing program for government-owned inventions both at home and abroad.
- The support, through the National Science Foundation, of applied research in industry when its use would be advantageous to accomplish NSF objectives. (Under section 3(c) of the National Science Foundation Act of 1950, as amended.)
- Studies by the NSF of the effects of Federal tax, patent, procurement, regulatory and antitrust policies on technological innovation.
- Submission of legislation soon to increase the ratio of government support to Small Business Investment Companies; to increase the limit on Small Business Administration Loans to SBIC's; to permit Federally regulated commercial banks to achieve 100% ownership of an SBIC.
- New programs in the NSF and the National Bureau of Standards to determine effective ways to stimulate private investment in R&D and its application.
- A program of research and development prizes awarded by the President for achievements in key areas of public concern.
- Designation of the Department of Commerce as the Executive Branch focal point for policy development concerning industrial R&D.

Actions to strengthen collaboration between the Federal agencies and State and local governments:

- Designation of the President's Science Adviser and the White House Office or Intergovernmental Relations as the focal point for Federal agency discussions with representatives of State and local governments in order to examine ways:
  - -- To communicate the priority needs of State and local governments to guide Federal R&D planning.
  - -- To assure State and local government access to the technical resources of major Federal R&D centers concerned with domestic problems.
  - -- To encourage aggregation of State and local markets to stimulate innovation and economies of scale.
- Experimental programs in the NSF and NBS to stimulate the use of R&D by State and local governments and to strengthen their ties to local industry and the universities.

Actions to strengthen cooperation between the United States and other nations in science and technology:

- Direction to Federal agencies to identify new opportunities for international cooperation in R&D;
- Invitation to other countries to join research efforts in the U.S. (in cancer research at NIH and Fort Detrick, Maryland, and in research on the health effects of chemicals and pollutants at the National Center for Toxicological Research at Pine Bluff, Arkansas.
- Initiation of a broad review of U.S. involvement in international scientific and technological organization programs.

BACKGROUND ON FEDERAL R&D

In his State of the Union Message and in his budget, the President initiated the key elements of his strategy. Here are the highlights as taken from those documents:

DEFENSE AND SPACE PROGRAMS

The Department of Defense will increase its research and development funding by $767 million in FY 1973. This includes an increase of $123 million for research. The Navy R&D budget is up 14%, the Army 11% and the Air Force 9%.

Oceanography, biomedical research, atmospheric sciences, electronics and materials are important areas of research interest. Significant development thrusts are stronger sea-based strategic deterrents and new capabilities and increased effectiveness for general purpose forces.

He also proposed a new National Aeronautics and Space Administration budget for space sciences research -- an all-time high -- up 25% to $554 million. The space agency's applications research program increased $17 million to $201 million. Funds are requested for a new generation Orbiting Solar Observatory, and National Aeronautics and Space Administration will launch missions to Mars in 1975 and to Jupiter and Saturn in the 1977-78 period.

Manned Apollo missions 16 and 17 are to take place as scheduled this year. In 1973, Skylab, a three-man reusable space station, will be visited by three separate teams of astronauts for periods of up to 56 days. The Space Shuttle program for the late '70's was approved by the President on January 5. The overall cost of developing the reusable, two-part launch vehicle/orbiter is estimated at $5.5 billion over the next six years. Alternative advanced propulsion technologies will also be examined, including a small nuclear engine, for possible unmanned outer planets missions and other applications in the 1980's.

UTILIZING THE CAPABILITIES OF HIGH TECHNOLOGY AGENCIES

The President in the State of the Union message announced the decision to draw more on the capabilities of the high technology agencies such as the National Aeronautics and Space Administration, the Atomic Energy Commission and the National Bureau of Standards to deal with domestic problems and meet long-range national goals, but without diverting them from their primary missions. For example, our outstanding capabilities in space technology should be used to help the Department of Transportation develop better mass transportation systems.

TARGETS FOR RESEARCH AND DEVELOPMENT

Of the total civilian R&D increase of more than $700 million, almost $400 million of the increase is focused in five technology opportunity areas identified by the President in the State of the Union Message. As the President stated, these are areas where an extra effort in R&D is "most likely to produce a breakthrough and where the breakthrough is most likely to make a difference in our lives," but they do not represent our total civilian R&D effort.

(1) Abundant and Clean Energy Sources

An additional $88 million is being obligated for work on clean, abundant energy sources, a total of $480 million and some $392 million more than last year. This is an increase of more than 22 percent.

A broad research and development program is crucial to balance environmental and energy needs. Further effort will be devoted to the development of pollution control technologies in order to provide additional options for meeting air quality standards at lower costs. Research and development programs identified in the Energy Message of June 1971 will be expanded, including the fast breeder reactor for nuclear power, coal gasification, magneto-hydrodynamics controlled thermonuclear fusion power, solar energy and mapping and basic assessment of the resources of the Outer Continental Shelf.

The 1973 budget also provides for research by the Atomic Energy Commission on advanced dry cooling towers and large scale energy storage batteries, cryogenic power generation and transmission in the AEC and National Bureau of Standards, greater use of laser technology in fusion power research under the AEC, and research by the Department of the Interior on the uses of low-BTU gas produced -- with less pollution -- from coal.

(2) Safe, Fast Pollution-free Transportation

Obligations for R&D in transportation are being increased 46%, from $456 million in FY '72 to $666 million in FY '73.

New and expanded research and development programs will explore systems which are not only safer and more efficient but which reduce adverse environmental impacts. Programs will be initiated or expanded to attack the problem of truck and aircraft noise, develop more attractive and economical mass transit vehicles, and provide for safer automobiles.

Work will be accelerated on personal rapid transit, which provides individualized, nonstop service for commuters; and new work will be undertaken on dual-mode systems for metropolitan areas which might combine the convenience of the automobile with the efficiency of a rapid transit system and on new tunneling technologies to reduce the cost of underground excavation for mass transit. Work on advanced air traffic control concepts, a short takoff and landing (STOL) aircraft, and quiet aircraft engines will continue at higher levels to provide more efficient, safer air transportation with reduced environmental impact. In these more advanced fields of both ground and air transportation, the capabilities of NASA will assist in meeting R&D program objectives. Similarly, the technical talent of AEC will be utilized in advanced work on tunneling.

(3) Reducing Losses from Natural Disasters

Funding in this area is being increased from $93 million in FY '72 to $136 million in FY '73, or 46%.

Natural disasters take an unwarranted toll on human life and property. In 1969, 12,000 people died from fires alone and $2.4 billion in property was destroyed. While increased warning time has significantly reduced deaths from hurricanes, property damage has increased dramatically to some $2.4 billion during 1965 through 1969.

Research efforts will be accelerated to diminish losses of lives and property from these and other hazards and natural disasters. Particular attention will be focused on research in hurricane modification to reduce damage from surface winds; on the prediction -- and ultimately control -- of earthquakes and on engineering to design safer structures; and on fire research -- including forest fires.

(4) Effective Emergency Health Care

An 88% expansion in funding, from $8 million to $15 million, is proposed for new demonstration projects.

One health need that has yet to be properly addressed is the provision of adequate emergency medical service. New technologies are available which can help in this field. The problem is to pull together these technologies into a system which effectively links communication, transportation of victims, ambulance equipment and services, trained manpower, and emergency room hospital service.

Full-scale demonstration of such integrated emergency treatment systems -- as planned in the 1973 budget -- can be undertaken with relatively small amounts of added Federal funds to act as a catalyst.

(5) Curbing Drug Traffic and Rehabilitating Users

Funds amounting to $60 million have been requested for FY '73, an increase of 20% over the 1972 amount of $50 million. This year's budget provides for an overall fourfold increase in research budgets of a number of agencies over the two-year period since 1971.

The June 1971 message to the Congress on drug abuse prevention and control recognized the need for a major effort to curb a problem that is assuming the dimensions of a national emergency. This message called for the creation of a Special Action Office for drug abuse prevention. The search for new ways to curb drug trafficking and to rehabilitate drug users has been stepped up in both 1972 and 1973.

As the President said of these R&D programs in his State of the Union Message: "And these are only the beginning."

-- End of Section D --

OTHERS ARE SAYING...

Please check why these cures are being withheld

Ignoring Cancer

If the federal department of Health, Education and Welfare (HEW) really wants a breakthrough in cancer research, it's discovered a unique way of showing it.

The department, over the last two years of Joseph Califano's regime, has become a bottleneck for new discoveries which could hold the promise of early detection — and control — of cancer.

But HEW is hung up on who should retain patent rights over such discoveries — the government or the scientists who develop the pioneering techniques.

Unable to make up its mind, HEW thus prevents the clinical testing of such discoveries by companies that would ultimately manufacture and distribute the compounds.

In this limbo, scientists lose interest as their discoveries languish. And manufacturers turn to other pursuits, leaving the various products unconfirmed as to their value and in short supply if they do have merit.

Two examples have recently come to light.

Two government-funded scientists at opposite ends of the world discovered revolutionary techniques for treating cancer.

In Israel, Dr. Michael Sela found an early detection blood test for breast and digestive-tract cancer.

At the University of Arizona, Dr. Sydney Salmon discovered a simple lab test for cancer that can be conducted in test tubes rather than on patients, thus eliminating painful drugs.

HEW lawyers, apparently arguing that hospital costs will go up if the patents are privately held, won't clear the way for testing while the debate rages.

Now, it can be argued that the scientists are being selfish in pursuit of the profit motive.

It also can be argued that politics is taking precedence over science.

The one irrefutable fact is that something has become lost in the test of wills — the commitment to human life and the preservation of it through cancer-fighting chemicals.

Surely, the government's investment in these discoveries becomes lost as time drags on and more patients die and other techniques come to the fore.

So why the impasse?

Sen. Robert Dole, R-Kansas, made this very serious charge the other day: "HEW has decided to pull the plug on development of biomedical research. They have decided to withhold potential cures and revolutionary new diagnostic techniques for treating such diseases as cancer, arthritis, hepatitis and emphysema."

Is it really too difficult to put priorities where they belong — on human life?

Is it beyond human vision to devise a way whereby government could recover its investment while at the same time rewarding the scientist or the pharmaceutical company for their daring and discovery?

Certainly, to shut and lock the door on such cancer breakthroughs serve neither the cause of science or compassion or profit.

Sensing this, no doubt, and prodded by Senator Dole, Califano the other day ordered a number of potential cures freed for further testing and distribution.

That is the least that an afflicted public should expect.

Cancer poses enough frustrations and heartaches without the HEW adding one, even fractional, delay in delivering treatment to the sick.

—Morning Star, Rockford

the small society

PATENT BRANCH, OGC
JUN 28 1973

Cooperative R & D

Reluctant but Necessary Alliance for Industry and Universities.

STORIES of industrial research centers that use PhDs as clerks and universities that get massive grants to study the sex life of some obscure insect must be filed, along with penny candy and a good nickel cigar, as memories of days not likely to return.

When money was plentiful, a few years back, R&D programs multiplied like rabbits. With the 70s came the cost crunch, foreign competition, and the real bite of inflation. Now industry says: We need new technology but we can't afford to develop our own. Universities say: We have the ability to create new technology, but no one to finance it. And the Government says: We want more practical utilization of the R&D money we spend.

The need to get these parties together, with their matching abilities and needs, seems obvious. Some universities and research centers have had long-standing, mutually profitable relationships with industry. But, in many cases, the business man and the scholar have been aloof and occasionally antagonistic.

"We are like two independent nations that suddenly realize that we need each other to survive," as one sales manager puts it. Such attitudes are, in part, the result of industry and university research programs that flourished with their own independent goals. If a university program came up with something that happened to interest industry, fine. This was an interesting fringe benefit, but certainly not the goal of "pure science." Industry, too, erected its own barriers to cooperation. The axiom was, "It is easier to rediscover it in our own labs than search for it somewhere else." Besides, there is also the NIH factor.

As one professor said, "Industry may be too dumb to know they have an R&D problem—or they're afraid to admit it. I've never had a request from industry stating a specific problem or been asked what the university had to offer."

Similar gripes come from the other side: "Even when we set specific parameters for what we want, university researchers wander all over the place. Our experience is that they can't give us what we ask for."

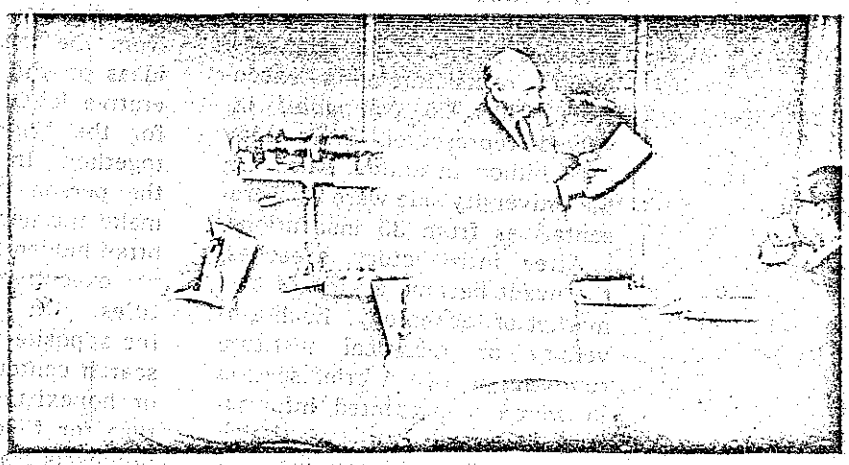
Harsh words and, in some cases, true. But the economic realities of the R&D picture are causing new alliances to form.

In the background is the Government which finances, directly or indirectly, much of the research done in the U. S. It is now Government policy to get more of its R&D back into the economy in the form of useful products. The sometimes-successful Technology Utilization program of NASA is an example.

Although the Government officially backs such a program, many observers feel that any kind of meaningful exchange of technology must occur without Government control. "The Government must act like a government, regardless of its announced policy," says one engineer familiar with the difficulties of dealing with federal programs, "so we can't expect them to guarantee one section of the economy the protection needed to encourage significant investment."

Meeting of Giants

The necessity for resolving specific differences and common problems was clearly pointed



Industry gets a look at what university researchers have to offer in the way of potential new products. This demonstration, by the University of Missouri, was one of many given at a recent forum sponsored by Dr. Dvorkovitz & Associates, of Ormond Beach, Florida.

File of editorials

TECHNOLOGY

Four nations launch program to cut energy use in cement making

Four countries belonging to the 25-member International Energy Agency (IEA), part of the Organization for Economic Cooperation and Development, are starting a $1.5-million, three-year program that could reduce energy use in cement kilns by 80%. Projects will concentrate on four areas: the U.S. and Germany will examine the possibility of using a precalciner compatible with low-alkali cements; the U.S. and Sweden will attempt to determine the amount of waste materials that can substitute for portland cement without affecting structural properties; the United Kingdom and the U.S. will research use of high-sulfur fuels; and the U.S. will investigate ways of making low-alkali cement without increasing energy consumption.

Wanted: Proposals for new cogeneration systems for industry

The Dept. of Energy is looking for new ideas for cogeneration systems that can tie into existing facilities in a number of energy-intensive industries (including chemical, petroleum refining, pulp and paper, textile and food processing). The agency is inviting proposals in a Program Opportunity Notice (PON-4135) to be submitted by Sept. 18. DOE's Division of Industrial Energy Conservation is interested in cogeneration as part of its charter to support near-term systems, increase industrial interest, and speed the transfer of technology.

Congress considers more R&D funds for small companies

Small companies may get a bigger share of Federal research and development funds. Members of four subcommittees of the Senate and House Small Business Committees held joint hearings last week, saying they intend to watch closely the Administration's review of policies that may hamper research in 28 federal agencies (CW, May 24, p. 37). Testifying before the legislators, Richard S. Morse, just-retired lecturer at the Massachusetts Institute of Technology's Sloan School of Management, warned substantial changes are needed to "reverse the current and extremely dangerous trends" that have cost the U.S. its unique position in technological innovation. In the course of the hearings, a 1977 Office of Management and Budget report was made public. It showed that firms employing fewer than 1,000 accounted for almost half of the major innovations from 1953 to 1973. Their ratio of innovation to sales was about one-third greater than that for larger firms; their ratio of innovation to R&D employment, about four times bigger. Yet, small companies got only 8% of federal funds awarded to industry. Upshot: the committee members say they want to implement recommendations of past studies rather than wait several years for a new report that might exclude small businesses completely or give them only "crumbs from the table."

H-Coal plant running late, 40% over cost estimates

Badger Plants will take over construction management of the H-Coal plant being built in Catlettsburg, Ky., a responsibility that had been held by Ashland Synthetic Fuels. The plant is running late and turning out to be 40% more expensive than the original $178-million estimate. But those are not the reasons for the switch, says the Dept. of Energy. The change will enable Ashland to devote its full expertise to technical aspects of the construction and to prepare for eventual operation of the plant, DOE says. Ground was broken in December 1976 (*CW, Dec. 22, 1976, p. 19*). The admittedly tight schedule called for

1830 Larkdale Rd.
Northbrook, IL 60062
July 3, 1978

Mr. John L. Cobbs, Editor
Business Week
McGraw-Hill Building
1221 Avenue of the Americas
New York, New York 10020

Dear Mr. Cobbs:

Reference: "Vanishing Innovation", July 3, 1978 Issue

I, for one, am not ecstatic that the "White House has ordered up a massive 28-agency review of the role government plays in helping or hindering the health of industrial innovation." You quote some diagnostic information from "a 1977 Commerce Department report" co-authored by me and my then principal deputy, Dr. David B. Chang, and prepared at the request of former Secretary of Commerce Elliot Richardson. To be sure, a "thundering herd" did not articulate the policy alternatives to be found in "U. S. Technology Policy" (NTIS document PB-263 806); however, a significant number of the industrial people you quote, or their associates, did contribute to their formulation. Surely further study is not required to demonstrate that "excessive or contradictory federal regulatory policy is the single greatest complaint" (barrier to innovation) as you put it, or "reduction of unnecessary regulatory barriers to innovation is required", as we phrased it. Instead of a "massive review", how about a little action toward implementating an improved climate for industrial innovation?

Our study suggests a number of possible actions the Administration could at least evaluate, if not undertake, to reduce detrimental regulations. And do we really need to spend more taxpayers' money to rediscover that modification of antitrust laws to permit cooperative R&D is desirable (p.49); that substantial

increase in the tax investment credit for R&D plants from the present 10% to, e.g. 25% is overdue (p. 36), that inflation and the low average rate of return are making capital formation very difficult (p. 53), that a uniform Federal patent policy is needed which (among other things) enables contractors to obtain patent rights to inventions resulting from Federally-sponsored research (p.70-1), etc., etc.?

Wouldn't applying a massive effort toward implementing at least one corrective step before vanishing innovation more than just threatens U. S. technological superiority be a lot more useful?

Betsy Ancker-Johnson, Ph.D.
Former Assistant Secretary of
Commerce for Science and
Technology

BAJ:bs

VANISHING INNOVATION

A hostile climate for new ideas and products is threatening the technological superiority of the U. S.

A grim mood prevails today among industrial research managers. America's vaunted technological superiority of the 1950s and 1960s is vanishing, they fear, the victim of wrongheaded federal policy, neglect, uncertain business conditions, and shortsighted corporate management. They complain that their labs are no longer as committed to new ideas as they once were and that the pressures on their resources have driven them into a defensive research shell, where true innovation is sacrificed to the certainty of near-term returns. Some researchers are bitter about their own companies' lax attitudes toward innovation, but as a group they tend to blame Washington for most of their troubles. "[Government officials] keep asking us, 'Where are the golden eggs?' " explains Sam W. Tinsley, director of corporate technology at Union Carbide Corp., "while the other part of their apparatus is beating hell out of the goose that lays them."

That message—and its implications for the overall health of the U. S. economy—is starting to get through. Following months of informal but intense lobbying led by such executives as N. Bruce Hannay, vice-president for research and patents at Bell Telephone Laboratories Inc., and Arthur M. Bueche, vice-president for research and development at General Electric Co., the White House has ordered up a massive, 28-agency review of the role government plays in helping or hindering the health of industrial innovation. "Federal policy affecting industrial R&D and innovation must be carefully reconsidered," wrote Stuart E. Eizenstat, the White House's domestic policy adviser, in a recent memo outlining the review's intent.

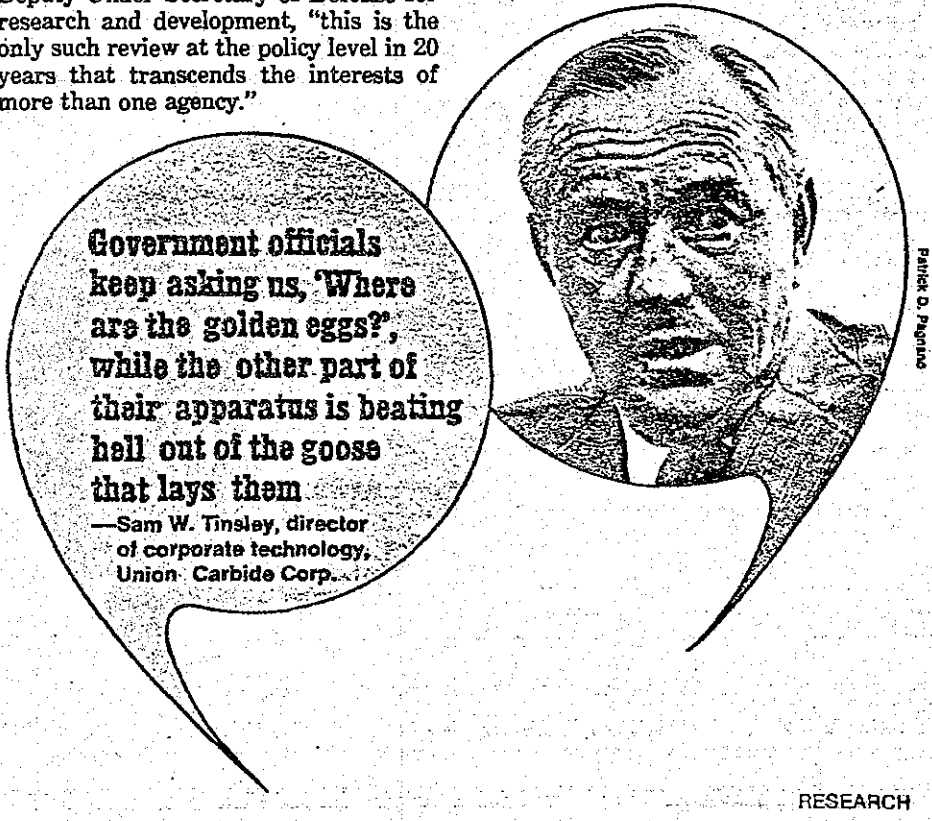
One thing that the study clearly will not accomplish is a quick fix for the deepening innovation crisis. The problem is regarded as immensely complex by the Administration, and is inextricably tied to other economic dilemmas now facing Carter's White House.

"Historically, the government's role has been to buy more science and R&D," says Martin J. Cooper, director of the strategic planning division at the National Science Foundation (NSF). "Now maybe we better go with investment incentives." Says Jordan J. Baruch, Assistant Commerce Secretary for science and technology, who will be the review's day-to-day manager: "This study developed in an environment of people concerned about economics, business, and technology."

The Administration's concern is underscored by the fact that it is organized as a domestic policy review, the highest sort of attention a problem can receive within the executive branch. Among its objectives, such a review must produce options for corrective action by the President. According to Ruth M. Davis, Deputy Under Secretary of Defense for research and development, "this is the only such review at the policy level in 20 years that transcends the interests of more than one agency."

The White House also seems determined not to conduct the study in a governmental vacuum. Baruch is soliciting input from groups such as the Industrial Research Institute (IRI), the Business Roundtable, and the Conference Board. "We want both CEOs and R&D vice-presidents," says a White House official. Labor groups have been asked to participate, too, along with public-interest groups. Congressional leaders such as Senator Adlai E. Stevenson (D-Ill.), chairman of the Senate subcommittee on science, technology, and space, have been brought into the early planning. And the 28 agencies involved extend beyond obvious candidates, such as the Environmental Protection Agency, to the Justice Dept. and even the Small Business Administration.

The study's scope is so sweeping, in



Patrick D. Pagnano

fact, that some federal officials are talking about a "thundering herd" approach to policymaking. But one government science manager demurs. "It beats having one guy write a national energy program in three months," he sniffs.

Philip M. Smith, an assistant to Presidential science adviser Frank Press and an early organizer of the study, concedes that "a lot of people have told us that we are likely to fail." But such skepticism, he believes, does not take into account the considerable clout of those involved in the effort. Commerce Secretary Juanita M. Kreps, for example, is chairing the study, and she heads a coordinating committee whose members include Charles L. Schultze, chairman of the Council of Economic Advisers, Administration inflation fighter and chief trade negotiator Robert S. Strauss, and Zbigniew Brzezinski, Carter's national security adviser. Even more important is the support of Eizenstat, who, says Smith, "is very interested in this particular review."

Finding 'new directions'

On the other hand, there is already grumbling within the Agriculture Dept., which was left off Kreps's committee. "We are red-faced," says a high-ranking Agriculture official. "We are out of the project because this Administration and those before it do not place any priority on agricultural research." However, Jordan Baruch insists that the department will play a role in the study. Agriculture experts point out that farm commodity exports of over $24 billion play a key role in the U. S. balance of payments. They note also that superior technology is the basis of the commanding American position among world food exporters.

Whatever its outcome, the White House policy review is being undertaken at a time when, as Frank Press puts it, "we badly need some new directions." Many experts view with alarm the declining federal dollar commitment to R&D, which has dropped from 3% of gross national product in 1963 to just 2.2% this year. For its part, industry as a whole has more or less matched the inflation rate and then some with its own spending. But such macroscale indicators do not tell all. "We've got to find out what the story is sector by sector, because each industry is going to be different," says Press. "We also have to find out what's going on abroad."

Better data on the relationship between industrial innovation and the health of the economy are becoming available. According to a 1977 Commerce Dept. report, for instance, technological innovation was responsible for 45% of the nation's economic growth from 1929 to 1969. The study went on to compare the performance of technology-intensive manufacturers with that of other industries from 1957 to 1973, and found that the high-technology companies created jobs 88% faster than other businesses, while their productivity grew 38% faster.

The numbers help to establish the central role of industrial innovation in stimulating economic development, but they also are beginning to reveal the changing character of industrial research. The amount of basic research that industry performs, for instance, has dropped to just 16% two years ago from 38% of the national total in 1956.



And a new IRI survey of member companies for the National Science Foundation demonstrates how federal policy has directly altered the nature of the research effort in another way, making it more and more defensive. The study shows that surveyed companies increased R&D spending devoted to proposed legislation by a striking 19.3%, compounded annually, from 1974 to 1977. And the rate was 16% a year for R&D devoted to Occupational Safety & Health Administration (OSHA) requirements. "When overall R&D spending is not growing nearly this fast," note the survey's authors, George E. Manners Jr. and Howard K. Nason, "other categories of effort—especially research—must be suffering."

Other observers compare the viability of industrial innovation in the U. S. with that of foreign countries. One expert is J. Herbert Hollomon, director of the Center for Policy Alternatives at Massachusetts Institute of Technology. According to Hollomon, a reason the U. S. is losing its leadership is that "we're arrogant—we have an NIH [not invented here] complex at the very time a majority of technological advances is bound to come from outside the U. S." Consequently, he argues, the U. S. has not organized itself to capitalize on these advances, as foreign countries have done for years with American knowhow. Since as much as two-thirds of all R&D is now conducted by foreign laboratories, Hollomon says, it should be no surprise that they have taken the lead in such technologies as textile machinery and steel production.

"We essentially prohibited West Germany and Japan from defense and space research," says Hollomon. "So it's no accident they concentrated on commercial fields." He adds: "I believe other nations better understand that the innovation process is important."

Says a research director for one high-technology company: "For a country like ours, the technology leader of the world, what has been happening is downright embarrassing." Indeed, even the presumed sources of strength in a consum-

er-oriented society are today under intense pressure. "Our experience with Japan in the consumer electronics industry—namely televisions, radios, audio, and transceiver equipment—shows some of our weaknesses," testified Gary C. Hufbauer, a Deputy Assistant Treasury Secretary, before a congressional subcommittee. In 1977, he said, "we had a $3.6 billion trade deficit with Japan in high-technology goods, and about two-thirds of this was accounted for by imports of consumer electronic goods."

The role of regulation

The cumulative response to these developments has been alarm. "The system has now sharpened its pencils in a way that discourages changes that are major," worries Robert A. Frosch, head of the National Aeronautics & Space Administration. "We have been so busy with other things that we may have inadvertently told the people who think up ideas to go away."

Even labor unions, which historically have left R&D decision-making up to corporate board rooms, now are complaining about lack of innovation. "Having helped to develop and pay for this technology," says Benjamin A. Sharman, international affairs director of the International Association of Machinists, "American workers have a right to demand government responsibility for using it to create new products, more jobs, better working conditions, and general prosperity." And Charles C. Kimble, research director of the Electrical, Radio & Machine Workers union, goes so far as to suggest that labor should now have a say in how industrial research money is spent.

Among research managers themselves, excessive or contradictory federal regulatory policy is the single greatest complaint. Hannay of Bell Labs points to Food & Drug Administration requirements as a case in point. According to one study, says Hannay, a 1938 application for adrenaline in oil was presented to the FDA in 27 pages. In 1958, a treatment for pinworms took 439 pages to describe. "By 1972," he says, "a skeletal muscle relaxant involved 456 volumes, each 2 in. thick—76 ft. in total thickness and weighing one ton."

Regulation, says Tinsley of Union Carbide, has put a bottleneck on new-product development in the chemical industry and has so added to the cost of getting any new chemical approved that only those targeted at a vast, assured market are attempted today. Food and drug industry researchers echo that complaint. "Today," says Al S. Clausi, director of technical research at General Foods Corp., "our industry does work that is fostered by unreal and invalid public concerns."

But regulation can have less obvious impacts, such as forcing an industry to stick with old technology rather than to experiment with new approaches to problems. "The overall effect of regulations on the auto industry has been to build an envelope around the internal-combustion device and the whole car structure," says Harvard Business School Professor William J. Abernathy, who specializes in technology management. " 'Don't do anything really new, don't change.' That's what these regulations say." Paul F. Chenea, vice-president for research at General Motors Corp., agrees. "You just don't have time to explore wild new ideas when a new rule is so closely coupled to your current business," he says.

'The science of the matter'

In Congress, where the regulatory laws are written, such thinking has so far found a small audience. "A great number of the regulations that we would call environmental . . . may actually be self-defeating," muses Harrison H. Schmitt, the former astronaut from New Mexico who is the ranking Republican on Stevenson's Senate subcommittee. "Instead of looking at pollution controls, if we were looking at building a more efficient and therefore less-polluting engine, we would not only be solving our environmental problems, but we would be producing a new thing for export."

Schmitt is one of only three federal legislators with the semblance of a science background. "We probably have

How antitrust charges can limit R&D payoffs

Companies that make it across the development minefield and bring superior technology to market still may find a threat on the other side: monopolization charges that keep them from fully exploiting the technology. As old as that problem is, such charges can come as a shock, as they did to Du Pont Co. last April.

Courts established decades ago that the Sherman act prevents a company with a hammerlock on a particular industry from making sound, otherwise perfectly legal business decisions that would, however, perpetuate its dominance. In 1945, for example, Judge Learned Hand found evidence that Aluminum Co. of America unlawfully monopolized its industry by its tendency to "double and redouble capacity" as demand increased. That, said Hand, locked would-be competitors out of the expanding market.

In a similar vein, the Federal Trade Commission said three months ago that Du Pont had used "unfair means" to keep competitors from increasing their share of the expanding market for titanium dioxide, a widely used paint pigment. "The complaint is wholly without basis," says Irving S. Shapiro, the company's chairman.

40% share. Superior technology clearly contributes to Du Pont's dominance. In the 1950s, the company devoted a decade of work—and what a spokesman will peg only at "many millions of dollars"—to develop a new way of making TiO_2. Although the highly automated, continuous process went on stream more than 20 years ago, it still tops the processes used by such competitors as NL Industries, SCM, and American Cyanamid, because it uses cheaper raw materials and produces less acid waste.

The problem with the government arises because Du Pont's 40% share of the $700 million-a-year market is still growing. That alone is enough to send government lawyers poking about for actions that can be attacked. According to Alfred F. Dougherty Jr., head of the commission's antitrust arm, even a 30% chunk of the market "could be a dominant position if all the other firms in the market had a much lower share." In fact, Justice Dept. antitrust chief John H. Shenefield asked his staff to look at Du Pont's TiO_2 policies only to find the FTC there ahead of him.



Joan Sydlow

Du Pont's Shapiro: The FTC's "complaint is wholly without basis."

Basically, the FTC says that Du Pont keeps its market share by expanding capacity before the market is ready for more production, thereby forestalling competitors' expansion plans. Du Pont, says the FTC, should get rid of one of two current TiO_2 facilities and a new plant at De Lisle, Miss., that would begin production next year. The FTC staff also wants the company to take competitors under its wing by giving them, royalty-free, the superior technology and knowhow it has built up over the past 25 years.

exercised very poor judgment in the past," he says, "because the Congress overall—members as well as staff—have not been able to understand what is possible technologically and what is not, and therefore not been able to relate the costs [of legislation]."

Jason M. Salsbury, director of the chemical research division at American Cyanamid Co., pleads, "Before the lawyers write the legislation, let them know the science of the matter." Not only may some mandates be beyond what industry can legitimately perform, he says, but the rules force a conservative approach to science. One key indicator of this trend is the increasing number of toxicologists now employed in chemical company research labs. "Toxicologists don't innovate," notes Frank H. Healey, vice-president for research and engineering at Lever Bros. Co.

Then there is the regulatory bias against new ideas. In the EPA's grant programs for waste-water treatment at the municipal level, for instance, equipment specifications must be written so that gear can be procured from more than one source. That means a company with a unique process is discriminated against. What is more, the mandate for cost effectiveness precludes trying out innovative approaches whose value can only be measured if someone is willing to gamble on them.

If the domestic policy review is to solve such questions, it will depend in large part on the willingness of regulators to see matters in a new light. According to Philip Smith, there is "a sense that people like [EPA Administrator] Doug Costle and [FDA Administrator] Don Kennedy want to work with industry, and they don't want to fight all the time. I think we have a team of people now in government that may be able to do something."



The investment climate

But industry should not expect a major overhaul of regulatory practices to emerge from the study. EPA Administrator Douglas M. Costle concedes "a tremendous growth in the last decade in health and safety regulations—13 major statutes in our area alone." Though Costle agrees that the economic impact of such rules should be more closely quantified, he contends that "this rapidly widening wedge of regulation has been a response to a massive market failure—failure of the marketplace to put an intrinsically higher value on pollution-free processes."

Most regulators agree that not enough research has been done on the true nature of the environmental problems they are empowered to combat, but they also argue that regulation has led to cost-saving practices, especially in the area of resource recovery, where closed-cycle processes now help capture reusable material. OSHA officials also cite examples where the agency has laid down rules that have led to cost-cutting innovations. But Eula Bingham, the OSHA administrator, emphasizes that the "legislatively determined directive of protecting all exposed employees against material impairment of health or bodily function" requires tough regulation without quantitative weighing of costs and benefits. "Worker safety and health," she insists, "are to be heavily favored over the economic burdens of compliance."

Bingham and her boss, Labor Secretary Ray Marshall, may represent an increasingly isolated view, however. Economic issues have come to dominate thinking within the Carter Administration, and it is precisely these questions that industry has stressed in its discussions with science adviser Press and other White House officials. Just over a month ago, Treasury Secretary W. Michael Blumenthal told a meeting of financial analysts in Bal Harbour, Fla., "We are now devoting a very sizable chunk of our private investment to meeting government regulatory standards . . . and in some of these areas we may well be reaching a breaking point." Blumenthal also noted: "Our technological supremacy is not mandated by heaven. Unless we pay close attention to it and invest in it, it *will* disappear."

A month before the Blumenthal speech, GE's Bueche suggested to an American Chemical Society gathering that "we step back and look at R&D for what it really is: an investment. It is an investment that, like more conventional investments, has become increasingly less attractive."

Bueche, along with most other research managers, rejects the idea of direct federal subsidies to industrial R&D. Instead, he points out that "perhaps 90% of the total investment required for a successful innovation is downstream from R&D, [and thus] it becomes . . . clear why we must concentrate on the overall investment climate." Bueche attacks Administration proposals to eliminate special tax treatment of long-term capital gains, plumps for more

Whether the need for such onerous penalties can be established—before an FTC judge, the full commission, then a court of appeals and, perhaps, the Supreme Court—may take years to determine. But the approach is not unusual in monopolization cases.

The Xerox case. Just a year ago, the Justice Dept. ended such a suit against Industrial Electronic Engineers Inc. by getting the California company to promise royalty-free licenses to all comers on patents it had used to dominate the market for rear-projection readout equipment for electronic data-processing systems. And three years ago, the FTC settled a complaint by getting Xerox Corp. to open its portfolio of 1,700 copier patents to competitors. Xerox had to license three patents—chosen by the competitors—free. Fees for use of the rest were strictly limited by the FTC.

As severe as those measures may seem, and as discouraging to innovation, the antitrusters contend that it is the only way rivals can eat into a monopolist's dominance of a market. Says Alan K. Palmer, assistant director of the FTC's antitrust arm: "We have to look to what relief will really be effective."



Peter Yates

You just don't have time to explore wild new ideas when a new rule is so closely coupled to your current business.
—Paul F. Chenea, vice-president for research, General Motors Corp.

rapid investment write-offs, and says "it is extremely important to provide stronger incentives for technological innovation by making permanent and more liberal the 10% investment tax credit."

Critics in industry

Bueche's arguments suggest the broad—yet often indirect—way in which federal policy runs counter to the best interests of innovation. Fear of antitrust moves from the Federal Trade Commission or the Justice Dept., for instance, has prevented many companies from sharing research aimed at a problem common throughout an industry—including new technology aimed at solving regulatory questions. At General Electric, the legal staff must now be notified if a competitor visits a company research facility, even if no proprietary material is involved.

For their part, Justice Dept. trustbusters claim that fears that their policies stifle innovation are not justified. They say they are flexible enough to recognize the differences in the pace of innovation from industry to industry, and that is why they allow a fair number of mergers among electronics companies. "That's an industry where you don't have to worry about someone cornering the market," says Jon M. Joyce, an economist in the Justice Dept.'s antitrust division. "There's just a lot of guys out there with good ideas."

Industry further claims that the inability to secure exclusive licenses on government-sponsored research leaves much good technology on the shelves, while federal attempts to market new products are often silly at best. Richard A. Neshit, director of research at Beckman Instruments Inc., recalls a government circular that waxed rhapsodic over the federal commitment of billions of dollars to R&D. Included with the letter was a syringe for sampling fecal matter, and the suggestion that Beckman might want to license the technology. "I wondered if they spent billions to develop that," Nesbit recalls. "The contrast was ludicrous."

Even national accounting procedures draw criticism from industry. A major target is the 1974 ruling by the Financial Accounting Standards Board that stipulated that R&D spending could no longer be treated as a balance sheet item, but must be listed as a direct profit or loss item in the year spent. R. E. McDonald, president and chief operating officer at Sperry Rand Corp., recently told an executive management symposium, "The ramifications of that rule change are quite complex, but the net effect has been to dry up a lot of potential venture capital investments. . . . I can say quite candidly that Univac would not be here today if we had not had the advantage of the old rule for so many years."

The shortage of risk capital has had a tremendous impact on small, technology-oriented companies trying to arrange new public financing. According to a Commerce Dept. survey, 698 such companies found $1.367 billion in public financing in 1969. In 1975, only four such companies were able to raise money publicly, and their numbers rose to just 30 in 1977. Equally ominous is the experience at Union Carbide, which, according to Tinsley, has not been able to compete for venture capital and has thus canceled plans to start a number of small operations built around interesting new technology. Years ago, says Tinsley, Carbide was reasonably successful at getting such funding. "And you must remember that these ideas are perishable," he says. "They don't have much shelf life."

The Treasury Dept., in fact, has an ongoing capital-formation task force that will be integrated into the policy review under the direction of Deputy Secretary Robert Carswell. Carswell notes that "you can't draw a clear line" between R&D support and investment in general, but "if it turns out that we find some form of capital formation gives the economy a greater multiplier effect than another form, we at the Treasury would not shy away from whatever policy would help most."

Washington's changing role

Even as it has pursued policies detrimental to industrial R&D, the federal government has withdrawn as a major initiator of innovation. Research managers generally believe that companies are better equipped than government to bring new technology to society because they are more attuned to market pull. But Lawrence G. Franko of Georgetown University, an international trade expert, recently pointed out to a congressional committee that the U. S. government has in the past played an important role "as a source of demand for new products and processes, and as a constant, forbearing customer in computers, semiconductors, jet aircraft, nuclear-power generation, telecommunications, and even some pharmaceuticals and chemicals. . . ."

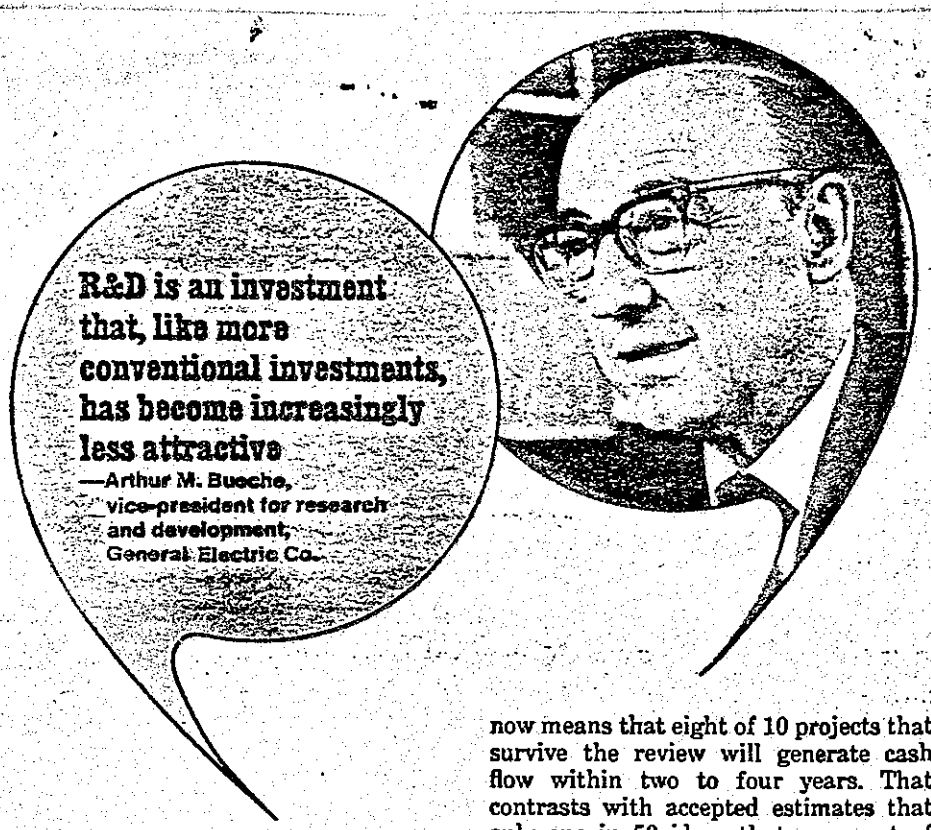
According to the Defense Dept.'s Davis, both Defense and NASA "have faded" in this role, the result of the Vietnam war and concerns over the military-industrial complex. "The consumer marketplace and other government agencies have not been able to pick up where DOD and NASA left off," she says. "The Department of Energy should be able to help with this, but it hasn't yet. And the Department of Transportation just never blossomed in this role." An unreleased IRI study for the Energy Dept. summed up industry's views. The company officers interviewed said government could spur industry's energy R&D only by creating a national energy policy, increasing its managerial competence, and offering financial incentives rather than massive contracts.

On the other hand, there have been some recent, notable government efforts to spur the innovation process. "We've talked to the leading semiconductor companies about our hopes for their innovation," says Davis. She says that the Defense Dept. expects to program $100 million over the next five years for industrial innovation in optical lithography, fabrication techniques involving

electron-beam technology, better chip designing and testing to meet military specifications, and system architecture and software implementation.

At the Transportation Dept., chief scientist John J. Fearnsides wants to involve the private sector much earlier in the government's R&D process, thereby allowing industrial contractors to develop technology alternatives instead of having to cope with rigid specifications at the outset. Such a policy, some believe, might have resulted in major savings for the Bay Area Rapid Transit system, for instance. "It is more expensive to fund a wider range of choices, but only at first," says Fearnsides.

The NSF also has announced a new industry-university grant program for cooperative exploration of "fundamental scientific questions." The aim is to make "a long-term contribution toward product and/or process innovation."



The failures of business

While agreeing on the need for federal policies that bolster innovation, those knowledgeable about industrial research think that the companies themselves share some of the blame for stagnation and must be willing to examine their practices critically. Alfred Rappaport, a professor of accounting and information systems at Northwestern University's graduate school of management, believes that one reason the U. S. lags in R&D is that the incentive compensation systems that corporate executives live under tend to deter intelligent risk-taking. "Incentive programs are almost invariably accounting-numbers oriented and based on short-term earnings results," he says. "That puts management emphasis on short-term business considerations." Another criticism has been of the haphazard way in which companies have launched new R&D programs. In essence, industry should try to learn how to weed out bad ideas early on, say the detractors. To that end, Dexter Corp. has instituted an eight-factor "innovation index" approach to research management that weigbs questions such as effectiveness of communications, competitive factors, and timing, and comes up with an "innovation potential" for new ideas. At Continental Group Inc., D. Bruce Merrifield, vice-president of technology, says that "constraint analysis" of new ideas now means that eight of 10 projects that survive the review will generate cash flow within two to four years. That contrasts with accepted estimates that only one in 50 ideas that come out of research labs ever generates cash flow, and not for seven to 10 years.

Large companies often fail to exploit their own resources effectively. In the 1950s and 1960s, some companies set up centralized research facilities, but many of these did not yield the hoped-for synergism—in many cases, apparently, because the different parts of the company were in businesses too unrelated to one another.

On the other hand, Raytheon Co. was highly successful in transferring its microwave expertise to its newly acquired Amana appliance subsidiary in 1967, resulting in the counter-top microwave oven. That was done through a new-products business group set up specifically for such purposes. And more recently, this group, headed by Vice-President Palmer Derby, brought the company's microwave talent to bear on its Caloric subsidiary's product line, resulting in a new, combination microwave-electric range.

In such ways, industry can maximize its potential for innovation in the most adverse environment. But the future health of the nation's economy, many experts believe, requires a much more benign environment for industrial R&D than has existed over the past decade. And Jordan Baruch, the enthusiastic leader of the multi-agency federal study, believes that such an environment is likely to emerge as a result of the Administration's concern.

"We may have bitten off more than we can chew," notes Frank Press, "and it may be that we can't get much done in a year. But even if it takes three or five or 10 years, I think it is historically very important." ■

Turning to Japan for venture capital

The recent drag in U. S. venture-capital commitments has opened opportunities for foreign companies to appropriate American ideas. A case in point is the experience of System Industries Inc., a Sunnyvale (Calif.) manufacturer of minicomputer peripherals.

In 1969, System Industries went to work on a new ink-jet printing process, forming a subsidiary, Silonics Inc., to develop and market it. By 1973, the research phase was over, and a cash-short System Industries went looking for venture capital to tool up for production. Unfortunately, none was there. With a depressed stock market, and recent increases in the maximum tax on capital gains that cut the expected return on such investments in half, the usual capital sources "couldn't justify taking the same risks they used to," says Edwin V. W. Zschau, the company's chairman and chief executive officer.

Keeping only 51%. Next, he explains, "we were thinking about government funding. But we were discouraged from even making a proposal when we learned the government would get data rights and be able to license it to other people. We didn't see why we should give away those rights just to get a little money." What Zschau finally did give up was 49% of Silonics to Konishiroku Photo Industry Co., the Tokyo-based maker of Konica cameras.

In return, the Japanese company has spent $5.5 million on Silonics, which is enough to bring the new printer to market at the National Computer Conference in Anaheim, Calif., in mid-June. "We have one of the most promising imaging technologies for the 1980s," Zschau now complains. "But we only own 51% of it."

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July 10, 1978

Dr. Jordan Baruch
Ass't. Sec'y. of Commerce
for Science and Technology
U.S.Dept. of Commerce
Washington, D.C.

Dear Jordan:

Please see the attached letter regarding the July 3 edition of Business Week.

Perhaps you are attempting to overcome the NIH syndrome by this massive effort so that the, by now, long-known policy alternatives are regarded by the current Administration as its own, and then you hope to begin evaluating and implementing. If so, I certainly wish you well.

Sincerely,

Betsy

Betsy Ancker-Johnson, Ph.D.
Associate Laboratory Directory
for Physical Research

BAJ:bs
Attachment (1)

File w/ editorials

Henry Kissinger, a name identified with national security, recently wrote about the rising "crisis of the spirit" in the U.S. The former Secretary of State said that "without some conception of what security is, you really will be constantly confronted with a series of confusing situations through which you cannot find your way."

It is against the backdrop of what security means today that C&EN conducts this "symposium in print" on what, in turn, innovation means today.

Man always has used technology most creatively to protect himself from danger—whether man-made such as war and equivalent attacks on society's tranquility of order, or from earthquakes, floods, plagues, and other vagaries of nature.

In the broadest sense, the biggest threat to security is disorder, or in the scientific vocabulary, entropy. Mankind's challenge is to arrange institutions and fashion inventions to create a sounder order so that it can evolve with security. The greatest challenge, then, is to establish the right institutions of governance to preserve order with liberty rather than repression. And the technological innovations nutured by government would be those that optimize security and the governance process.

Because there are significant nonmilitary threats to national security, there is a need to cast about for broader but workable definitions of innovation during a time of concern about the country's innovative capacity.

And now the White House, under assistant secretary of Commerce Jordan Baruch, is beginning an important study for President Carter on how to stimulate that capacity. The study, due to reach the President's desk next April 1, was established out of the decade-long concern that innovation in the U.S. is being stifled by combinations of federal policies and such related economic forces as inflation. The topic is already impossibly broad and the arguments even dated. The question is how the study can be made significant, whether it can help the President and his advisers perceive the kind of threats that politicians and their economic advisers commonly do not perceive.

C&EN's approach to the article is a simple one. The author asked some molders of science, technology, and corporate policy what they believe are the five major nonmilitary threats to national security. It was explained that to examine innovation, especially with the high degree of skepticism surrounding the exercise, it makes sense to define some threats to security. It is only logical that when examining innovation, one also should know what society should be innovating for.

Innovation and national security:

Innovation can contribute to both security and anarchy

