Government Research and Development

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Report Outline

Rise of Federal Spending for Research

Quacrupling of Research Outlays in a Deasde

President kennedy has asked Congress to make funds available for expenditure of a record $12.3 billion on research and development programs in the fiscal year beginning next July 1. The budget and supporting statements transmitted to Congress on Jan. 18 showed that expenditures in the amount recommended would represent an increase of $2 billion over comparable estimated expenditures in fiscal 1962 and an increase of $3 billion over the total in fiscal 1961. Approval of the budget proposal will open the way to spending for research and development in the next fiscal year an amount that will be four times the outlay made for that purpose only a decade ago.

The huge expansion of government-supported research and development projects has created difficult problems of public policy and fiscal management. Special attention centers on R & D policies within the Defense Department; seven of every ten dollars spent by the federal government for research and development in the next fiscal year will go primarily to meet national defense needs. Congressional committees have been investigating various aspects of Pentagon “contracting out” procedures under which nonprofit corporations carry on research and development work for the armed services.

Within the Executive Branch, a special Bureau of the Budget review of federal contracting procedures in scientific and technical work is now in its final stages. When President Kennedy ordered the study last July, he indicated that he would like to find out if there was any reason why government laboratories and scientists could not take over some of the scientific and technical work now farmed out under contract. A related issue, certain to be debated in Congress, concerns loss of government scientists to private industry and the resulting deterioration of the government's own capabilities in scientific fields.

An analysis of research and development programs, included in the budget message, shows that the federal government now supports more than two-thirds of all research and development work in the United States. Private industry finances about 25 per cent, and foundations, educational institutions and state and local governments provide the remaining support.

Amount of Expenditures and Types of Research

Of the $12.3 billion proposed for expenditure by the federal government on research and development programs in fiscal 1963, $8.5 billion is to meet national defense needs. Much of the $3.8 billion scheduled for other federal research and development programs will go to finance non-military space programs of the National Aeronautics and Space Administration. The Department of Health, Education and Welfare and other agencies which engage in medical research also will receive R and D funds.

The federal government now supports more than three-fifths of the country's medical and health-related research. Total obligations of federal agencies for the conduct of such research and for the research facilities are estimated at slightly more than $1 billion in fiscal 1963 as compared with $875 million in fiscal 1962 and $623 million in fiscal 1961. The National Institutes of Health, administered by the U.S. Public Health Service, alone awarded grants totaling nearly $312 million for medical research in fiscal 1961.

The Nasa budget reflects the nation's enlarged effort to achieve predominance in space. Nasa is responsible for the development, testing, and operation of space vehicles for manned and unmanned exploration of space and other non-military applications, and for conducting the broad supporting programs of research and development. In addition, the agency has jurisdiction over research to advance aircraft and missile technology in support of both military and civil interests.

Expenditures for space research and development are expected to amount to about $2.4 billion in fiscal 1963, compared with $1.3 billion in fiscal 1962 and $744 million in fiscal 1960. The cost of research and development on manned space flight programs, which are intended to lead to a lunar landing and return within the present decade, is estimated at $1.2 billion in fiscal 1963 alone.

The rate at which federal expenditures on research and development have been increasing in recent years hardly can be maintained indefinitely. Alvin M. Weinberg, director of the Oak Ridge National Laboratory, has pointed out therefore that “We shall have to devote

much more attention than we do now to making choices between science projects in very different fields." [1]

Other scientists have asserted that while research and development costs have increased phenomenally in the past decade, the actual volume of technical effort has grown much more slowly. A study by the former Operations Research Office at Johns Hopkins University sought to demonstrate that for 4½ times as much money as was spent in 1950 the country in 1960 was getting only a little more than twice as much research and development activity. The major elements in cost increases have been higher salaries for scientific personnel and larger overhead. The study suggested resort to a cost-of-research index to reach realistic evaluations of investment in dollars versus man-years of effort. [2]

Controversy Over Federal Aid to Basic Research

Controversy has arisen over the extent of federal expenditures for basic research, aimed to increase fundamental scientific knowledge, as opposed to applied research. Within the $12.3 billion total for federal research and development in fiscal 1963, expenditures for basic research will increase to about $1.6 billion as compared with about $1 billion in fiscal 1962 and $800 million in fiscal 1961. Much of the increase is attributable to Nasa and its manned space flight programs. The Department of Defense, slated in fiscal 1963 to expend $7.1 billion for research and development, will spend about 4.5 per cent of this amount for basic research.

Sen. Hubert H. Humphrey (D Minn.), chairman of a Senate Government Operations subcommittee on reorganization and international organizations, asked at subcommittee hearings last July 26: "Why is it that in report after report the Department of Defense has been advised to increase the proportion of its spending which it allots for basic research and, yet, despite this fact, year after year the respective services have hardly asked for any increases in basic research?" Harold Brown, Director of Defense Research and Engineering, Office of the Secretary of Defense, told Humphrey that basic research always competes with other needs and "has the unfortunate characteristic of being less urgent, although not thereby less important, than other matters, and things are often decided on the basis of urgency rather than on the basis of importance."

Basic research has been denned in the classical sense as research directed toward discovery of new facts and laws of nature without respect to possible applications. It requires virtually complete freedom for the scientist to push in any direction he chooses. Quick results cannot be expected because, as one scientist has written:

It [basic research] is only tenuously connected with specific application. Its chief justification and motivation is for a better and more profound understanding of natural phenomena. At times it aims to test accepted or proposed natural laws under various circumstances. At other times it is frankly a search and exploration of new phenomena in a field where such phenomena are suspected for reasons which are partly intuitive. The general aim is always dictated by the desire to know more about the phenomena of nature, to connect these phenomena with others and to round out a more consistent picture of the natural world. [3]

Costs of research are becoming so great that the principle of unqualified government support for basic research is running into trouble. Richard H. Bolt, associate director (research) of the National Science Foundation, has said that value judgments are going to have to be taken into account in granting federal support for science to an extent that would have been unthinkable a few years ago. The overriding question for national scientific policy, he stated, is how to make such judgments without killing the initiative of individual investigators. [4]

Dangers of Government Dominance in Research

In his farewell address to the nation, Jan. 17, 1961, President Eisenhower spoke of dangers raised by a technological revolution that had brought sweeping changes in the nation's industrial-military posture. "In this revolution," Eisenhower declared, "research has become central; it is also becoming more formalized, complex and costly. A steadily increasing share is conducted for, by, or at the direction of, the federal government."

Today, the solitary inventor, tinkering in his shop, has been overshadowed by task forces of scientists in laboratories and testing fields. In the same fashion, the free university, historically the fountainhead of free ideas and scientific discovery, has experienced a revolution in the conduct of research.

Partly because of the huge coats involved, a government contract becomes virtually a substitute for intellectual curiosity. For every old blackboard there are now hundreds of new electronic computers. The prospect of domination of the nation's scholars by federal employment project allocations, and the power of money, is ever present—and is gravely to be regarded.

Colleges and universities and associated research centers received approximately $760 million in fiscal 1960 under government contracts for research and development projects, and the annual total on this account is now believed to approach $1 billion. Educators have been engaging in lively debate on the question whether the increasingly close relationship between the universities and the federal government will unbalance academic programs. [5]

To allay fears that it may do so, the Bureau of the Budget issued a circular, Jan. 7, 1961, setting down policy guides for research and development projects carried on by educational institutions under federal grants or contracts. The circular stated that each college and university “should be encouraged to conduct research in a manner consonant with its academic programs and institutional objectives while fulfilling its contractual responsibilities.” A directive by Secretary of Defense Robert S. McNamara, Oct. 26, 1961, provided that long-term planning and funding of basic research was to be employed by the Defense Department to the maximum possible extent, and that the grant instrument—as opposed to the contract—was to be preferred as a method of supporting basic research by educational and other non-profit institutions.

No reversal of the trend toward ever-greater government participation in research and development projects by universities is expected. The National Aeronautics and Space Administration disclosed a new plan last November to establish space study laboratories at campuses across the nation. The announcement followed by a month a plea by James Van Allen, head of the physics department at Iowa State University, that the government make American universities “full-fledged partners” in the national space effort by giving more financial assistance.[6] A major policy study by the National Science Foundation, published last July 9, concluded that the United States will have to treble its investment in scientific education and research in the universities to meet its scientific needs in the next decade.

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Government Employment of Scientists

Of the total federal expenditures for research and development, almost 70 per cent are made through contracts with private industry; about 10 per cent through grants and contracts with universities and other non-profit institutions; and the remainder directly for activities of laboratories and other facilities of the federal government. The government employs more than 128,000 scientists and engineers in administrative agencies and in its own research laboratories.[7] Around one-third of the total number are engaged in research and development work.

Pay Scales and Resultant Staffing Problems

Pay for government scientists and engineers ranges from a starting salary of about $5,000 to a ceiling of $19,000 a year. These salary scales no longer approach those prevailing for scientists in private industry, non-profit research organizations, and some universities. As a result, in 1960, more than 500 senior scientists in civil service grade 13 ($13,700 a year) and higher grades gave up their government posts.

The present situation contrasts sharply with that in the 1930s. Being able to compete effectively for scientific talent at that time, the government built up the staffs of the Bureau of Standards, the Naval Research Laboratory and other installations until they gained prestige comparable to that of university research centers. For a time after World War II the government could still attract and hold scientists of first rank because its laboratories were breaking new ground in various fields.

Difficulty in hiring and keeping scientific personnel was felt increasingly with the development of automation in industry, the mushrooming of electronics enterprises, and the leap into the missile and space era. Because government laboratories could not be expanded rapidly enough to meet the demand of the armed services for research and development projects, contracts for work were let to private concerns and to universities on a large scale. In some cases, non-profit research corporations were set up primarily to carry out government research, particularly for the Department of Defense. These non-profit groups, as well as business corporations, liberally supplied with public funds, were able to pay substantially higher salaries than the government could pay directly to scientists in the civil service.

The director of a government laboratory, for example, receives a top salary of $19,000 and limited fringe benefits. A comparable scientist under contract to a private corporation may receive $35,000 a year, fringe benefits, and a stock option arrangement which could make him wealthy if all goes well. His counterpart in a non-profit corporation may receive $40,000 and general fringe benefits (but no stock option). Such disparities have speeded the exodus of senior scientists from government, an exodus which, if continued, may threaten the government's competence to manage effectively its expanding research and development programs.

Plans for Holding Scientists in Space Program

To prevent further loss of scientific talent, the Kennedy administration at first thought of recommending to Congress that the pay of senior scientists be increased to as much as $25,000 or $30,000 a year. But it had second thoughts about singling out one category of government workers for special treatment. Hence the President in his budget message asked “some adjustment in nearly all [civil service] salary grades.” But he said it was “clear that the higher grades have fallen farthest below the level of reasonable comparability [with private enterprise salaries] and must therefore be given the greatest percentage increases to make the government competitive.”

The administration is reported to have been considering a plan under which the government would sponsor creation of a non-profit corporation that would contract to operate the national space program. This suggestion grew out of a visit by Vice President Lyndon B. Johnson to space installations in the West last autumn. Johnson is statutory head of the national space program by virtue of his position as chairman of the National Aeronautics and Space Council, set up by Congress in 1961. He and others responsible for the space

program have been disturbed by the high turnover of government space scientists.

In one instance, a key man drawing the top government salary for a scientist—$19,000—was hired away from the National Aeronautics and Space Administration by an offer of $27,000 from a private company. Nasa's moon project office lost two experts to industry within a month. As federal workers, both were in the $15,000 bracket; now one is earning $27,000, the other $35,000 a year.

If the plan to curb such losses of scientific talent by putting the space program in the hands of a non-profit corporation should be submitted to and approved by Congress, the corporation would be able to hire, at going rates in industry, the men Nasa believes it needs to staff the moon project and other vital space programs. The corporation would then assign its scientists to Nasaheadquarters and various agency facilities, where they would work for the space agency in all except legal fact.

Efforts to Upgrade Armed Forces Laboratories

The problem of holding scientific personnel is being attacked in quite a different way in the Pentagon. Defense Department policy is to try to reverse a long trend toward farming out supervisory and other work to profit-making or non-profit scientific management firms.

The government itself now has 100 research and development installations under military management, of which about 25 are regarded as major establishments. Numerous reasons for keeping R & D within these Defense laboratories have been cited. Government-operated laboratories form a spearhead for continuous research peculiar to military needs and make it possible for the military to subject contract research and development programs to independent review. The laboratories provide organizations that manage or help manage weapons systems development and test programs. They play an essential part also in the technical education of military officers.

A memorandum of instructions issued last Oct. 14 by Defense Secretary McNamara was designed to strengthen the “in-house” laboratories and bolster the morale of their employees. The memorandum said the government laboratories were to be used as “a primary means of carrying out Defense Department programs” and were to provide “scientific and technical advice in the exercise of government responsibility for development and acquisition of new weapons.” The laboratories were to be given increased status in the chain of military command. Officer scientists in responsible jobs were to be rotated less frequently. Laboratory directors were to be allotted funds which they could spend on promising research work without prior approval or review at higher levels.

McNamara said in the memorandum that the Pentagon would attempt to increase the number of job billets in the special technical “super” civil service grades paying salaries up to $19,000. At present, 603 Pentagon employees hold such posts. “Working with other interested government agencies as appropriate,” McNamara added, “the Department of Defense will make every effort to secure compensation for its senior personnel which, commensurate with the responsibilities which they exercise and with their professional talent, are consistent with levels set outside as well as inside the government service.”

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Contracting-Out of Research Projects

Despite talk of bolstering “in-house” capabilities in military research and development, little diminution of contracting-out practices is foreseen. Establishment of non-profit laboratories has offered a practical and expeditious way to meet urgent needs. Such laboratories are believed to afford a valuable detached viewpoint: they are able to treat cross-service problems without generating friction. Finally, as Harold Brown, the Pentagon's research director, pointed out last October 19, “We have employed non-profit organizations to work in areas in which it would be quite improper to use an industrial organization but in which we could not, as a matter of practical fact, otherwise acquire the proper people or facilities at the proper time—and still get a critical job done,”

Growth of Contracting-Out by Defense Agencies

About 350 non-profit companies have been set up in the past decade to perform services for the government, largely in the missile, electronic and nuclear fields. More than 30 departments and agencies of the federal government now contract for research and development. Growth of this new pattern in research has been described as revolutionary:

The net, logical division of labor among the government, industry, and the universities has broken down. In its place stands a single structure linked together by a network of grants, contracts, and research corporations. The government by the very nature of its interest in survival is the major component of the new structure. Both the universities and industry look to it as the prime source of research funds and clues for the direction which research must take.…The phrase “federalism by contract”…accurately describes the state of affairs.[8]

Government research contracts provide for (1) research of the contractor's choice, usually basic research at a university; (2) research aimed to solve specific problems arising in the conduct of government programs; or (3) management and operation of government-owned research facilities.

The armed services have approached the problem of integrating military requirements and controls with industrial planning and organization in various ways. The Army, for example, used its own facilities and know-how to take the Red stone and Jupiter missiles from basic requirements through the production of prototype missiles. The Navy long has relied on its own Naval Research Laboratory for the bulk of its research and development work. At the other extreme is the Air Force which, because it had few laboratories of its own but received a major share of missile and space development funds, turned to private industry for the large number of scientists and engineers required to manage and coordinate a complex weapons program.

Aerospace Corporation as Agent of Air Force

Foremost example of the weapons system management concept is the relationship of the U.S. Air Force with Aerospace Corporation, which serves as technical manager of Air Force missile and space projects.[9] Aerospace, employing 800 scientists and engineers and 2,100 administrative employees, has headquarters at El Segundo, Calif. Probably the largest non-profit company working-for the government, it will receive between $60 million and $65 million in government funds in the current fiscal year.

The company was established in the summer of 1960 to end a controversy growing out of the Air Force's previous arrangement for technical management of its space and missile programs. From 1954 through June 1960, that job had been performed in the main by a unit of Ramo-Wooldridge Corp., now Thompson Ramo Wooldridge, Inc., a profit-making corporation. Ramo Wooldridge had brought together scientists and engineers for the Air Force job in what is now Space Technology Laboratories, Inc., a Thompson Ramo Wooldridge subsidiary. Space Technology Laboratories also served the Air Force as an analyst of proposals for future space projects submitted by other private manufacturing companies.

Because of the privileged position occupied by Space Technology Laboratories in its relationship with the Air Force, Thompson Ramo Wooldridge was barred from holding production contracts for components of missiles on which Space Technology Laboratories was serving as technical manager, and from holding production contracts on any Air Force space project. This restriction was disliked by the parent company, which wanted to bid for the more lucrative production contracts for missile components. Other companies, fearing that the contract ban might be lifted some day, resented manufacture of prototypes of rocket stages and instrument packages by Space Technology Laboratories.

The non-profit Aerospace Corporation, resorted to as a way out of this tangle, is barred from making missile hardware and is supposed to perform only general design and engineering work, leaving detailed matters to hardware contractors. Aerospace's research and planning division conceives ideas for new space vehicles and evaluates other such proposals from industry, universities and governmental units, including the Air Force itself. When a new space program is approved, the corporation's engineering division draws up general specifications and oversees the project through manufacture and testing. A laboratories division works primarily on problems connected with space programs.

Executives of profit-making companies concerned with missiles and space are said to look upon Aerospace and similar concerns as "vigorous competitors in the field of weapons design and management."[10] Some fear that the role of Aerospace eventually will be broadened to include manufacturing. Aerospace as a result has undergone periodic congressional scrutiny. The House Appropriations Committee last spring cut $5 million out of funds destined for the corporation's proposed $35 million basic support budget, after complaining that "Salaries paid by the Aerospace Corp. are too high and it plans to employ too large a staff."

Federal agencies and private industry alike tend to view such non-profit intermediaries as Aerospace as piratic employers of scarce or highly prized scientific personnel. About 40 per cent of Aerospace's technical staff was recruited from Space Technology Laboratories at little or no increase in pay. But in a report on May 1, 1961, the House Government Operations Committee found that about one-third of Aerospace's scientific and technical employees were making 8 per cent more at Aerospace than on their previous jobs.

While critical of salary disparities, the committee report said it was unlikely that such contract agencies as Aerospace would be eliminated. "The increasing sophistication and proliferation of weapon systems, the swiftly accelerating pace of weapon and space technologies, and the compelling competition with the Soviet Union, are factors which favor the retention and continued use of contract agencies for technical management and other specialized functions."

Policy Questions in Use of Outside Consultants

A more serious question than salary levels is whether use of agencies like Aerospace militates against the buildup of sufficient technical competence within government agencies to insure sound decision-making and effective supervision of contractors. However, as the House committee noted, "One rarely hears such concern expressed about the Atomic Energy Commission." The technical competence of A.E.C. resides in its laboratories and other field research facilities and installations, all of which are contractor-operated. In 1960 the A.E.C. had 130 prime contractors operating 158 establishments for atomic energy work. Twenty-nine of the prime contractors operated 38 government-owned facilities.

Victor K. Heyman, an expert on public administration, sees the contracting-out device as possibly the only way of "pleasing both those who want a small government and those who want big new governmental programs." He has warned, however, that civil service and military personnel never will gain the knowledge and experience required to perform the functions in question if it contracts for them every time they are needed. As for salary disparities, Heyman comments: "One of the ironic features of the present situation is that the

government is indirectly paying these people [scientists and others] what it will not pay them directly." "

Assuming that the government needs expert outside help in weapons systems management and technical supervision, it still does not follow automatically that it should rely to an equal extent on outside management analysis and consultant services. The so-called "think groups" are usually classified as consultant-type services. The Air Force established the first of these groups, the RAND Corporation, to provide expert assistance and advice on questions involving almost anything from military strategy and tactics to disarmament, political analysis, and economics.Rand started with five employees in 1946; it now has more than 850 workers and an annual budget of $13.5 million.

Groups similar to Rand include the Mitre Corporation (Air Force); Institute for Defense Analysis (Department of Defense); Human Relations Research Office, George Washington University (Army); and the Naval Warfare Analysis Group and Operations Evaluation Group, Massachusetts Institute of Technology (Navy). Heyman has noted that these groups "are for all intents and purposes government organizations, except that they are not government-owned, their personnel are not civil service and are not subject to the Hatch acts, and they are not protected against a sudden decision by the government to end the contract."

Risks of Conflicts of Interest for Scientists

A special investigations subcommittee of the House Armed Services Committee, headed by Rep. F. Edward Hébert (D La.), was reported last November to have begun a preliminary inquiry into whether any scientists were utilizing their knowledge of government programs for personal gain. Of special interest was whether university consultants to non-profit research corporations affiliated with the Defense Department were making use of inside information on research contracts to profit from speculation in the stock market.

The Pentagon is now working on a policy statement designed to assure observance of high moral standards in the non-profit corporations. It is expected that the directive will require disclosure of any private interests that might conflict with responsibilities undertaken in a nonprofit corporation, disqualification for work on particular matters, and restrictions on use of inside information. It has been reported that the Defense Department is considering also a regulation to require its scientific advisers to list their private financial interests and consultancies.

A Justice Department ruling in 1959 has been interpreted as barring a scientific adviser to a government agency from serving as consultant to a private concern performing re search work for the agency. Strict adherence to this interpretation of the conflict-of-interest laws would make it difficult for the government to obtain the advice and assistance of outside scientists. Justice Department officials stated, Jan. 7, that they would ask Congress to ease application of the pertinent statutes to scientific consultants. Such action would benefit the Atomic Energy Commission which, on advice of the Justice Department, has ruled that scientists on its General Advisory Committee may not act as consultants to private corporations engaged in research sponsored by the commission.

Criticism of Action to Evade Salary Ceilings

The harshest language used to describe the current contracting-out methods of the federal government came from the House Appropriations Committee when it reported the Department of Defense appropriations bill for fiscal 1962. The report, June 23, 1961, asserted that use of contracts with non-profit organizations was "merely a subterfuge to avoid the restrictions of civil service salary scales." It said the committee had considered forbidding payment of salaries in these organizations substantially in excess of applicable federal pay rates. It refrained from doing[11] so because "it was felt that such a drastic action would bring about delays in vital military programs now under way and create further confusion rather than eliminate it."

But the committee declared it would insist that the Secretary of Defense "establish and announce a realistic policy with respect to this problem prior to the presentation of the next annual Defense estimates." It warned: "In the absence of any such policy, the committee expects to recommend, that severe restrictions be imposed on these and other similar corporations and organizations."

This threat from Congress set in motion a series of reviews in the Department of Defense and elsewhere in the administration. A top-level study group on contracting-out policies was formed at the Pentagon. Adam Yarmolinsky, special assistant to Defense Secretary McNamara, was assigned to work out a common policy for the military departments and the office of the Secretary.

President Kennedy ordered a review, July 31, of the extensive use of contracts for operation and management of government research and development facilities and programs. The White House directive to Budget Director David E, Bell took no strong stand on either side of the question. At the same time, however, the President said: "I would … like to have full consideration given to the limitations which make direct federal operations difficult, and to the development of proposals for adjustments and new concepts in direct federal operations which would provide the government with greater flexibility in determining whether the public interest would best be served by the use of contractor or direct government operations."[12] Results of the study were to be submitted to the President no later than last Dec. 1, but the report now is not expected earlier than February.

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Federal Policy on Patent Rights

Differences in Practices of Different Agencies

The fruit of research is invention. Legislation may be considered at the present session of Congress on the question of who should own patent rights for inventions developed out of research projects financed by the federal government. Lined up on one side are those who think the government ought to take title to all inventions developed under its research contracts. On the other side are those who think title ought to go to the companies doing the actual research.

No consistent federal policy has been adopted. The Department of Defense requires only that the government receive a royalty-free, non-exclusive license to reproduce for government purposes inventions that may grow out of research and development contracts. Title to the inventions, and all commercial rights, remain with the contractors. A diametrically opposed policy is followed by the Atomic Energy Commission and the National Aeronautics and Space Administration. Those two agencies are required by law to take title to inventions unless it can be shown that the public interest requires a different disposition.

In practice, the policy of Nasa has been to turn patents over to private companies but to retain for the government not only a license to use an invention but also the right to license its use by other companies. The latter stipulation is important because the government usually grants licenses free while private companies charge for them. There has been a tug of war between those who would bring Nasa policy more closely in line with that of the Department of Defense and those who would move in the reverse direction. The House passed a bill in 1959 to revise NASA patent provisions and impose the Defense Department's policy on the space agency. No action was taken on the measure in the Senate.

Actually, the Department of Defense has adopted a policy in recent years of taking title, under certain circumstances, to inventions made possible by government expenditures. A regulation issued in 1960 listed as examples of situations in which the government might take title: (1) Key patents in a new technological field; (2) where the principal duties of a contractor are those of managing the work of other contractors, and (3) where the health or safety of the public is directly involved. The Defense Department in 1961 adopted Nasa's policy with regard to contracts dealing with satellite communications and other space efforts.

In most cases, however, Defense Department contractors still are allowed to retain title to patents for commercial exploitation for 17 years under current patent law. These by-products of defense research have proved extremely valuable. “Besides the well-known advances in aircraft and communications equipment, Defense Department sponsorship has led to countless other new products — plastics and adhesives, high-temperature alloys, miniature electronic components, automation equipment, computers, insecticides, drugs and blood plasma substitutes—all having value to the civilian consumer. Dehydrated soups, frozen vegetables, and ‘TV dinners’ have resulted from research paid for by defense dollars.” [13]

Private Vs. U.S. Government Ownership of Bights

The argument for private ownership of patent rights is that government ownership departs from the basic concept of a free enterprise system. Unless private companies are given the right to exploit the product of their work, there will be little incentive for them to undertake government research contracts. “When the government, by contract, directs a company to turn [its] talent loose on a problem, it is hiring a service. It receives the solution for which it pays; it should not then deny that team or that company the right to use the product of its own skill for commercial purposes.” [14]

The counter-argument has been put forward by Vice Admiral Hyman G. Rickover, who helped to develop the nuclear submarine. He contended before a Senate Judiciary subcommittee on patents, trademarks and copyrights, June 2, 1961, that the Defense Department was following a policy of “giving away inventions paid for by the American people.” The suggestion that federal agencies could not get companies to accept research contracts unless patent rights were surrendered struck Rickover as “fanciful nonsense.” He said: “I think it important that it be generally known that the principal defenders of the patent give-away policy … are members of the patent bar, and that in defending this policy they are defending their own special interest rather than the public interest,”

Rickover charged that exponents of a liberal patent policy were demanding for themselves a status different from that which they were willing to grant their own employees and subcontractors. For the most part, patents now go, not to the inventor, hut to those who employ him and provide him with research facilities. “By depriving employed inventors of any right to the products of their inventive brains, industry has precluded itself from making a valid claim to inventions paid for by government funds. Once you disregard the claims of talent, know-how, and personal effort in favor of the claims of monetary investment in research, you have to accept the fact that patent rights lodge entirely in whoever pays for the research that produces inventions.”

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Footnotes

[1] Alvin M. Weinbere, “Big Science: A Liability?” *Context*, Fall 1961, P. 3. Sea “National Science Policy,” *E.R.R.*, 1960 Vol. I, p. 361.

[2] *A Proposed Cost of Research Index* (Study prepared by Operations Research Office, Johns Hopkins University, under contract with Department of the Army). September 1930.

[3] I.I. Rabe in *Basic Research in Electronics*, a report prepared by a working group in the Office of the Assistant Secretary of Defense for Research and Development, May 22, 1966.

[4] Speech at annual meeting of American Meteorological Society, New York, Jan. 25, 1961.

[5] See “Government, Business and Higher Education,” *E.R.R.*, 1961 Vol. I, pp. 205–216.

[6] Speech before American Rocket Society, New York City, Oct. 10, 1961.

[7] Latest available total, as of October 1960, supplied by National Science Foundation. In 1931 fewer than 14,000 scientists and engineers were employed by the federal government. The number rose to 48,000 in 1838; 75,000 in 1847; 100,000 in 1951; and 121,000 in 1958.

[8] A. Hunter Dupree, “Perspectives on Government and Science,” *Annals of the American Academy of Political and Social Science*, January 1960, p. 26.

[9] Defense Secretary McNamara last March 8 assigned to the Air Force responsibility for filial research and development of military space systems. The Army and Navy were given authority to conduct preliminary research where it concerned their assigned functions.

[10] *Wall Street Journal.* Dee. 4. 1961.

[11] Victor K. Heyman, “Government by Contract: Boon or Boner?” *Public Administration Review*, Spring 1961, p. 69.

[12] See *Congressional Quarterly Weekly Report*, Aug. 11, 1961, p. 1411.

[13] Douglass Cater, “Is Our Patent Law Out of Date?” *The* Reporter, Jan. 18. 1962, p. 85.

[14] Rep, Emilio Q. Daddario (D Conn.), “A Patent Policy for a Free Enterprise Economy,”*American Bar Association Journal.* July 1961, p. 673.

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Special Focus

Federal Expenditures for Research and Development, Fiscal Years 1953–63

(in millions of dollars)

Fiscal year	Defense	Other	Total
1953	2,832	269	3,101
1954	2,868	280	3,148
1955	2,979	289	3,268
1956	3,104	332	3,436
1957	4,027	433	4,460
1958	4,463	523	4,985
1959	5,048	744	5,792
1960	6,639	1,103	7,742
1961	7,719	1,572	9,291
1962 (est.)	7,820	2,424	10,244
1963 (est.)	8,572	3,793	12,365

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