cc → M.L.

INTERNATIONAL CONFERENCE ON
TECHNOLOGY TRANSFER IN INDUSTRIALIZED COUNTRIES

ROLE OF GOVERNMENT IN PROMOTING TECHNOLOGICAL INNOVATION

Summary of Remarks by William G. Wells, Jr.
Committee on Science and Technology
U.S. House of Representatives

November 8, 1977

The role of government in promoting technological innovation is a political issue which all too often has been primarily considered in managerial, organizational, economic or methodological terms. Yet, it has been fraught with political controversy arising from deep-seated divisions of opinion since the Constitutional Convention. Jefferson had wanted a stronger expression of support of science in the Constitution, but the end result was the relatively short patent clause. All subsequent federal roles and support concerning science and technology have been derived from defense and common welfare provisions.

Presidential and Congressional interest has waxed and waned over the years, but particularly since World War II. The spectacular achievements arising from the application of science and technology in the war effort led to major innovations which, in an incredibly brief time, resulted in the creation of new industries, major restructuring of some, and the destruction of others. In the aerospace, electronics, nuclear, and petrochemical fields, vast new complexes of industrial, government, and university research centers were established as one result of political decisions by Presidents Roosevelt and Truman to extend the government's responsibilities for science beyond its own establishment and to couple science and government to serve national interests.

The Eisenhower years marked a period of rapid growth in support of Federal R & D -- but the growth was largely in the defense, atomic, and space sectors. No conscious attention was given at the presidential level -- in a business-oriented Administration -- to the transfer of technology to the private sector. Implicit in Eisenhower's support of R&D was that the Federal Government would provide the support and set the objectives, and that the private sector -- universities and industry -- would provide the required innovations. For example, eventually, requirements arising from the space program and defense activities led to the stimulation of great advances in electronics, communications, and computers. The Government was a large-enough customer to support the development of a range of technologies which became dispersed throughout the economy.

The arrival of Kennedy in the White House brought a change in attitude about the government's role in the innovation process; not only would money, facilities, and objectives be provided, but for the first time at the

presidential level it became presidential policy to strengthen civilian technology. Wiesner, Kennedy's Science Adviser, had long been preoccupied with ways of keeping the American plant from running down too badly, and his concern was influential in initiating a long-term debate on the policy question facing this panel: what is the proper role of the Federal Government with respect to industrial research and the "reinvigoration of American industry." In a not very successful effort to bring about the necessary reinvigoration, an Assistant Secretary of Commerce for Science and Technology was appointed, and a Civilian Technology Panel was created to work with the Commerce Department and the President's Council of Economic Advisers.

Subsequent Administrations varied in their interest in the issue; Johnson was favorably inclined, and eventually agreed to the establishment of the State Technical Services Program proposed by an energetic Assistant Secretary of Commerce for Science and Technology: Herbert Holloman. Authorized by legislation, the Act of 1965 called for the promotion of economic growth by accelerating dissemination and utilization of scientific and technological knowledge by industry. From the beginning, the program was opposed by important segments of industry and powerful Members of Congress -- and it eventually was killed in 1970. The State Technical Services Program was part of why we are having this meeting this week: by the mid-1960's the subject of technology transfer was emerging as a major public policy issue.

The Nixon Administration had a much more ambivalent attitude about the government's role. On the one hand, the President was very much taken with technological spectaculars and the notion that "if we can go to the Moon, why can't we .....?" In part, such thinking led to the New Technological Opportunities Program which started out as a multi-billion dollar plan to apply and transfer technology on a grand scale to the private sector. After much work and close examination by the White House and Office of Management and Budget staffs, it became embarassingly clear that the New Technological Opportunities Program approach would not work -- primarily because it was ultimately recognized that not much really was known about the technology transfer and innovation processes. Furthermore, David, Nixon's Science Adviser, held strong views that the Government did not really know anything about industrial innovation and should leave the innovating to industry. The upshot of the Nixon foray into technology on a grand scale were two relatively small efforts intended to investigate ways for the Federal Government to assist and encourage innovation. An R&D Assessment Program was placed in the National Science Foundation and the National Bureau of Standards acquired an Experimental Technology Incentives Program. These two programs have been the source of funding for much of the policy analysis and experimental work which has been conducted on the topic of this panel.

Taken together, the efforts of government <u>specifically</u> directed at technology transfer have not been overwhelmingly successful. There remains much controversy over how various policy alternatives should be employed.

For example:

1. Expenditure patterns and mechanism by the government in the form of resource allocation decisions and procurement strategies can be looked at retrospectively -- in the context of innovation -- but there has been little demonstrated success in developing broad-gauged innovation policies.

2. To some extent, the Federal tax system has been looked at as a medium to encourage technological innovation. But the empirical evidence for supporting significant use tax system (e.g. tax credits) is sparse, and there are arguments by those (such as Mansfield) that it is too blunt an instrument. On the other hand, the National Bureau of Standards has strongly supported the use of tax policies to promote innovation. Congress remains unconvinced, and more debate is required before significant measures in this area would be possible.

3. The establishment of specific technology transfer and innovation-inducing agencies within the government has a mixed history. As noted earlier, a variety of approaches have been used during the past several decades -- but most of the evidence is anecdoted and qualitative. Indeed, Brumm and Hemphill [1] note the lack of evidence (as have others) that such programs have been cost-effective. It is easy to agree with their argument that a pressing need exists to bring more factual information to bear on existing theories and paradigms. More generally, we are not much advanced from the period when the Nixon Administration realized that little was really known about either the nature or the processes of industrial innovation. From a public policy point of view, as Pavitt and Walker suggest, there is a clear need for a better understanding of both.[2] A California Institute of Technology report reaches a similar general conclusion -- however, it is suggested that the most effective type of policy for increasing innovative performance in areas where it is deemed socially desirable to do so is likely to be a system of grants and prizes, administered by several agencies having overlapping responsibilities.[3]

4. Edward E. David, former Science Adviser to President Nixon, has testified before the Congress that the relationships between regulatory activities and science and technology will constitute one of the major policy issues for the next several decades. There seems to be little disagreement with David's view; however, there is much controversy on whether or not regulation has, on balance, been beneficial or detrimental to the overall rate and direction of innovation in industries subject to regulation. [4]

---

1 Harold J. Brumm, Jr. and John M. Hemphill, The Role of Government in the Allocation of Resources to Technological Innovation, Report to NSF, October 1, 1975 under Grant No. RDA 74-23122.

2 K. Pavitt and W. Walker, "Government Policies Towards Industrial Innovation: A Review", Research Policy. 5 (1976).

3 Government Policies and Technological Innovation, Volume I, Project Summary, Cal Tech, no date.

4 Technological Innovation and Federal Government Policy, NSF 76-9, January 197

5. Patent policy.

a. In the 94th Congress, the subject of the impact as either an hinderance or an incentive to American technological advance of patent policy and other government regulatory activities became increasingly clear. Mr. Thornton, as Chairman of the Domestic and Scientific Planning and Analysis Subcommittee of the Committee on Science and Technology chaired three hearings in the general area of government research and development where this potential was highlighted. These hearings were on Intergovernmental Dissemination of Federal Research and Development Results, held in November 1975; Federal Research and Development Expenditures and the National Economy in April and May 1976; and, Interagency Coordination of Federal Scientific Research and Development in July of 1976. A final series of hearings, Government Patent Policy (The Ownership of Inventions Resulting From Federally Funded Research and Development), were held to allow a singular focus on the issue of federal patent policy.

b. From a broader perspective the concerns that have led individuals in government and the private sector to focus on the potential impact of federal patent policy is, first, the role the federal government should play. The Constitution in Article I, Section 8, Clause 8 states in part: "The Congress shall have Power... To promote the Progress of Science and Useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries..." The Supreme Court in U.S. v. Dubiliar Condenser Corporation, took the position that the courts would not consider policy issues related to patent decisions when an invention invloved federal monies. The Court considered this a function of the Congress.

c. Congress has acted, But, in a fragmented, Agency by Agency way with the result being at least twenty one different policies to determine inventors' rights when inventions result from federal research and development funding. In addition, Agencies with unclear statutory authority must rely on interpretation of a Presidential Memorandum originally issued in 1963 and modified by President Nixon in 1972. This raises concern with the equity of government action when an individual inventor's rights may differ not only from agency to agency but from department to department within an Agency.

d. The legislation entitled the "Uniform Federal Research and Development Utilization Act of 1977" was proposed to address these issues. Basic provisions are those which provide for a uniform patent policy for all inventions resulting from federal research and development. This policy states that title shall be retained by the inventor. However, public interest in the development and utilization of inventions is also considered and strong march-in provisions are provided to insure this utilization. Action on this legislation is pending for the second session of the 95th Congress.

Conclusion:

In addition to the history and the wide range of topics touched on in this paper, it may be useful to report the current thinking in the Executive Office. In the closing days of the Ford Administration, two advisory groups appointed by President Ford under the leadership of Vice President Rockefeller met and identified 73 major issues which should be considered by the new office of Science and Technology Policy. At least 10 of the issues pertain directly, and many others indirectly, to the subject of this panel. For example, one specific issue was: "How can potential barriers to innovation be identified and reduced or eliminated, and what mechanisms are appropriate to accomplish these objectives on a continuing basis?" A second issue was: "Can some clarity be provided with respect to the question of the proper roles of government and the private sector in pursuing the use of science and technology in achieving national goals?"

This cluster of issues and the subject of this panel are high on the priority list of Dr. Frank Press, Director of OSTP and Science Adviser to the President. A large number of meetings have been held with representatives of industry, OECD, and others, as part of a series of exploratory investigations. The current status of the review as follows: a formal study plan is being prepared in association with the Department of Commerce and its Assistant Secretary for Science and Technology, Jordan Baruch. It is an accurate summary to say that all or most of the issues identified in the early advisory group study are being considered within the overall Executive Office study. It is expected that a plan will be presented to the President within several months.

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

WILLIAM G. WELLS, JR.

Mr. Wells has held the position of Technical Consultant on the Committee for Science and Technology since 1969 and has been involved with a wide variety of subjects including aeronautical R&D, nuclear R&D, spacecraft tracking and data relay systems, legislative oversight of the National Science Foundation and the National Aeronautics and Space Administration, and the development of national science policy. His career includes previous positions as Technical Assistant to a Member of Congress, Manager of Program Plans for Apollo with NASA, and 21 years with the Air Force in a number of operational, technical and management assignments.

During the 1950's, Mr. Wells was associated with the development and operational planning for the Air Force ballistic missile program. His latter years in the Air Force were concerned with the central planning and direction of the Air Force's research and development program. He left the Air Force as a Colonel in early 1965.

His education is in the physical sciences, electronic engineering, management, and industrial administration: Ripon College (Wisconsin), University of Chicago, Harvard, M.I.T., Purdue University and The George Washington University where he is in the final stage of obtaining his doctorate degree. Additionally, he is a part-time member of George Washington University's faculty in the School of Government and Business -- holding the position of Associate Professorial Lecturer.

TECHNICAL ATTACHMENT

AMENDMENT 1

Add the following new section 315(d)(2):

(a) The head of a Federal agency may deviate on a class basis from the single patent rights clause normally used provided that such deviation is necessary to expedite resolution of an imminent public health problem.

Change present section 315(d)(2) to 315(d)(3).

Change present section 315(d)(3) to 315(d)(4).

Discussion: Such authority is necessary to enable the Department to properly manage its research and development program on a timely basis. The need for this authority was evidenced by public reaction to the possibility of the swine flu epidemic.

In any future cases similar to the swine flu situation, it is anticipated that research and development contracts will need to be negotiated with a number of pharmaceutical companies in order to accomplish expeditious delivery of the necessary therapeutic agent. The Department may need to control ownership of any invention made by such a company in performance of its contract in order to assure its availability to all the other companies in the delivery program.

Health, safety, or welfare are the only purposes identified as affecting allocation of invention rights in the bill. Thus, section 313(a)(2)(D)(i) requires licensing of an invention if necessary to resolve a health, safety, or welfare problem. Further, section 315(b)(7) lists public health, safety, or welfare as factors to be considered by the agency in determining whether licensing should be required after the expiration of the normal 7 and 10 year exclusive control period.

If the Department can regain control of an invention after it has been made on the basis of public health considerations, it should also have the ability to deny ownership prior to the making of an invention if it has identified an imminent public health problem.

AMENDMENT 2

It is suggested that the Act's coverage of grant-sponsored research (by defining contracts as including grants) be given more visibility by including definitions near the beginning of the bill.

AMENDMENT 3

Section 313(a)(2)(D)(i) - In lines 12 and 13 of page 10 substitute the words "health or safety" for the words "health, safety, or welfare."

Discussion: The Government has historically retained march-in rights only for "health or safety needs." Reasonable people can agree when a contractor is not satisfying health or safety needs. However, to expand the "march-in" to "welfare needs" appears to overly broaden the march-in to the point of making it undefinable.

AMENDMENT 4

Section 313(a)(2)(E) - Substitute, in lines 4 and 5 of page 11, the words "of the patent application covering the subject invention" for the words "the subject invention was made."

Discussion: Determining when an invention was "made" is probably impossible and certainly subject to varying interpretation. By using the date of filing of the patent application, the beginning of the period will be a time certain not subject to debate.

AMENDMENT 5

Section 313(a)(2)(E) - Add after the word "apply" in line 18 of page 11 the words "to non-profit institutions, their agents, or".

Discussion: Universities and other non-profit organizations do not manufacture and deliver inventions to the public. Accordingly, they should be treated more like small business in the bill, rather than industry subject to the 7 and 10 year limitations of ownership. The only basis for a university to acquire rights to an invention is to promote its utilization through licensing industry. Such licensing has been traditionally on a limited term exclusive basis when necessary and on a non-exclusive basis otherwise. Therefore, the added flexibility will unlikely be abused. The purpose of referral to "agents" is to assure that universities may continue to utilize related non-profit organizations such as Research Corporation and Wisconsin Alumni Research Foundation as their licensing agents.

AMENDMENT 6

Section 313 - After line 9 on page 12 add the following new subsections (c) and (d):

"(c) In any case, determinations made under section 313(a)(2)(C), (D), or (E) shall only be made after the contractor is advised in advance that the Federal agency is considering taking such an action, and only after an opportunity for hearing if so requested by the contractor, its assignee, or a licensee of either."

"(d) Any hearing conducted pursuant to paragraphs (b) and (c) of this section 313 shall not be subject to the provisions of 5 U.S.C. 554, 555 or 556; however, all interested parties shall have the right to present either written or oral testimony and to provide rebuttal testimony. The agency's determination shall be accompanied by a written statement of findings and conclusions."

Section 316 - On page 15 revise line 23 to read as follows:

"Sec. 316(a) Any contractor, its assignee, or a licensee of either adversely affected by a Federal".

Section 316 - On line 25 of page 15 delete "or undersubsection (a), (b)" and on line 1 of page 16 delete "or (c) of section 315". In line 5 of page 16 change the word "determination" to "action".

Section 316 - On page 16 after line 5 add the following new subparagraph (b):

"(b) Other Federal agencies or other persons adversely affected by an agency determination under section 313(a)(2)(D) or (E) may at any time within sixty days after the determination is issued, file a petition to the United States Court of Claims requesting review, and the Court of Claims may hold unlawful and set aside agency action, findings, and conclusions which are found to be as set forth in 5 U.S.C. 706(a)(A)-(E)".

Discussion: These are a related set of changes pertaining to hearing and appeals procedures under the "march-in" provisions of the bill. As now written these provisions may inhibit investment in Government supported inventions because potential licensees, especially smaller concerns, may be open to excessive harassment by competitors when they perceive that a successful subject invention will bring

competitors into the marketplace. As presently drafted, inventing organizations may shy away from investing in the further development of such inventions. For the same reasons the procedural rights of the contractor vis-a-vis the Government need clarification.

For example, the bill is silent on when contractors are entitled to a hearing in section 313(a)(2)(C) cases and only makes this optional in section 313(a)(2)(D) and (E) cases. Also, while H.R. 6249 does not appear to require a full APA type hearing, it does allow "any person adversely affected" to obtain a de novo hearing in the Court of Claims. It seems that this language would likely be construed to allow competitors or others who initiated or participated in the hearing to bring a de novo appeal, especially in Section 313(a)(2)(D) and (E) cases. Such a procedure effectively removes the decision-making power from the agency and places it in a court. The agency proceeding will largely be meaningless, and competitors or other persons who purport to represent the public interest will be in a position to force the contractor and his licensee to go through a lengthy and expensive process. This costly process would be an especially easy means for dominant members of the industry to harass smaller competitors. The only party that should have standing to appeal an agency's decision on a de novo basis is the contractor, his licensees, or assignees. Moroever, the right of appeal by parties other than the contractor should be limited to Section 313(a)(2)(D) and (E) cases, and no appeal should be permitted of Section 313(a)(2)(C) determinations. The latter creates a rather sweeping march-in right with no time set on its exercise. Because of this, its use should be left to the discretion of the agency with a right of appeal by an adversely affected contractor. Other parties will be able to force judicial review at a later date under Section 313(a)(2)(E), but to allow competitors the means to attack a competitor immediately will discourage the development of Government supported inventions, especially by smaller companies.

In line with the above, the purposes of the recommended changes are to:

(i) Make it clear that a contractor is always entitled to advance notification and a hearing if he requests, before any Government action is taken under sections 313(a)(2)(C)-(E);

(ii) To allow the contractor the right to a de novo review of any agency decision under section 313(a)(2)(C)-(E);

(iii) To eliminate any right of appeal by parties other than the contractor in section 313(a)(2)(C) cases;

(iv) To limit judicial review under section 313(a)(2)(D) and (E) cases, when the appeal is by a contractor's competitor or other person adversely affected by the agencies' decisions, to a review on the agency record rather than de novo; and

(v) To make it clear that agency hearings are not required to comply with all the requirements of the Administrative Procedures Act, but at the same time require certain minimum requirements, including a requirement that the agency prepare findings of fact and conclusions, so as to provide a suitable record for judicial review of appeals that are not de novo.

Limiting section 316 to use of contractors, its assignees or a licensee of either eliminates any right of appeal by any party of section 315(a)-(c) matters. Section 315(b) and (c) actually are subsumed as part of section 313(a)(2)(C)-(E) cases, and the change of the word "determination" on page 16, line 5, to "action" is intended to show that the appeal is to the entire decision and remedy prescribed by the agency and not just the "determination". Deletion of the reference to section 315(a) is related to amendment 8 discussed below.

AMENDMENT 7

Page 7, line 24, delete the word "promptly" and add the word "prompt" before the word "disclosure" on page 7, line 25. On page 8, line 2, add "within a prescribed time thereafter or such longer periods as may be agreed to by the Federal agency" after the word "election".

Discussion: As now written section 312 could be interpreted in a way that might force premature elections prior to the time a contractor has had an opportunity to evaluate the commercial potential of the invention. The proposed amendment makes it clear that the implementing clauses could provide for a flexible system of electing rights.

AMENDMENTS 8 AND 9

Section 315 - At the end of line 15 on page 13 add the following:

"Such determination shall be final and not subject to any form of judicial review."

Section 315 - On page 13 line 6 delete the words "of the contractor's exclusive commercial rights".

Discussion: Amendment 9 is merely an attempt to correct an inaccurate description of what the period in section 313(a)(2)(E) is. It is not the period "of the contractor's exclusive commercial rights" as now stated. Rather, it is the period after which march-in under section 313(a)(2)(E) may be exercised. Amendment 8 ties in with Amendment 6 and is intended to make it clear that an agency's decision either to extend the section 313(a)(2)(e) period or to refuse to extend it are not subject to appeal or judicial review. In some instances, such extensions may be necessary to allow the successful licensing of an invention. A right of appeal coupled with the public notice requirement would be a sure invitation to litigation by dominant competitors of the proposed licensee.