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INTERNATIONAL CONFERENCE ON
TECHNOLOGY TRANSFER IN INDUSTRIALIZED COUNTRIES

ROLE OF GOVERNMENT IN PROMOTING TECHNOLOGICAL INNOVATION

Summary of Remarks by William G. Wells, Jr. 225-8115
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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 embarrassingly 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 specifically 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 anecdotal and qualitative. Indeed, Brumm and Hemphill¹ 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 1976

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.

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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.