The Technology Innovation Program

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Summary

The Technology Innovation Program (TIP) at the National Institute of Standards and Technology (NIST) was established in 2007 to replace the Advanced Technology Program (ATP). This effort is designed "to support, promote, and accelerate innovation in the United States through high-risk, high-reward research in areas of critical national need," according to the authorizing legislation. Grants are provided to small and medium-sized firms for individual projects or joint ventures with other research organizations.

While similar to the Advanced Technology Program in the promotion of R&D that is expected to be of broad-based economic benefit to the nation, TIP appears to have been structured to avoid what was seen as government funding of large firms that opponents argued did not necessarily need federal support for research. The committee report to accompany H.R. 1868, part of which was incorporated into the final legislation, stated that TIP replaces ATP in consideration of a changing global innovation environment focusing on small and medium-sized companies. The design of the program also "acknowledges the important role universities play in the innovation cycle by allowing universities to fully participate in the program."

The elimination of ATP and the creation of TIP have renewed the debate over the role of the federal government in promoting commercial technology development. In arguing for less direct federal involvement, advocates of this approach believe that the market is superior to government in deciding technologies worthy of investment. Mechanisms that enhance the market's opportunities and abilities to make such choices are preferred. It is suggested that agency discretion in selecting one technology over another can lead to political intrusion and industry dependency. On the other hand, supporters of direct methods argue that it is important to focus on those technologies that have the greatest promise as determined by industry and supported by matching funds from the private sector. They assert that the government can serve as a catalyst for cooperation. As the Congress makes appropriation decisions, the discussion may serve to redefine thinking about governmental efforts in facilitating technological advancement in the private sector.

Contents

Introduction 1
Funding 2
Background 3
A Different Approach 4
Issues and Observations 4

Contacts

Author Contact Information 6

Introduction

The Technology Innovation Program (TIP) at the National Institute of Standards and Technology (NIST) was created to "to support, promote, and accelerate innovation in the United States through high-risk, high-reward research in areas of critical national need," according to the authorizing legislation. The intent of the program is to provide grants to small and medium-sized firms for individual projects or joint ventures with other research organizations to undertake work that

> (A) has the potential for yielding transformational results with far-ranging or wide-ranging implications;
>
> (B) addresses critical national needs within the National Institute of Standards and Technology's areas of technical competence; and
>
> (C) is too novel or spans too diverse a range of disciplines to fare well in the traditional peer-review process.[1]

NIST published the final rule prescribing the policies and procedures for the TIP activity on June 25, 2008 (15 C.F.R. Part 296). Small or medium-sized for-profit firms are eligible for individual project awards of up to $3 million over three years. Collaborative research ventures including small or medium-sized companies, national laboratories, universities, or other non-profit research institutions may be funded for a total of up to $9 million over five years. A competitive, merit-based process is to be used to make grants of up to 50% of total project costs. In January 2009, nine awards were announced for "new research projects to develop advanced sensing technologies that would enable timely and detailed monitoring and inspection of the structural health of bridges, roadways and water systems that comprise a significant component of the nation's public infrastructure." According to TIP, $42.5 million in federal money was expected to be matched by $45.7 in private sector support. Twenty more awards were announced in December 2009 totaling almost $71.0 million in NIST financing with approximately $145.7 million in funding from other sources. Of the projects selected for the two solicitations, thirteen were in the area of monitoring and inspection of civil infrastructure; four were in the area of advanced repair of civil infrastructure; eleven were in the area of process scale up for advanced materials; and one was in the area of predictive modeling for advanced materials.

In April 2010, NIST announced a new TIP competition in the area of "Manufacturing and Biomanufacturing: Materials Advanced and Critical Processes."[2] This program is expected to fund up to 25 new projects totaling approximately $25 million for the first year. The intent is to facilitate the use and commercialization of new materials in the production process.[3] Nine projects in various areas including biopharmaceuticals, electronics, nanotechnology, renewable energy, and energy sources received awards of more than $22 million in December 2010. Federal funding for these projects is expected to be matched by approximately $24 million in private sector support.[4]

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[1] P.L. 110-69

[2] National Institute of Standards and Technology, *2010 TIP Competition Focuses on Manufacturing Technologies*, April 15, 2010, available at http://www.nist.gov/tip/20100413_tip_comp_announce.cfm.

[3] Ibid.

[4] National Institute of Standards and Technology, NIST Announces $22 Million in Funding for Advanced
(continued...)

Funding

The Technology Innovation Program was authorized by the America COMPETES Act (P.L. 110-69) and replaced the Advanced Technology Program (ATP). The FY2008 Consolidated Appropriations Act, P.L. 110-161, provided the initiative $65.2 million (with an additional $5 million in unobligated balances from the FY2007 ATP appropriation). This was 17.6% less than FY2007 funding for ATP. According to NIST, the major portion of FY2008 support was to be used to meet previous ATP funding commitments.

The FY2009 budget request did not contain any financial support for TIP. During the 110th Congress, no final FY2009 appropriations legislation was enacted for the program; P.L. 110-329, the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009, funded TIP at FY2008 levels through March 6, 2009. FY2009 funding of $65.0 million was subsequently provided by P.L. 111-8, the FY2009 Omnibus Appropriations Act.

For FY2010, $69.9 million was appropriated for TIP by P.L. 111-117, the Consolidated Appropriations Act, 2010, an increase of 7.5% over the previous fiscal year. The figure reflected that amount included in President Obama's budget request and H.R. 2847 as originally passed by both the House and the Senate.

The Administration's FY2011 budget included $79.9 million for TIP, a 14.3% increase in support over FY2010. In the 111th Congress, S. 3636, the FY2011 Commerce, Justice, Science appropriations bill reported from the Senate Committee on Appropriations, would have funded TIP at the FY2010 level of $69.9 million, 12.5% below the Administration's proposal. No FY2011 Commerce, Justice, Science appropriations bill was reported from the House Appropriations Committee during the 111th Congress.

TIP remained funded through several Continuing Resolutions until a final appropriations bill was enacted. The last CR, P.L. 112-6, included support for the program at the FY2010 level of $69.9 million. Under H.R. 1, as passed by the House (the "Full-year" CR), TIP would have received $44.9 million, 35.8% less than FY2010.

P.L. 112-10, provided FY2011 appropriations of $44.8 million for TIP which represents a decrease of 35.9% from FY2010, is 43.9% less than the President requested, and almost the same as the amount in H.R. 1.

The Administration's FY2012 budget requests $75.0 million for TIP, 67.4% more the FY2011 appropriation.

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Manufacturing Research in Electronics, Biotechnology and Nanotechnology, December 15, 2010, available at http://www.nist.gov/tip/tip_121510.cfm.

Background

The Technology Innovation Program replaced the Advanced Technology Program[5] which was established by Title V of the Omnibus Trade and Competitiveness Act (P.L. 100-418). ATP was intended "to serve as a focal point for cooperation between the public and private sectors in the development of industrial technology" and to help solve "problems of concern to large segments of an industry," as noted in the conference report to accompany the bill. Located within NIST, in recognition of the laboratory's ongoing relationship with industry, ATP provided seed funding to single companies or to industry-led consortia of universities, businesses, and/or government laboratories for development of generic (broad-based), pre-competitive technologies that had applications across industries. Awards, based on technical and business merit, were for high-risk work past the basic research stage but not yet ready for commercialization. Market potential was an important consideration in project selection.

Awards were for either product or process technology development. Individual firms were restricted to funding of $2 million over three years. Money was to be used only for direct R&D costs. Large firms provided at least 60% of total (direct and indirect) projects costs; small and medium-sized companies were not required to cost-share direct costs. Joint ventures could receive up to five years of financing for any amount, limited only by availability. In such cases, the private sector provided more than 50% of funding. While universities and federal laboratories could participate in collaborative work, the ATP grant was made solely to companies.

According to NIST, through the end of 2007 when ATP was terminated, 824 projects had been funded, of which about 28% were joint ventures. Approximately $1.6 billion in federal funds have been matched by $1.5 billion from the private sector. Small businesses or cooperative efforts led by such firms made up almost 68% of the awardees. (The legislation creating TIP required that the Director of NIST "continue to provide support originally awarded under the Advanced Technology Program, in accordance with the terms of the original award and consistent with the goals of the Technology Innovation Program.")

Financing for ATP was a continuing issue in the appropriations debate prior to the elimination of the program. Opponents of ATP cited it as a prime example of "corporate welfare," whereby the federal government invested in applied research activities that, they emphasized, should be conducted by the private sector. Others defended ATP, arguing that it assisted businesses (and small manufacturers) in developing technologies that, while crucial to industrial competitiveness, would not or could not be developed by the private sector alone.

TIP appears to have been designed to avoid what opponents of the ATP program argued was government funding of large firms that had no need for federal support for R&D activities. The House Committee on Science and Technology report to accompany H.R. 1868, part of which was incorporated into the COMPETES Act, stated that TIP replaces ATP in consideration of a changing global innovation environment focusing on small and medium-sized companies. The structure of TIP also "acknowledges the important role universities play in the innovation cycle by allowing universities to fully participate in the program."[6]

[5] For additional information on ATP see CRS Report 95-36, *The Advanced Technology Program*, by Wendy H. Schacht.

[6] U.S. Congress, House Committee on Science and Technology, *Technology Innovation and Manufacturing* (continued...)

A Different Approach

While similar to ATP in the promotion of high-risk R&D that would be of broad-based economic benefit to the Nation, there are several differences in the operation of TIP primarily associated with the size of eligible companies. Financial support under TIP is limited to small and medium-sized businesses whereas grants under ATP were available to companies regardless of size. In addition, the Advanced Technology Program required that joint ventures include two separately owned for-profit firms and could include universities, government laboratories, and other research establishments as participants in the project but not as recipients of the grant. In the TIP initiative, a joint venture may involve two separately owned for-profit companies but may also be comprised of one small or medium-sized firm and a university (or other non-profit research institution). A single company could receive up to $2 million for up to three years under ATP; under TIP, the participating company (which must be a small or medium-sized business) may receive up to $3 million over three years. In ATP, small and medium-sized companies were not required to cost share (large firms provided 60% of the total cost of the project) while in TIP there is a 50% cost sharing requirement which, again, only applies to the small and medium-sized businesses that are eligible. There were no funding limits for the five-year funding available for joint ventures under ATP; the TIP limits joint venture funding to $9 million for up to five years. The Advisory Board that was created to assist in the Advanced Technology Program included industry representatives as well as federal government personnel and representatives from other research organizations. The Advisory Board for the Technology Innovation Program would be comprised of only private sector members.

Awards are made for work in areas of "Critical National Need" defined by NIST as:

> An area that justifies government attention because the magnitude of the problem is large and the societal challenges that need to be overcome are not being addressed, but could be addressed through high-risk, high-reward research.[7]

To identify the needs for which TIP awards grants, the organization solicits input from government agencies, advisory groups, industry organizations, universities, and NIST.[8] These are further refined by TIP working groups and specific topics are selected. Current areas include civil infrastructure and manufacturing while future areas of interest include advanced robotics, complex networks, energy, healthcare, sustainability, and water.[9]

Issues and Observations

The effort to terminate the Advanced Technology Program, along with additional attempts to withdraw government support for certain other technology development efforts, appeared to reflect a philosophy that eschewed direct federal financing of private sector R&D efforts aimed at

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Stimulation Act of 2007, Report to accompany H.R. 1868, H.Rept. 110-115, April 30, 2007, 21.

[7] Slides provided by Lorel Wisniewski, Deputy Director, Technology Innovation Program, NIST, May 19, 2010, 2.

[8] National Institute of Standards and Technology, *Technology Innovation Program, Transforming America's Future Through Innovation, Annual Report 2008,* December 2009, 4.

[9] *Slides,* 4.

the commercialization of new technologies and production processes. Such activities are seen by opponents as "industrial policy," the means by which government rather than the marketplace "picks winners and losers." Instead, measures that would occasion a better investment environment for industry to expand their innovation-related efforts would, proponents argue, be preferable to government funding.

The current approach, including the new Technology Innovation Program, involves varied mechanisms to facilitate technological advancement. Legislation has created a body of laws, programs, and policies that involve both indirect and direct measures to stimulate technology advancement in the private sector. Indirect incentives include a research and experimentation tax credit; changes to the antitrust laws to encourage collaborative R&D and cooperative manufacturing ventures; alterations of patent ownership policies to facilitate government-industry-university interaction; and practices to promote technology transfer. Direct measures involve, among other things, federal funding for TIP and the Small Business Innovation Research Program. These cost-shared programs have been supported, in part, because of what proponents argue is their potential contribution to the country's national or economic security.

The elimination of ATP and the creation of TIP have renewed the debate over the role of the federal government in promoting commercial technology development. In arguing for less direct federal involvement, advocates believe that the market is superior to government in deciding technologies worthy of investment. Mechanisms that enhance the market's opportunities and abilities to make such choices are preferred. It is suggested that agency discretion in selecting one technology over another can lead to political intrusion and industry dependency. On the other hand, supporters of direct methods argue that it is important to focus on those technologies that have the greatest promise as determined by industry and supported by matching funds from the private sector. They assert that the government can serve as a catalyst for cooperation.

Technological progress is important to the nation because of its contribution to economic growth and a high standard of living. How best to achieve this continues to be debated. Critics viewed ATP as a means for a federal agency to select commercial firms and/or technologies for support. They maintained that the absence of market-generated decisions will result in technologies that can not be utilized productively by participating companies. Such a program, they argued, encourages selection of well-written proposals rather than assistance for truly important technologies. However, proponents stressed that ATP was market driven and that the technical areas for investment had been developed in conjunction with industry. In addition, companies were required to put up significant amounts of funding and survive a rigorous business review; procedures that made the ATP different from other federal efforts. Replacing ATP with the Technology Innovation Program may be one response to criticisms that large firms should not be recipients of this form of federal research funding, support that should be reserved for small and medium-sized companies which do not have the financial resources available to major corporations.

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