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Resources, Community, and
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The Honorable Sam Brownback
Chairman, Subcommittee on Oversight of
Government Management, Restructuring
and the District of Columbia
Committee on Governmental Affairs
United States Senate

The Honorable Tom Bliley
Chairman, Committee on Commerce
House of Representatives

Subject: Federal Research: Challenges to Implementing the Advanced Technology Program

This report responds to your request concerning the Advanced Technology Program (ATP), which is administered by the National Institute of Standards and Technology (NIST) within the Department of Commerce. The program assists U.S. businesses in carrying out research and development (R&D) on high-risk, high-payoff emerging and enabling technologies. While the program's fiscal year 1998 budget is $192.5 million, the President's 1999 budget proposal increases the program's funding to almost $400 million by the year 2003.

You asked that we address eight questions about NIST's administration of the program under the recently revised regulations. Generally, these questions were concerned with NIST's ability under the new regulations to identify specific projects in which research-related market failure has occurred. Such market failure can occur in the funding of R&D because firms may find it difficult to receive a return on their investment, and in the absence of public funding, some projects that are beneficial from society's point of view would not be undertaken.

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In summary, the program's recently revised regulations appear to be more closely tied to addressing the underlying economics of market failure than they have been in the past. For example, the project selection criteria now explicitly consider the potential "spillover" benefits of proposed projects. Spillover benefits are the benefits that accrue to those who are not involved in the support or performance of a particular research project.

However, significant challenges remain in connection with NIST's ability to identify the projects in which market failure has occurred. First, the consideration of spillovers may not provide much useful guidance to actually selecting research projects. Spillovers that have already occurred are difficult to identify, and predicting future spillovers is even more difficult. Second, NIST must rely on applicants for information about the willingness of private sector sources to fund projects. The information they provide is likely to be presented in such a way as to increase their chances of receiving public funding. Third, the program's objectives may work against each other and hinder the program's ability to identify and address market failure. For example, NIST selects projects that are expected to be commercially successful but would not be performed without public funding. However, projects that are likely to be commercially successful are also likely to have incentives for private investment. Background on the program and detailed responses to the eight questions you asked are in enclosures I and II, respectively.

AGENCY COMMENTS

We provided a draft of this report to the Department of Commerce for its review and comment. The Department did not provide comments in time for us to include them in our report.

We conducted our review from October 1997 through February 1998 in accordance with generally accepted government auditing standards. Because of the economic issues and concepts related to R&D funding decisions, we discussed our analysis with economists who have experience with the ATP. These economists, Professors Josh Lerner, Paul Gompers, and Brian Hall of Harvard Business School and Professor Adam Jaffe of Brandeis University, suggested a number of changes to our analysis, which we incorporated as appropriate. In addition, we consulted the economic literature and spoke with NIST officials.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days after the date of this letter. At that time, we will send copies to the Secretary of Commerce; the Director, National Institute of Standards and Technology; the Director, Advanced Technology Program; the Inspector General, Department of Commerce; the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others on request.

Please call us at (202) 512-7106 if you or your staff have any questions. Major contributors to this report include Robin M. Nazzaro and Andrew J. Vogelsang.

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Enclosures - 3

BACKGROUND

The Advanced Technology Program (ATP) is a competitive cost-sharing program designed for the federal government to work in partnership with industry to foster the development and broad dissemination of challenging, high-risk technologies that offer the potential for significant, broad-based economic benefits for the nation. The ATP provides multiyear funding for individual companies and industry-led joint ventures.

Since the ATP was implemented in 1990, its regulations have been revised. Some significant changes have been made most recently in response to the Secretary of Commerce's 1997 study of the ATP. Some of these changes include (1) setting the cost-share ratio for large companies applying as single applicants at a minimum of 60 percent of total project costs, rather than the ATP's paying all of the direct project costs for small and medium-sized companies, and (2) making changes with the intent of putting more emphasis on joint ventures and consortia and less on individual applications from large companies. In addition, the ATP regulations now explicitly consider the potential spillover benefits of projects during project selection, and the application requests that applicants describe their efforts to obtain support from private sources.

The ATP can be described as a program that attempts to support types of research that the private sector would not undertake on its own. Most scientific research has both private benefits that accrue to the owners of the research results as well as social benefits that accrue to society at large. The private benefits generally provide sufficient incentives for firms to undertake many research projects on their own. In 1997, private firms were expected to spend over $130 billion on research and development. However, in some cases, firms do not fund research and development (R&D) projects that would be beneficial to society because doing so might not provide a return on the firms' investment. It is these cases in which market failure occurs and government intervention by programs like the ATP may be justified. One example of research that is prone to market failure is basic research. Basic research, in areas such as astronomy or pure mathematics, for example, is so far removed from commercial application that private firms have little incentive to undertake it on their own. Society would have to forgo the social benefits of this research unless the government funded it through agencies such as the National Science Foundation.

According to its latest regulations, the ATP assists U.S. businesses in carrying out research on high-risk, high-payoff emerging and enabling technologies. Unlike basic research, however, there is a continuing debate over whether or not these types of research lack sufficient incentives for the private sector to perform them without support from the ATP. This debate has not been resolved for a number of reasons. For example,

the economic decision by firms to support research is extremely complex and is based on trade-offs between risks and rewards that are sometimes unclear or ill-defined. In addition, the information that private firms consider in making research decisions is often confidential or proprietary.

QUESTIONS AND ANSWERS ABOUT THE ADVANCED TECHNOLOGY PROGRAM

Question 1: Considering that the 1994 "Economic Report of the President" said that the goal of technology policy is "to correct a genuine and significant market failure" and that GAO found that 63 percent of the ATP applicants in a survey never sought private capital before applying for an ATP award, are the ATP regulations appropriate to identify only those projects where a genuine and significant market failure has occurred?[1]

Answer 1: In December 1997, the Department of Commerce revised the ATP regulations. The new regulations include changes that are designed to help ensure that the program funds projects for which a genuine and significant market failure has occurred.

The project selection criteria contained in the December 1997 regulations specify that projects will not be selected if the program judges that federal support is not needed. In the past, this restriction was not an explicit consideration contained in the criteria, although officials of the National Institute of Standards and Technology (NIST) stated that this determination has always been made as a part of the proposal review process. In addition, the application forms for the program now request that applicants describe what efforts were made, before applying for ATP funding, to secure private capital to support the project. In the past, this information also was not explicitly requested of applicants on the applications.

Explicit consideration of "spillover" benefits is now included in the selection criteria also. In the case of the ATP, spillover benefits are the benefits of a research project that accrue to those who are not involved in the support or performance of the particular project. The regulations on project selection now state that emphasis is placed on a strong potential for spillover benefits extending well beyond those accruing to the awardees.

Although we view these changes as positive, significant challenges remain for NIST's use of this information to identify projects in which market failure has occurred. First, the information requested on the ATP application is not specific. For example, the application is vague about the source of funding as well as the reason that the project was not funded. Such details might help the ATP determine if sufficient efforts have been made to find funding from the private sector.

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[1]Measuring Performance: The Advanced Technology Program and Private-Sector Funding (GAO/RCED-96-47, Jan. 11, 1996).

A second, more difficult problem is that NIST must rely on information provided by the applicants in order to make many of the decisions that are important for determining if a market failure exists. For example, one important decision is determining whether the private sector would fund the proposed project. It is typically very difficult for anyone outside of a company to have sufficient information for making this sort of determination. As stated in a NIST report, "Project proponents have better information than the ATP about the prospects for private funding, and also have an incentive to conceal this information."[2]

Third, although spillovers have a well-founded theoretical basis, the concept may be of limited value as a guide to selecting the appropriate projects to fund. Spillovers are inherently hard to identify, even years after a research project has been completed. In addition, most spillovers are realized after successful commercialization has occurred, and predicting commercial success is quite challenging in itself. NIST has an even more challenging task in that it is attempting to identify and predict future spillovers of research projects, and then select research projects on that basis. For these reasons, we believe that significant challenges remain to NIST's ability to identify those projects in which a genuine and significant market failure has occurred.

Question 2: Has the Department of Commerce studied whether private capital is available to support research on technologies such as those being funded by the ATP?

Answer 2: We identified three studies undertaken by the Department of Commerce that address issues related to the availability of private capital for technologies such as those funded by the program. The Department has contracted through the National Bureau of Economic Research for these studies, one of which has been completed and two that were expected to be completed in late February of 1998. We believe that these studies have made and will make contributions to the understanding of research-related market failure as well as the challenges government faces in trying to address them.

The completed study, written by Adam Jaffe of Brandeis University in 1996, is entitled Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program, This study describes the economics of spillovers and market failure. It also examines how the ATP can incorporate these ideas into future activities. This study helped form the basis for adding explicit language about spillovers to the new regulations.

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[2]Adam B. Jaffe, Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program, U.S. Department of Commerce, National Institute of Standards and Technology, Advanced Technology Program (NIST GCR 97-708, Dec. 1996).

The second study has been undertaken by Professor Brian Hall of Harvard University. It is concerned with the various characteristics of financial markets that make it difficult for small firms to obtain financing for R&D projects and the implications for the ATP. The third study, undertaken by Professors Paul Gompers and Josh Lerner, both of Harvard University, examines whether the private sector provides adequate capital to new firms for advanced technology development.

Question 3: Does the Department maintain a database of private capital sources for ATP applicants? Is the Department precluded by law from insisting that applicants disclose the private capital sources sought as part of the ATP application process?

Answer 3: The Department has identified several existing databases of private capital sources and is investigating the possibility of cross-linking the ATP website to one or more of them. The Department decided it would be inefficient to develop and maintain its own database.

The Department is not precluded by law from insisting that applicants disclose the private capital sources from which they attempted to find funding prior to applying to the ATP. In fact, the latest version of the ATP application includes a section that states, "Describe what efforts were made, prior to applying for ATP funding, to secure private capital to support this project wholly." According to an ATP deputy director, the information that applicants provide in this section will be used as a starting point for reviewers in determining if the proposed project could not be done without ATP funds or if the project would take a much longer time without ATP funds. The deputy director added that these determinations have always been a part of the project selection process. In the past, however, the information was not requested on the application form; applicants were questioned about their proposals, in person, by ATP officials. Both of these determinations must be made before an applicant can be selected to receive ATP funding.

The deputy director said that the applicant's failure to provide information on prior funding efforts would not automatically disqualify the applicant. The application could still proceed through the review process, but if the application reached the final review stage, the reviewers would question the applicant extensively on this matter.

Question 4: A recent study ("High-Tech R&D Subsidies: Estimating the Effects of Sematech" by Irwin and Klenow in the *Journal of International Economics*, May 1996, pp. 323-344) suggests that government R&D subsidies displace rather than complement private sector financing. Do these observations hold true for research financed by ATP?

Answer 4: Two University of Chicago researchers, Douglas Irwin and Peter Klenow, examined the SEMATECH government-industry R&D joint venture to determine whether the program led to an increase in industry R&D expenditures or if the government expenditures led to decreases in private sector expenditures.[3] The principal finding of that research was that SEMATECH induced its members to cut their overall R&D spending on the order of $300 million per year. The analysis and results of this study are specifically tied to SEMATECH, however, and it would be inappropriate to extend these results to all government research subsidies, in general, or the ATP, specifically.

Our 1996 report also provided information on the question of whether ATP funding is displacing private funding.[4] We surveyed all ATP award winners and "near winners" from 1990 through 1993. The data provided by our survey indicated that the ATP has funded research projects that would have been funded by the private sector as well as those that would not. The ATP is displacing private sector financing to the extent that the ATP funds projects that would have been funded by the private sector. For example, the winners of ATP funding were nearly evenly divided when asked if they would have pursued their projects even if they had not received ATP funding. In addition, some of the ATP applicants who made it to the final stage of review but did not receive ATP funds were able to secure funding in the private sector. This suggests that in both cases the ATP was displacing private sector funds for many of these projects.

Question 5: To what extent does the Department assess the commercial viability of a technology before providing, or continuing to provide, ATP funding?

Answer 5: The ATP regulations require that NIST conduct an extensive commercial assessment of each proposed project. The regulations stipulate five specific criteria to be used in selecting proposals for awards. Each criterion has an associated weight ranging from 10 percent to 30 percent for a total of 100 percent. One criterion is "Adequacy of Plans for Eventual Commercialization," which is weighted at a level of 20 percent. To satisfy this criterion, the ATP proposals must include evidence that, if the ATP research project is successful, the proposer will pursue further development toward commercial application. The proposals must also identify potential applications of the technology and provide credible plans to ensure prompt and widespread use of the technology. ATP guidance states that an essential element of the proposals is a business plan for using the new technology. Moreover, the plan should identify market segments that will be pursued, current and potential market size, and major competition in each market

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[3]Douglas Irwin, and Peter Klenow. "High Tech R&D Subsidies: Estimating the Effects of Sematech," Journal of International Economics, vol. 40 (May 1996), pp. 323-44.

[4]Measuring Performance: The Advanced Technology Program and Private-Sector Funding (GAO/RCED-96-47, Jan. 11, 1996).

segment and assess the strengths and weaknesses of the proposer's firm against those of the major competition.

The program uses peer review as a part of this selection process to assess the commercial viability of a technology before providing funding. The peer reviewers assess the technology's scientific and technical merit and its potential for yielding broad-based economic benefits to the nation. Multiple peer reviews are conducted by NIST-selected experts in the respective fields. The ATP's project selection boards include members who have extensive business and economics training and experience. In addition, NIST forms panels of outside experts in business and economics to advise the selection boards on the commercial viability of each technology and on its potential for broad-based benefits.

Before continuing to provide funding for the ATP projects, the Department of Commerce/NIST's procedures require that the ATP project management team review all aspects of each project at the time of the annual project renewal and assess the project's existing attributes, accomplishments, and plans to ensure that all of the selection criteria continue to be met. If substantive changes occur or are proposed at any time during the life of a project, the project management team evaluates the changes and recommends a course of action to NIST management. For example, if a critical member of a multimember joint venture drops out, the team will typically require that the joint venture indicate how it will compensate for the loss. If an alternative member is proposed, NIST will compare the new member with the replacement member to see if the commercial viability and other aspects of the joint venture are substantially maintained. In the case of a major change to a project, such as a change that affects the level of technical risk or potential broad-based benefits, the selection board may be reconvened to decide whether the project continues to satisfy the ATP criteria, including the criterion of having strong commercial viability.

In March 1997, NIST began a study to determine which ATP projects had resulted in commercialization. The study examined the 38 projects that had been completed by March 1997. The contractor that was performing this study told us that approximately one-third of the 38 projects had resulted in a commercial product, one-third would not result in a commercial product, and one-third may or may not result in a commercial product. This last group included some projects that still had some procedural requirements that had to be satisfied before being introduced to the marketplace. For example, a medical device that was related to one project still had to receive approval from the Food and Drug Administration. Work on this study was still under way as of February 1998. Enclosure III contains a list of those 12 technologies that have been commercially deployed.

Question 6: To what extent does the Department do a better job than the private sector in identifying technologies that warrant a financial investment? What criteria does the Department rely upon to identify these technologies?

Answer 6: The project selection criteria used by the private sector are designed to identify technologies that will provide sufficient profits to warrant investing the funds for R&D. Private sector criteria are unlikely to consider the social benefits of projects. The ATP criteria, however, seek to identify projects with social benefits but insufficient incentive for private firms to invest. In this way, society may gain the social benefits that could be lost if private markets failed to support such projects without government intervention.

By this reasoning, NIST is not expected to do a better job than the private sector in identifying technologies and projects that it should support; rather, NIST should identify projects differently and use criteria different from those used by the private sector in evaluating projects.[5] The ATP regulations state that the program supports projects that offer significant benefits to the U.S. economy and a wide breadth of potential application and form an important technical basis for future commercial applications. To the extent that these benefits accrue outside of the firm that supports the research, a firm would not consider them in deciding whether or not it should fund a research project. The challenge for NIST is to ensure that it supports only those projects that provide social benefits but have insufficient expected profits to warrant private investment.

Question 7: What are the sources and magnitude of venture capital funds available to support research on technologies such as those being funded by the ATP?

Answer 7: The venture capital industry can be defined as an industry that raises money for investment in businesses that offer high potential payoff with high risk. The industry has two parts–organized venture capital investors and wealthy investors who invest informally, often called business "angel" financing.[6] The largest source of professional

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[5]Two recent studies commissioned by the ATP are addressing questions that are closely related to whether it is doing a better job than the private sector. These studies are likely to provide some insights into the availability of funding for high-risk research among small firms and whether there is any evidence that investors are systematically missing profitable projects.

[6]Systematic information on informal financing is not available, although anecdotal information suggests that these sources also provide start-up capital for high-risk technologies. Informal venture capital financing has been estimated at as much as 10 times as large as the formal market, although the estimates vary widely.

venture capital funding is provided by pension funds, which provided about 50 percent of the total capital funds in recent years. Other significant sources of professional venture capital funding included endowments and foundations (approximately 20 percent), individuals (approximately 10 percent), corporations and insurance companies (approximately 10 percent), and foreign investors (providing a few percent). In comparison to the volume of R&D investments by private firms, venture capital funding is relatively small. For example, according to the National Venture Capital Association, venture capitalists invested a record high of over $10 billion in 1996. By comparison, U.S. private sector R&D expenditures were expected to reach over $130 billion for 1997.

The venture capital industry provides insights into the willingness of investors to provide funding for high-risk R&D, such as that funded by the ATP. The risks facing venture capitalists have been described by the proportion of investments that have been unsuccessful.[7] For example, in one case more than half of the investments studied had a rate of return of less than 10 percent, and over one-quarter resulted in a loss. Another example shows similar results in which more than one-third of the investments resulted in a loss. In this case, however, the losses were offset by a few large successes: 6.8 percent of the investments yielded profits of more than 10 times the cost. The same basic pattern of numerous losses offset by a few large successes has been found by others who have researched the venture capital industry.

The ATP supports high-risk research projects. However, according to the revised regulations, ATP projects should also have high spillover benefits, which would probably reduce the value of a research project to a venture capital firm or other private sector investor. In addition, some researchers believe that the venture capital industry has consolidated and matured and that it is increasingly focusing on later stage (closer to commercialization), lower-risk projects. If venture capital firms do focus on later stage projects, there may be less overlap between these projects and those that the ATP is intended to support.

Question 8, part 1: How powerful are the private incentives to invest in the technologies being funded by the ATP?

Answer 8, part 1: In general, the revised regulations appear to help focus ATP funds on technologies in which the private incentives to invest are insufficient. For example, as discussed above, the emphasis that the ATP selection criteria place on the potential for spillover benefits should help the program select projects that a firm would not fund without some assistance.

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[7]William A. Sahlman, "The Structure and Governance of Venture Capital Organizations," Journal of Financial Economics, Vol. 27 (1990), pp. 473-521.

However, in some respects, the ATP regulations and program guidance also emphasize project characteristics that would increase the likelihood of private sector interest. For example, the ATP project selection criteria require plans to ensure adequate protection of the resulting intellectual property. Projects in which the research results can be adequately protected, however, are less likely to result in extensive spillovers and more likely to increase the private incentives to invest.

This suggests an inherent tension between the ATP's goals. First, the ATP tries to support projects with results that can be protected and are likely to be commercialized. In general, this type of project would have high associated private incentives for investment. The ATP also has as a goal to support projects that are likely to have spillovers that extend throughout the economy and cannot be controlled. In general, this type of project would have low associated private incentives for investment. This tension has been pointed out in a NIST-supported economic study.[8] This report states,

> "A company that is going to do some research but leave it in the laboratory is less likely to generate spillovers or large social returns; hence projects that are unlikely to be commercialized do not achieve ATP's objectives. All else equal, however, anything that improves the prospects for commercial success increases the expected profits or private returns, thereby decreasing the spillover gap and increasing the likelihood that the ATP will displace private funds."

There may be no way to avoid this tension, however, given the goals of the program. The ATP statute says that one of the ATP's purposes is to assist U.S. businesses in creating and applying the generic technology and research results necessary to commercialize significant new scientific discoveries and technologies rapidly. This suggests that the results of ATP-supported projects should have both widespread spillover benefits as well as a high likelihood of being commercialized.

Question 8, part 2: Have capital markets become so exclusively focused on short-term returns that there is a market failure for those technologies funded by the ATP?

Answer 8, part 2: In recent years, a number of analysts have raised questions as to the willingness of the private sector to invest in long-term R&D. Some have argued that U.S. businesses have focused consistently on quick returns and thus made poor investment choices. It is argued that investors are ignoring investments with expected profits

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[8]Adam B. Jaffe, Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program. U.S. Department of Commerce, National Institute of Standards and Technology, Advanced Technology Program (NIST GCR 97-708, Dec. 1996).

because they provide benefits only in the long term. Because R&D investments are often long-term, they might decline in an investment environment with pressures for short-term results. However, there is no clear answer about whether or not this actually exists.

One author who has extensively researched this issue, Michael Porter, suggests that many American companies invest too little in intangible assets, such as R&D.[9] Porter describes the internal mechanisms that firms use to allocate capital as focusing on earning high returns on investment and maximizing current stock prices to the maximum. Because few outside owners play an active role on the boards of directors, management exercises the dominant influence on corporate goals. In addition, the decentralization of many American companies has led to a reliance on "by the numbers" evaluations of internal investment decisions, which are not unlike the decisions of outside investors. As a result, internal decisions on R&D are also made in an environment that is focused primarily on current profitability.

However, empirical tests have generally not provided any evidence of a trend to fund short-term R&D. For example, researchers such as Sundaram, Dukas, and Chan have observed the reaction of investors when announcements of R&D spending have been made. Their research provides some evidence of investors' willingness to invest in R&D, at least in connection with large publicly traded companies. If investors are motivated only by short-term returns, announcements of longer-term R&D projects would lead to a decrease in stock prices. Various authors have used these studies as an indication of investors' interest in stocks that make additional R&D expenditures. Using large databases of publicly traded companies, these authors examine the market reaction to firms' R&D funding announcements by comparing stock prices in the period before and after the announcement. Results from these studies have typically shown that firms that announce increases in R&D spending experience an increase in stock prices, suggesting that the investors value these long-term investments. For example, in a 1996 study of 125 announcements by 65 firms, the average stock price increased by .43 percent.[10] Another study showed similar small positive returns averaging .31 percent, while an earlier study showed much larger returns averaging 1.38 percent. These results suggest that among large firms, investors appear to react positively to increases in R&D expenditures.

However, it should be noted that much of this evidence is related specifically to the incentives and R&D expenditures of large firms. This relationship occurs partly because

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[9]Michael Porter, "Capital Disadvantage: America's Failing Capital Investment System," Harvard Business Review (Sept./Oct. 1992), p. 66.

[10]Anant K. Sundaram, Teresa A. John, and Kose John. "An empirical analysis of strategic competition and firm values: The case of R&D Competition," Journal of Financial Economics, Vol. 40 (1996), pp. 459-86.

data on large publicly traded firms are more readily available and also because these firms account for a significant part of private sector R&D expenditures. Various researchers have pointed out that small firms are likely to experience greater difficulties in terms of financing R&D than large publicly traded firms. For example, small firms are less likely to be able to rely on internally generated funds than large firms, which means that they have to look to outside sources of support for their investments. Because of the difficulty in evaluating R&D projects and the lack of collateral created by many R&D investments, outside investors may be reluctant to provide this funding.

Because of these differences, the studies on the issue of short-term R&D funding that are based on the incentives and empirical data from large firms are not necessarily applicable to small firms. As mentioned in the response to question 6, the ATP has commissioned two studies that are likely to provide additional insights on the availability of capital for small firms, but these studies have not been completed.

COMMERCIALIZED ATP PRODUCTS AND PROCESSES

Table III.I: Products and Processes Resulting From Projects Funded by the ATP

Company name	ATP ID	Product
Biosym	91-01-0224	Enhanced Turbomole™ software, incorporating DFT (density functional theory) technology
Illinois Superconductor	92-01-0017	Preselector receive filters
Nonvolatile Electronics	90-01-0166	GMR (giant megneto-Resistence) magnetic bridge sensor
Communications Intelligence	90-01-0210	Digitizer tablet; HandWriter™ software
Transitions Research	91-01-0034	Improved HelpMate™ robot
Cree Research	91-01-0256	Improved fabrication process for blue-LEDs; silicon carbide crystal wafers
Diamond Semiconductor	92-01-0115	New procedure for introducing dopants into semiconductors and application of the technology to the process of implanting the dopants on a 300mm silicon crystal wafer; licensed to Varian Associates and incorporated into Varian equipment
2 Millimeter Autobody Consortium	91-01-0177	Use of new parts stamping procedures in 5 or more automobile assembly plants
Light Age	90-01-0212	Tunable alexandrite lasers for laser surgery
Engineering Animation	91-01-0184	Virtual Human™ incorporated in 2 CD-ROMs and 2 textbooks; VisMockUp, a virtual prototyping tool for 3-D design work

Company name	ATP ID	Product
Applied Parallel Technologies	94-06-0024	Orchestrate™ parallel processing software application environment
Mathematical Technologies, Inc.	92-01-0053	Software incorporated in a product called Digital Restoration Services™

Source: Developed by GAO using NIST's data.

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