DEPARTMENT OF HOMELAND SECURITY
Office of Inspector General

The Science and Technology Directorate's Processes for Selecting and Managing Research and Development Programs

Homeland Security

August 7, 2008

Preface

The Department of Homeland Security (DHS) Office of Inspector General (OIG) was established by the *Homeland Security Act of 2002* (public Law 107-296) by amendment to the *Inspector General Act of* 1978. This is one of a series of audit, inspection, and special reports prepared as part of our oversight responsibilities to promote economy, efficiency, and effectiveness within the department.

This report addresses the processes the DHS Science and Technology Directorate uses to select and manage research and development efforts and balance the funding between various types of research--basic, innovative, and transitional--and the entities that conduct it. The report also addresses how the directorate leverages research and development by external organizations and guards against duplicative work. It is based on interviews with key directorate officials and staff as well as senior leaders of other relevant agencies and institutions and a review of applicable documents.

The recommendations herein have been developed to the best knowledge available to our office, and have been discussed in draft with those responsible for implementation. It is our hope that this report will result in more effective, efficient, and economical operations. We express our appreciation to all of those who contributed to the preparation of this report.

Richard L. Skinner
Inspector General

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Abbreviations

COE	Center of Excellence
DHS	Department of Homeland Security
FAR	Federal Acquisition Regulations
FFRDC	Federally Funded Research and Development Center
FY	Fiscal Year
HIPS	Homeland Innovative Prototypical Solution
HITS	High Impact Technology Solution
HSARPA	Homeland Security Advanced Research Projects Agency

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OIG

Department of Homeland Security
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Executive Summary

This report is responsive to two congressional requests, one from the Honorable Tom Davis, then-Chairman of the House Committee on Government Reform, and the other from the then minority staff of the House Committee on Homeland Security. The requests directed us to look at the manner in which the Science and Technology Directorate executes its research and development programs.

As a result of new leadership, the Directorate dramatically modified the way it does business by improving its management structure and processes for identifying, prioritizing, and selecting projects. The Directorate's new organizational structure centralized programmatic and fiscal oversight, and improved communications. Its new processes for identifying, prioritizing, and selecting each of its five types of projects incorporate Department of Homeland Security components' needs to a greater extent than in the past. However, the new processes may not address first responders' needs adequately. Additionally, the processes for identifying, prioritizing, and selecting basic research and some innovation projects are not clear or documented, making the Directorate vulnerable to concerns of real or perceived conflicts of interest. Although ultimately we did not find any statutory or regulatory violations, we identified three projects that initially appeared to have been chosen for improper reasons. Had there been a process in place and record of the rationale for selecting those projects, these appearances of bias may have been prevented. We are making three recommendations to improve the integrity of the project selection process.

In addition to its request that we assess changes in the research and development programmatic strategy, Congress asked us to evaluate how the Directorate decides to fund its projects. The results of that review will be submitted in a subsequent report.

Background

Following the tragic events of September 11, 2001, Congress passed the *Homeland Security Act of 2002*, establishing the Department of Homeland Security (DHS) and within it, the Science and Technology Directorate (S&T).[1] Among other things, the Act entrusted S&T with:

- Conducting basic and applied research, development, demonstration, testing, and evaluation activities that are relevant to any or all elements of the [d]epartment…;[2]
- Establishing a system for transferring homeland security developments or technology to federal, state, local government, and private sector entities;[3]
- Coordinating with other appropriate executive agencies in developing and carrying out the science and technology agenda of the [d]epartment to reduce duplication and identify unmet needs.[4]

The Act also empowered S&T to establish or contract with federally funded research and development centers (FFRDCs)[5] and establish university centers for homeland security.[6] In addition, the Act grants DHS equal access to and use of the United States Department of Energy sponsored national laboratories at the same costs as the Department of Energy pays and without additional administrative fees.[7] Finally, the Act allows S&T to contract its research and development (R&D) work to the public sector using routine federal award processes and "other transactions authority."[8]

The *Homeland Security Act of 2002* also created the Homeland Security Advanced Research Projects Agency (HSARPA), which is to be led by a Director, appointed by the Under Secretary for Science and Technology.[9] The Director is mandated to:

> "award competitive, merit-reviewed grants, cooperative agreements, or contracts to public or private entities, including businesses, … FFRDCs, and universities to:

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[1] 6 U.S.C. § 181.
[2] 6 U.S.C. § 182(4).
[3] 6 U.S.C. § 182(6).
[4] 6 U.S.C. § 182(13).
[5] 6 U.S.C. § 185.
[6] 6 U.S.C. § 188(b)(2).
[7] 6 U.S.C. § 189(e).
[8] 6 U.S.C. §§ 188 & 391(a).
[9] 6 U.S.C. § 187.

- Support basic and applied ... research to promote revolutionary changes in technologies that would promote homeland security;
- Advance the development, testing, and evaluation, and deployment of critical homeland security technologies; and
- Accelerate the prototyping and deployment of technologies that would address homeland security vulnerabilities."[10]

Since its inception, S&T has experienced several changes in leadership. It has had two Under Secretaries and two acting Under Secretaries in 4 years. While some change occurred under each, the basic organizational construct and its rules of engagement did not change significantly until mid-2006.

Congress has previously expressed dissatisfaction with the management of S&T and its seeming lack of direction. For example, in June 2006, the Senate report accompanying the fiscal year (FY) 2007 DHS appropriations bill included "the [c]ommittee is extremely disappointed with the manner in which S&T is being managed…. This component is a rudderless ship without a clear way to get back on course."[11]

In August 2006, Congress confirmed the appointment of Admiral Jay Cohen as the Under Secretary for Science and Technology. The same month, the Honorable Tom Davis, then-Chairman of the House Committee on Government Reform, requested a review of the processes used to initiate and manage HSARPA projects. We expanded the scope of our review to include a request by the then minority staff of the House Committee on Homeland Security to examine the processes by which S&T prioritizes and funds its R&D projects.

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[10] 6 U.S.C. § 187(b)(3).
[11] Senate Report 109-273, U.S. Department of Homeland Security Appropriations Bill, 2007.

Results of Review

Centralized Authority Is Improving R&D Project Management

The Under Secretary's new organizational structure improves upon the former structure by centralizing decision-making authority and enabling better programmatic and fiscal oversight. Six technical divisions execute projects within their subject matter areas. Three portfolios: Transition, Research, and Innovation/HSARPA, guide the selection and management of the projects within each technical division. The new Strategy, Policy, and Budget Division, which oversees S&T's finances, has developed procedures for monitoring the financial status and overall progress of S&T R&D projects. Division directors meet weekly with the Under Secretary or the Chief of Staff. Overall, the new organizational model and processes improve S&T's ability to manage research projects, which should result in the transfer of new technology to DHS, other federal entities, and state, local, and tribal first responders.

Original Organizational Structure Was Decentralized and Inhibited Information Exchange and Management Oversight

S&T's original organizational structure and processes split the responsibilities for the projects' lifecycle between independent offices. The Plans, Programs, and Budgets office identified, selected, and determined the funding for the R&D projects. S&T staff said that the Plans, Programs, and Budgets office did not consistently involve the DHS components when it identified and selected projects to pursue. Once it made its selections, the office assigned each project to one of three executing offices: the Office of Research and Development, HSARPA, or Office of Systems Engineering and Development (see Figure 1). These offices were responsible for awarding project funding to an R&D entity to execute the project and managing the entity's progress.

Figure 1: Former S&T Organizational Structure for Conducting R&D Projects
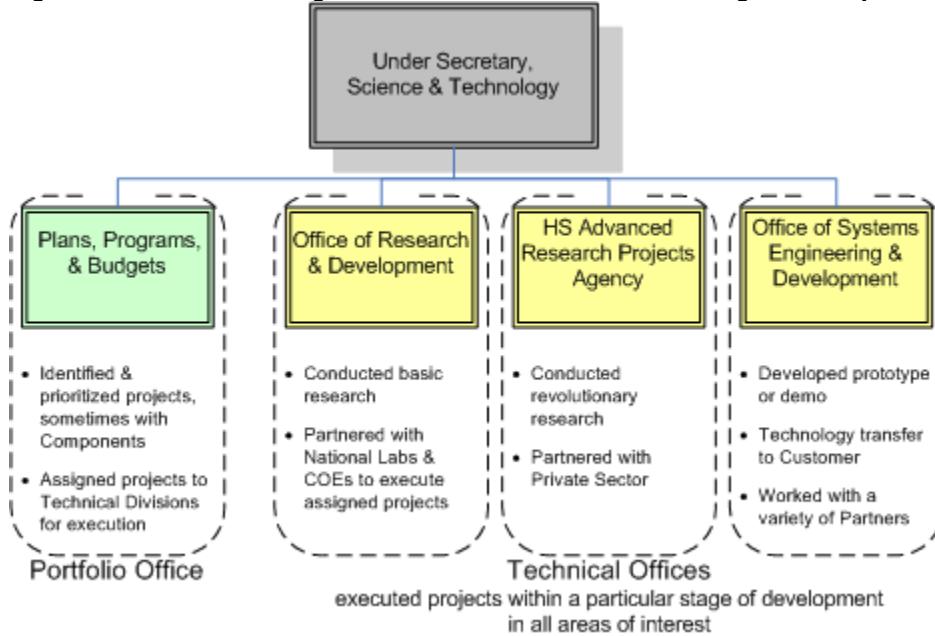
Source: Figure derived from OIG Report 04-24, 10/01/03, S&T Business Process

The Plans, Programs, and Budgets office assigned the projects to the executing offices according to the type of organization that would conduct the R&D project, such as national laboratories, FFRDCs, Centers of Excellence (COEs), or private industry. The Plans, Programs, and Budgets office assigned basic research projects to the Office of Research and Development, which would select a national lab, FFRDC, or COE to conduct the work. The *Homeland Security Act of 2002* mandated that HSARPA undertake projects that were revolutionary and that it contract with public or private organizations to conduct the work.[12] The Plans, Programs, and Budgets office nevertheless assigned HSARPA the R&D projects it determined would be conducted by private industry alone, regardless of whether they had potential for "revolutionary" change. In contrast, the Office of Systems Engineering and Development received the more mature R&D projects that were almost ready to transition to S&T customers, regardless of whether the organization conducting the R&D work was a federal, academic, or private entity. It executed its projects through a variety of partners.

Prior to mid-2006, S&T did not maintain a centralized program management or budget tracking system. Some S&T employees said that the Plans, Programs, and Budgets office did not follow up consistently on the progress of projects it assigned to the executing offices. Similarly, the executing offices did not habitually update the Plans, Programs, and Budgets office on their projects' progress or financial status. Each executing office functioned

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[12] 6 U.S.C. § 187(b)(3)(a).

as an independent entity, maintaining its own management and budget tracking tools. The absence of overarching, directorate-wide program management and budget tracking systems made it difficult for S&T to render timely, accurate, and thorough fiscal and project management updates to senior S&T and departmental leaders and to Congress.
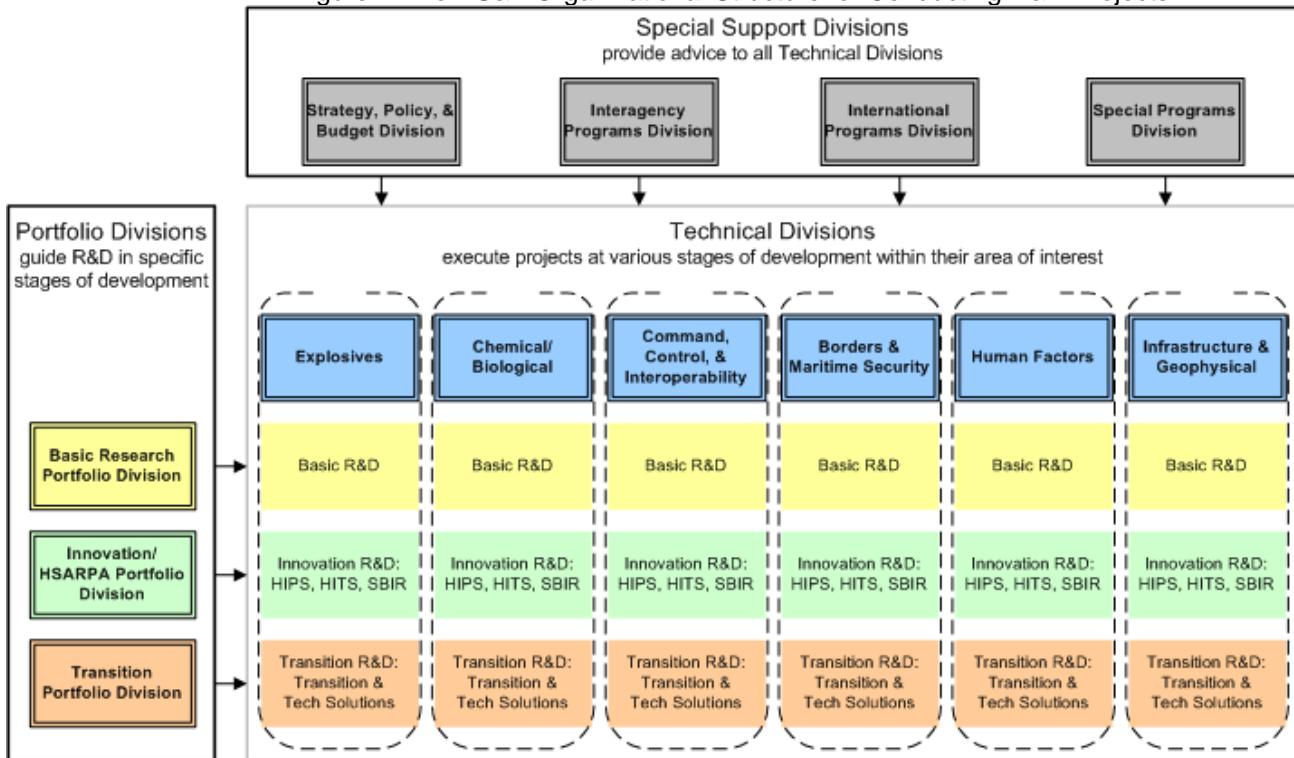
As a result of the split in responsibilities and minimal directorate-wide program management, some S&T employees said that at times the executing offices' program managers did not adhere to the Plans, Programs, and Budgets office's project descriptions. Rather, the program managers used the project funding for other projects that they thought appropriate. Therefore, the budgets set by the Plans, Programs, and Budgets office did not match the projects that the divisions were conducting. The difference between some of the funding approved by the Plans, Programs, and Budgets office and its actual use for other projects by the program managers contributed to S&T's inaccurate accounting of its R&D program expenditures.

According to some S&T employees and DHS component customers, another consequence of mismanagement was that S&T transitioned few R&D projects to the components. A few other S&T staff said that even though S&T was achieving some programmatic success, it was not adept at articulating those success stories. Recognizing that it takes 1 to 8 years to get a product to market, no one we interviewed was able to identify more than a few technologies that had been transitioned to the field by the former leadership team.

The New S&T Organizational Structure Unifies Project Management

The new Under Secretary reorganized S&T to ensure that single entities, called technical divisions, manage R&D projects' entire lifecycle, from the identification of potential projects through prioritization, selection, and execution (see Figure 2). The technical divisions are organized according to R&D project subject matter, such as explosives, borders, and maritime security. In addition, three portfolios—Transition, Basic Research, and Innovation/HSARPA—assist the technical divisions in executing the projects. Each of the three portfolios focuses on R&D projects at a certain stage of development: basic, applied, or transition. The Under Secretary also unified the formerly disparate project management processes by implementing a single project status report, a new database for tracking project progress, and a more robust budget office. The organization and processes are modeled from those the Under Secretary developed as the Chief of the Office of Naval Research. They provide continuity and strong management oversight, which should result in the transition of more technologies to S&T's customers.

Figure 2: New S&T Organizational Structure for Conducting R&D Projects

Special Support Divisions
provide advice to all Technical Divisions

| Strategy, Policy, & Budget Division | Interagency Programs Division | International Programs Division | Special Programs Division |

Portfolio Divisions
guide R&D in specific stages of development

Basic Research Portfolio Division

Innovation/ HSARPA Portfolio Division

Transition Portfolio Division

Technical Divisions
execute projects at various stages of development within their area of interest

| Explosives | Chemical/ Biological | Command, Control, & Interoperability | Borders & Maritime Security | Human Factors | Infrastructure & Geophysical |

Basic R&D (each division)

Innovation R&D: HIPS, HITS, SBIR (each division)

Transition R&D: Transition & Tech Solutions (each division)

Source: Data derived from S&T documents

S&T's R&D projects are executed by the technical divisions, with varying levels of assistance from the portfolios. The technical divisions are organized according to the major subject matter areas of S&T research:

- Explosives;
- Chemical/Biological;
- Command, Control, and Interoperability;
- Borders and Maritime Security;
- Human Factors; and
- Infrastructure and Geophysical.

The technical division directors maintain subject matter expertise and awareness of programs being conducted within the division and also R&D work being conducted domestically and internationally. They are responsible for the daily oversight of the projects in their divisions. The program managers, who are technical division staff, are involved in the day-to-day management of their projects, and ensure the projects meet their cost, schedule, and performance goals.

Three portfolios—Transition, Research, and Innovation/HSARPA—and the Special Programs division exercise varying degrees of authority over the R&D

projects being executed in the technical divisions. Each has a specific research focus and methodology. The Transition portfolio has significant authority in assisting with the selection and management of the two types of projects in its responsibility, transition and Tech Solutions. Transition projects are at an advanced stage of development and, if successful, will transfer to DHS components or other customers within 3 years. Tech Solutions projects address technology needs identified by federal, state, local, and tribal first responders. Designed to be completed within 1 year, the Tech Solutions projects modify existing technology or use rapid development methods to meet first responders' needs quickly.

The Research portfolio assists in guiding the technical divisions' basic research projects, which are fundamental, long-term projects that may take up to 8 years. Coordinating DHS' use of the national laboratories and COEs, it provides high-level guidance regarding the direction for the technical divisions' basic research. It also has a liaison staff person in each of the technical divisions. This portfolio exerts the least control over projects being conducted by the technical divisions.

The Innovation/HSARPA portfolio guides the innovation projects within the technical divisions, which are the Homeland Innovative Prototypical Solution (HIPS) and High Impact Technology Solution (HITS) projects, and the Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs. HIPS and HITS are projects with a high risk of failure, but if successful would be "game changing," novel

> HIPS delivers prototype-level demonstrations of game-changing technologies in 2 to 5 years. They have a moderate to high risk of failure, but if successful, a high payoff.
>
> HITS delivers proofs-of-concept within 1 to 3 years. They have a considerable risk of failure, with potential for significant gains in capability.

uses of technology to solve DHS and first responder technological needs. Figure 11 and Appendix C provide detailed information on HIPS and HITS. SBIR and STTR programs are legislatively mandated to direct a percentage of federal research funding to small businesses. (More information on SBIR and STTR programs is available at http://www.sba.gov). The Innovation/HSARPA portfolio, in conjunction with the Under Secretary, exerts more control over its projects than the other portfolios. In 2007, the Under Secretary identified, prioritized, and selected the HIPS and HITS projects. The portfolio shared the management of the HIPS and HITS projects with the technical divisions. The portfolio also directs the process for identifying and awarding the SBIR and STTR projects, and maintains some management control over their execution.

In addition to the three portfolios, S&T has three other divisions that inform S&T division directors. The International and Interagency Programs divisions provide insight into research and development being conducted outside of S&T. The Special Programs division informs the technical divisions of classified programs that might be of interest. The Special Programs division also conducts special access projects. Those are R&D projects at any stage of development that are classified due to the extremely sensitive nature of the technology or the way in which it is used. Relatively few special access projects are managed in the technical divisions because of their sensitivity. We do not address the special access projects in this review because they are classified and limited in number and funding.

In addition to the portfolios, the Strategy, Policy, and Budget division provides fiscal oversight to the R&D projects. The office combines policy, planning, programming, budgeting, and financial execution functions. It assists the technical divisions with budget development, monitoring, financial reporting, and acquisition support.

As depicted in Figure 3, there are transition and research section chiefs in each division who coordinate the work of the technical divisions' program managers with those portfolios. The transition portfolio section chiefs work closely with the program managers and with their own portfolio management in every aspect of a project, from identifying, prioritizing, and selecting a project, through funding and managing it.

In contrast, the research section chiefs may provide guidance to program managers, but the Research portfolio is not as involved with the section chiefs and the management of the research projects. This difference between the Transition and Research portfolios' involvement through their respective section chiefs is a function of the type of research being conducted in each portfolio. The transition projects have more definite specifications and deadlines that require close coordination with the customers to whom they will be transferred. Research projects are more exploratory and longer term, requiring less customer involvement, and less intervention by the Research portfolio.

Figure 3: Technical Divisions' Research and Transition Sections
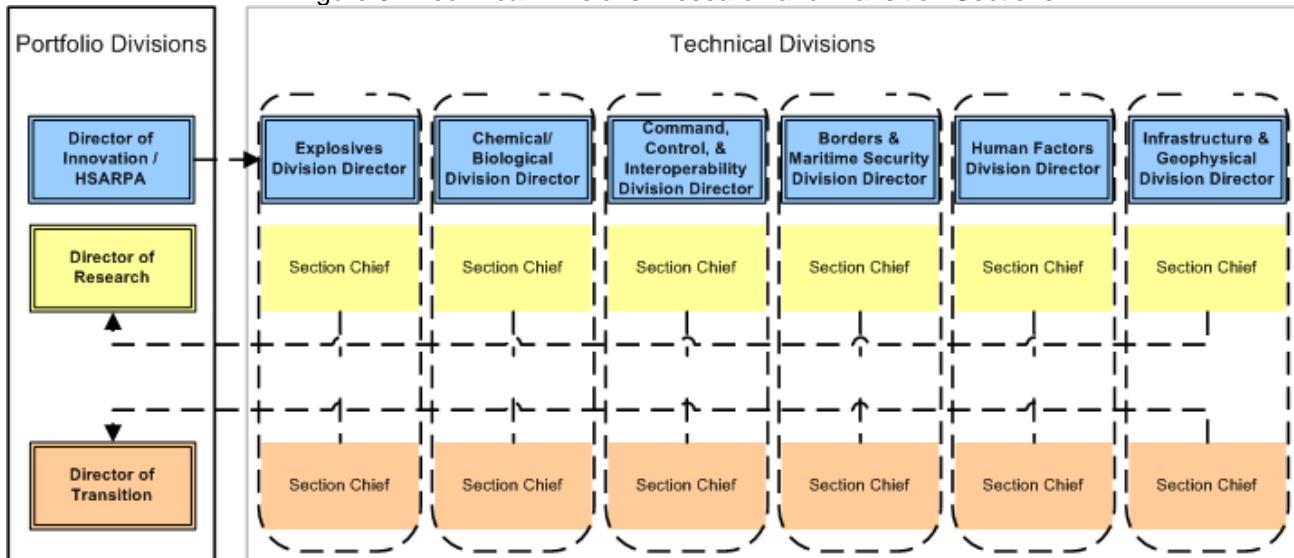
Source: Figure derived from S&T documents

Unlike the research and transition section chiefs, there are no Innovation/HSARPA section chiefs. The program managers responsible for Innovation/HSARPA HIPS and HITS projects report to both the technical division director in whose division the program is executed and to the Director of Innovation. The reporting relationship is complicated in that not all program managers responsible for HIPS and HITS are technical division staff. Instead, some are Innovation/HSARPA staff, embedded in the technical divisions to execute the HIPS and HITS projects. The reporting relationships for the program managers who are Innovation/HSARPA staff have been established for personnel matters, such as approvals for the HIPS and HITS training and travel requests.

However, unified rules for governing project progress have not been developed because the technical division directors have varying ideas of how to share responsibility with the Director for Innovation/HSARPA portfolio. Accordingly, the Director of Innovation/HSARPA negotiates the management responsibilities for project progress separately with each technical division director. This method of operating was ongoing at the time of our fieldwork, and should be adequate if it is communicated effectively to the program managers.

The new organizational structure fosters communication between the R&D divisions as well as up the chain of command. Since most of the program managers are located in the technical divisions, they have easy access to subject matter experts within their division. They attend portfolio meetings as well as meetings in their own technical divisions, thereby gaining insight into the other projects at a similar stage of development as well as those with a

similar subject matter focus. The section chiefs pass information and guidance from Transition and Research portfolios to the divisions' R&D projects. The program managers report to the technical division directors, who with the portfolio, and special support division directors, report directly to the Under Secretary and attend weekly senior leadership meetings where they provide updates and share information. They use the same tool to summarize their projects, a one-page document that describes each project's goals, schedule, and progress. If they disagree on any aspect of a project's activity, the Chief of Staff or the Under Secretary resolves it. This exchange of information reduces the risks of redundancy with other projects being conducted within or outside of S&T as well as increases the opportunities to leverage other research efforts.

The new organizational structure succeeds in providing unified management oversight throughout the lifecycle of each R&D project and networks for information exchange. The complementary oversight provided by the technical divisions and portfolios ensures that everyone, from program managers through senior officials, monitor and share accountability for the lifecycle of their projects. By grouping projects by subject matter in the technical divisions, program managers can exchange useful information related to their projects' area of science. In addition, program managers can share information related to their projects' developmental level through the portfolio's section chiefs. Technical division and portfolio directors share information with each other and the Under Secretary and Chief of Staff in the weekly senior leadership meetings.

S&T Centralized Fiscal Oversight and Developed a Tracking Tool, Providing Another Layer of Programmatic Management

After the Under Secretary began his tenure, S&T centralized the R&D programs' fiscal oversight and developed an electronic tracking tool, which should enhance its ability to manage the R&D programs. Prior to August 2006, S&T was unable to account quickly for the total number of projects and funding invested in each due to disparate management and accounting systems maintained by the primary R&D organizations. After the Under Secretary arrived, the Strategy, Policy, and Budget division began an extensive effort to compile a list of all ongoing projects and an accounting of the funding that had been committed, obligated, and disbursed for each.

After compiling the list of funded projects, S&T needed a system for maintaining and reporting program information. The Strategy, Policy, and Budget division developed an electronic system into which program managers regularly enter key project data, such as project milestones, progress, and financial outlays. The system is helping S&T management monitor and enforce programmatic and fiscal discipline. For example, program managers

must enter project execution plans before funds will be allocated for their projects. The Strategy, Policy, and Budget division also monitors the rates of commitment and obligation of funds to projects. When progress appears slow, a Strategy, Policy, and Budget division staff member seeks to identify the problem and solve it.

In addition, S&T uses the data in its annual audits and regular independent verification and validation of its R&D projects. Independent verification and validation identifies projects for which the performer has not submitted an invoice within 180 days and attempts to resolve any fiscal or programmatic factors that might be the cause of the delays. S&T had a number of such projects when the Under Secretary arrived. Funds were reserved for research that never took place. Now when the Strategy, Policy, and Budget division encounters a program that has not disbursed funding for 180 days, it works with the program manager to contact the performer and determine whether there is a problem. The Strategy, Policy, and Budget division assists in resolving the problems that are identified.

The tracking system or the procedures for using it may need to be adjusted. Some program managers said that using the system is too time-consuming and that the interface is unwieldy. However, the systematic collection of key program data into a format that can be used for internal control measures is an enormous improvement that will have far-reaching effects on S&T's ability to manage its projects and use its funding effectively.

S&T Improved Some Project Selection Processes, But Additional Improvements Are Needed

Many of S&T's new project selection processes are resulting in better informed R&D investment decisions that ultimately will provide DHS components and other stakeholders with useful, new technologies. Several offices in the new structure provide overarching guidance by monitoring R&D work being conducted outside DHS and informing senior staff of the work that S&T might leverage. This information also allows S&T to avoid inadvertently funding redundant projects. Each of the five project types in the new structure has its own process for identifying, prioritizing, and selecting the R&D projects it will fund. The processes used for the transition, Tech Solutions, SBIR, and STTR projects are clear, documented, and objective.

The DHS components conduct the processes for selecting the transition projects, which is a significant improvement over the former processes that did not include the components. However, those processes may not address the interests of state, local, and tribal first responders adequately. In addition, S&T has not yet established processes for identifying, prioritizing, and selecting the basic research and the HIPS and HITS projects. It should do so to ensure the most useful projects are selected and to prevent any concern that outside organizations improperly assert influence over the selection process. S&T was subject to such concerns over its selection of basic research projects in the past. During the course of our review, we identified three HIPS and HITS projects that initially seemed suspicious, but that we later concluded were selected for appropriate reasons. Without a clear process and documentation of the rationale, S&T will continue to be prone to suspicion of improper motives in project selections.

Former Processes for Selecting Projects Involved Stakeholders Inconsistently, Resulting In Poor Customer Satisfaction

Previously, S&T did not consistently involve the DHS components or other stakeholders in the project selection process. The processes it used were not objective and transparent according to some S&T and DHS component staff, and S&T provided little documentation to support them. This approach led to poor customer satisfaction and may not have resulted in the identification and execution of R&D projects that would have had the greatest effect in addressing the Nation's homeland security needs.

The Plans, Programs, and Budgets office, in conjunction with an Internal Review Board, used an Integrated Product Team (IPT) process to identify, prioritize, and select R&D projects. The Plans, Programs, and Budgets portfolio managers and a representative from each of the former technical

divisions: the Office of Research and Development, HSARPA, and the Office of Systems Engineering and Development, constituted the IPTs' membership. The IPTs did not include DHS components, other federal agencies, or first responders. The IPT members suggested ideas for R&D projects. The Plans, Programs, and Budgets office prioritized the projects, but an Internal Review Board made the final selection of those that would be funded.

Some S&T and DHS components' staff said that because it did not obtain ideas for new technologies from the DHS components, S&T selected projects that did not meet the components' needs. The components did not support some of the R&D decisions made by S&T and were not disposed to adopting the new technologies once they were developed.

A related problem was that S&T needed objective, transparent procedures for identifying, prioritizing, and selecting projects. S&T staff members were unable to produce documentation of the former procedures or criteria by which S&T selected R&D projects. In addition, some S&T and component staff said that awarding projects to certain national laboratories was the impetus for decisions to select and fund some projects. Staff said that certain national laboratories suggested ideas for R&D projects that interested the laboratories, and S&T would fund that research without thoroughly vetting the ideas. These staff members said that this inappropriate favoritism harmed S&T's reputation. More importantly, without a thorough and independent analysis, S&T may have selected projects that did not address the most important homeland security needs.

The *Homeland Security Act of 2002* directed that S&T conduct R&D projects that are relevant to all DHS components, and that it establish a system for transferring technologies to federal, state, and local governments, as well as private sector entities.[13] By not including DHS components and other customers in the identification of R&D needs, and by not using objective and transparent procedures for identifying, prioritizing, and selecting R&D projects, S&T did not meet congressional intent, disappointed components, and may have missed opportunities to make the Nation more secure.

Initial Process for Identifying Projects Produced Rational R&D Budget Allocation Between Portfolios

In late 2006, S&T assessed the current inventory of projects before selecting new ones. The Strategy, Policy, and Budget division staff compiled a list of ongoing projects and worked with DHS components and technical division staff to determine which R&D projects should be transitioned into the new organizational structure, which should be transitioned but modified, and

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[13] 6 U.S.C. § 182(4), (6).

which should be terminated. As a result, S&T terminated or modified certain programs to reflect the DHS mission and the components' needs. S&T used funding saved from the terminated projects to fund other projects, which resulted in an equitable allocation of the FY 2007 R&D budget between the portfolios.

The Strategy, Policy, and Budget division and S&T staff identified and assessed 167 programs, some of which may have included multiple projects. Of those, 50 were former HSARPA efforts. The review process consisted of two rounds. Each project was initially assessed to determine whether:

- There was a customer who supported the project;
- The work was being conducted at DHS or elsewhere;
- The funding was being expended;
- The project was at an advanced stage of development;
- The project was relevant to DHS; and
- The technology would have a positive effect on more than one component or other S&T stakeholder.

During the second round, division directors could dispute the projects the Strategy, Policy, and Budget division proposed to modify or terminate. They considered project and execution plans in making their determinations.

S&T transitioned the projects it decided to continue into the new organizational structure, placing each project in the technical division that best matched its subject matter, and aligning each project with either the Research or Transition portfolio according to its stage of development. The former HSARPA projects were assigned to either the Research or Transition portfolios because they were not efforts that promised revolutionary change as called for by the *Homeland Security Act of 2002*. This left the new Innovation/HSARPA portfolio with only ongoing SBIR and STTR projects.

S&T received an appropriation of slightly more than $838 million for FY 2007 programs, projects, and activities (see Figure 4 below). It gave the funding for the transition and research R&D projects to the technical divisions, not to the portfolios. Together, the technical divisions received approximately $596 million for R&D projects, which includes a statutorily mandated 2.5% of the budget for SBIR projects. In contrast, S&T gave the funding for the HIPS and HITS projects to the Innovation/HSARPA portfolio instead of the technical divisions. S&T provided $38 million for those projects, approximately 5% of its FY 2007 budget. Additionally, S&T placed $5.5 million in the Transition portfolio to fund the Tech Solutions projects. The total R&D project funding was $639.9 million. The remainder of the funding was used to fund R&D support activities. S&T provided the

Transition portfolio with $18.5 million to support the SAFETY Act and program transitions. The Research portfolio received $154.2 million to fund the DHS laboratories, the COEs, and university fellowships. In addition, the Testing and Evaluation/Standards division, which develops testing and evaluation methodology, received more than $25.4 million to fund its work.

Figure 4: S&T FY 2007 Program, Project, Activity Budget Allocation

R&D Project Funding	FY 2007 Appropriation (in millions)	% FY 2007 Budget
Technical Divisions		
Borders & Maritime Division	$33.4	4.0%
Chemical & Biological Division	$313.6	37.4%
Command, Control, & Interoperability Division	$62.6	7.5%
Explosives Division	$105.2	12.6%
Human Factors Division	$6.8	0.8%
Infrastructure & Geophysical Division	$74.8	8.9%
Subtotal	**$596.4**	**71.2%**
which includes $18.5M for SBIR and $10M for HSI		
Portfolios		
Innovation/HSARPA: HIPS/HITS	$38.0	4.5%
Transition: Tech Solutions	$5.5	0.7%
Subtotal	**$43.5**	**5.2%**

R&D Support Funding	FY 2007 Appropriation (in millions)	% FY 2007 Budget
Research: Laboratory Facilities and University Programs	$154.2	18.4%
Transition: SAFETY Act and Program Transition	$18.5	2.2%
Testing & Evaluation/Standards	$25.4	3.0%
Subtotal	**$198.1**	**23.6%**
S&T Total FY 2007 Appropriation for R&D	**$838.0**	

Source: Data derived from S&T documents

S&T's approach to funding the FY 2007 projects was reasonable. After terminating unnecessary projects and modifying others, S&T determined that the funding allocation between transition and basic research projects was proportionally the same as in previous years. S&T officials said that they saw no need to change the funding proportions. Because the transition projects that were continued with FY 2007 funds had been successful and were expected to transition to the components or other customers, it would be wasteful and irresponsible to cut the funding for those projects.

The basic research projects that were continued were long-term efforts in areas of interest to the department, such as explosives, chemistry, and biology. They should not be stopped without a compelling reason. The HIPS and HITS received 5% of the funding, which seems appropriate for projects that are likely to fail, but will provide revolutionary advances should they succeed. The Tech Solutions projects received a small percentage of funds. Given the

constraints of reorganizing S&T and managing FY 2007 funds that had already been committed, the FY 2008 allocation to the new Tech Solutions projects is adequate. However, S&T should consider whether to divert a larger proportion of its funds in FY 2010 and beyond to that program, depending on first responders' interest. The SBIR projects received the statutorily required amount, and the STTR projects did not receive any funding because S&T did not meet the budgetary threshold required for funding those projects.

Using clear criteria to review and terminate projects of negligible value to homeland security was a prudent approach to transitioning worthwhile projects from the former to the new organizational structure. It ensured that the R&D funding and S&T staff were devoted to worthwhile projects. The resulting allocation of funds between the R&D programs was rational and established a strong financial baseline for the new organization.

S&T Established New Offices to Capture Ideas and Leverage Other Organizations' Work for Its R&D Projects

There are many potential sources of ideas for projects, including personal knowledge; DHS components; federal, state, and local first responders; and work being pursued in other areas of the government and the private sector, domestically and internationally. S&T established several new offices to improve its ability to identify proposed work or work undertaken outside of S&T. These offices have been effective in providing ideas for projects or external efforts to leverage.

International and federal R&D programs provide ideas or projects to leverage for the benefit of homeland security. Congress recognized this when it passed the *Homeland Security Act*, which states that the Under Secretary for Science and Technology has the responsibility for, among other things: "Coordinating with other appropriate executive agencies in developing and carrying out the science and technology agenda of the department to reduce duplication and identify unmet needs."[14]

The S&T Interagency, International, and the Special Programs divisions capture and disseminate information about federal, international, or sensitive R&D efforts that might fulfill S&T's priorities so that S&T may avoid conducting redundant efforts inadvertently and may leverage the work of others. The new Interagency Programs division reviews R&D programs of other domestic federal agencies and national laboratories. Likewise, the International Programs division evaluates international projects that S&T may leverage. Both report programs of interest to the technical division directors

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[14] 6 U.S.C. § 182(13).

for their consideration. One key responsibility of the Director of the Special Programs division is to provide the portfolios and technical divisions with information about classified or especially sensitive programs that are relevant to their projects. Each of these entities uses a broad network of informal and formal contacts to gather information, and each has already assisted in identifying relevant research.

The private sector is another source of ideas for R&D projects. S&T staff at all levels said that vendors bombard them with oral and written presentations of ideas for R&D projects that they believe S&T should award to them. Some vendors are simply marketing their ideas, which S&T refers to as unsolicited concepts; others are submitting official, written offers, referred to as unsolicited proposals.

To manage the growing number of unsolicited proposals and concepts, and ensure the subject matter experts in the technical divisions are aware of them, the Under Secretary created the Office of Concepts and Ideas in the Transition portfolio. S&T staff who receive unsolicited concepts and proposals should forward those documents to the new office. The office logs the documents and forwards the unsolicited ideas to the appropriate technical divisions, and the unsolicited proposals to the DHS Office of Procurement Operations for handling in accordance with the federal acquisition regulations. The Office of Concepts and Ideas provides a pragmatic solution for tracking the numerous unsolicited ideas that come in to S&T. However, many of the S&T employees we spoke with did not know that the office existed. As a result, the office may not receive all of the ideas that are submitted, which would undermine its effectiveness. S&T plans to train its employees on procedures for handling unsolicited proposals and concepts.

S&T Has Improved Some Processes for Selecting R&D Projects, Although It Should Improve Others
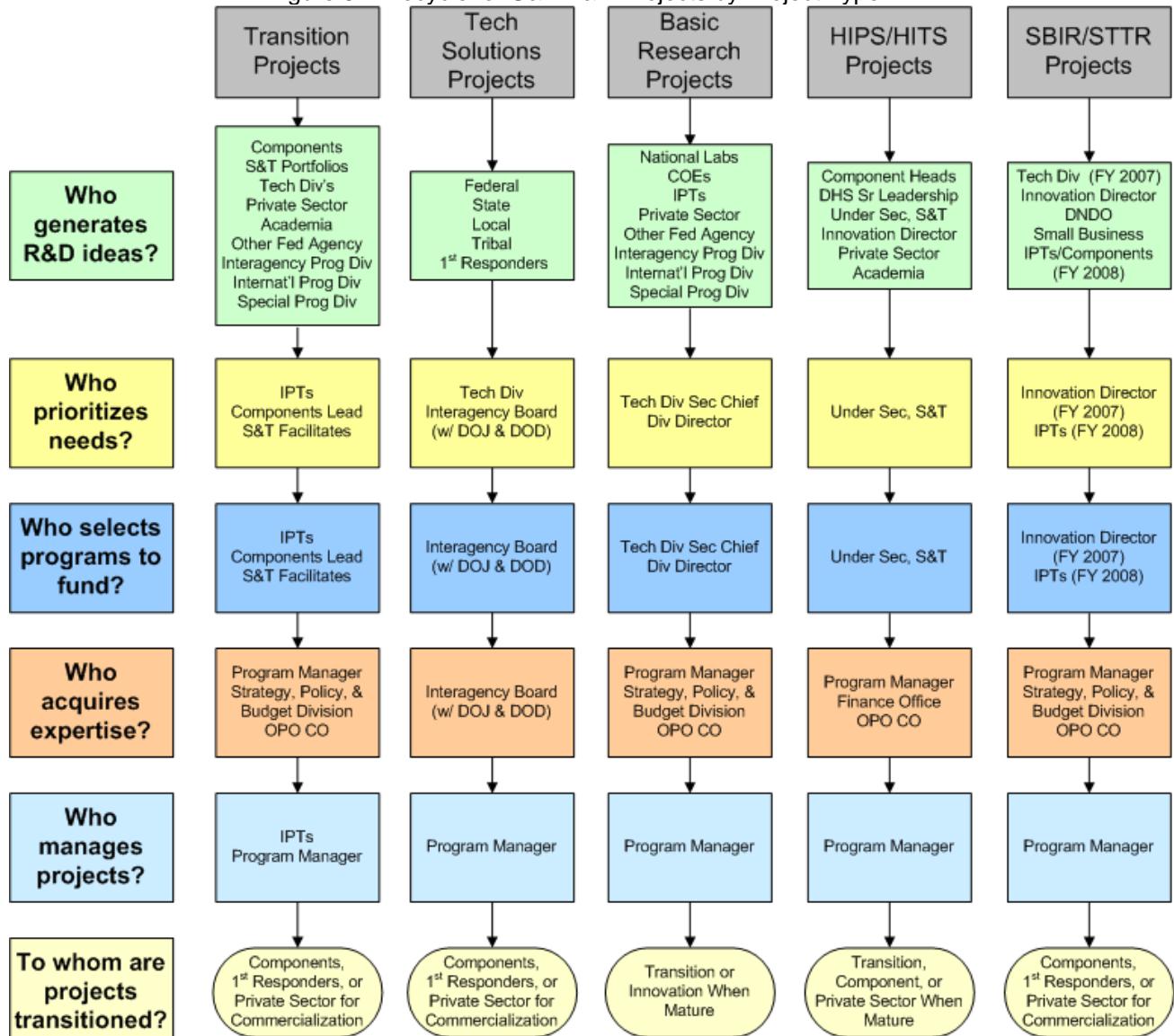
After identifying the transition and former HSARPA projects to continue in FY 2007, S&T needed to establish processes for selecting those projects in FY 2008 and the future. In addition, it had to establish processes quickly for selecting the HIPS, HITS, SBIR, and Tech Solutions projects that it would fund in 2007.

Previously, S&T relied on one office, Plans, Programs, and Budgets, and an Internal Review Board to identify and prioritize the R&D projects. Today, there is a unique selection process for each type of project in which the technical divisions and portfolios have varying levels of responsibility. Involving the technical divisions in the selection of projects improves accountability throughout the project lifecycle.

The processes for selecting transition, Tech Solutions, and SBIR projects are adequate, and in the case of Transition projects are excellent, because they use a clear process with objective criteria, and they are repeatable. However, the S&T technical divisions, which are responsible for the selection of basic research projects, have not developed clear, repeatable processes or criteria for selecting those projects. In addition, the Under Secretary, who was responsible for the selection of the Innovation portfolio's HIPS and HITS projects, did not establish a process or clear criteria for selecting the projects for FY 2007.

S&T may not have had enough time to develop processes and criteria for selecting basic research and HIPS and HITS projects for FY 2007, given that the Under Secretary's appointment was confirmed in August 2006, and much of the first months of his tenure was dedicated to identifying and reviewing projects and reorganizing the directorate. We commend S&T for quickly initiating repeatable, objective processes for selecting transition, Tech Solutions, and SBIR projects, and we recommend changes to the selection processes for basic research and HIPS and HITS projects. The processes now in place are illustrated in Figure 5.

Figure 5: Lifecycle for S&T R&D Projects by Project Type

	Transition Projects	Tech Solutions Projects	Basic Research Projects	HIPS/HITS Projects	SBIR/STTR Projects
Who generates R&D ideas?	Components S&T Portfolios Tech Div's Private Sector Academia Other Fed Agency Interagency Prog Div Internat'l Prog Div Special Prog Div	Federal State Local Tribal 1st Responders	National Labs COEs IPTs Private Sector Other Fed Agency Interagency Prog Div Internat'l Prog Div Special Prog Div	Component Heads DHS Sr Leadership Under Sec, S&T Innovation Director Private Sector Academia	Tech Div (FY 2007) Innovation Director DNDO Small Business IPTs/Components (FY 2008)
Who prioritizes needs?	IPTs Components Lead S&T Facilitates	Tech Div Interagency Board (w/ DOJ & DOD)	Tech Div Sec Chief Div Director	Under Sec, S&T	Innovation Director (FY 2007) IPTs (FY 2008)
Who selects programs to fund?	IPTs Components Lead S&T Facilitates	Interagency Board (w/ DOJ & DOD)	Tech Div Sec Chief Div Director	Under Sec, S&T	Innovation Director (FY 2007) IPTs (FY 2008)
Who acquires expertise?	Program Manager Strategy, Policy, & Budget Division OPO CO	Interagency Board (w/ DOJ & DOD)	Program Manager Strategy, Policy, & Budget Division OPO CO	Program Manager Finance Office OPO CO	Program Manager Strategy, Policy, & Budget Division OPO CO
Who manages projects?	IPTs Program Manager	Program Manager	Program Manager	Program Manager	Program Manager
To whom are projects transitioned?	Components, 1st Responders, or Private Sector for Commercialization	Components, 1st Responders, or Private Sector for Commercialization	Transition or Innovation When Mature	Transition, Component, or Private Sector When Mature	Components, 1st Responders, or Private Sector for Commercialization

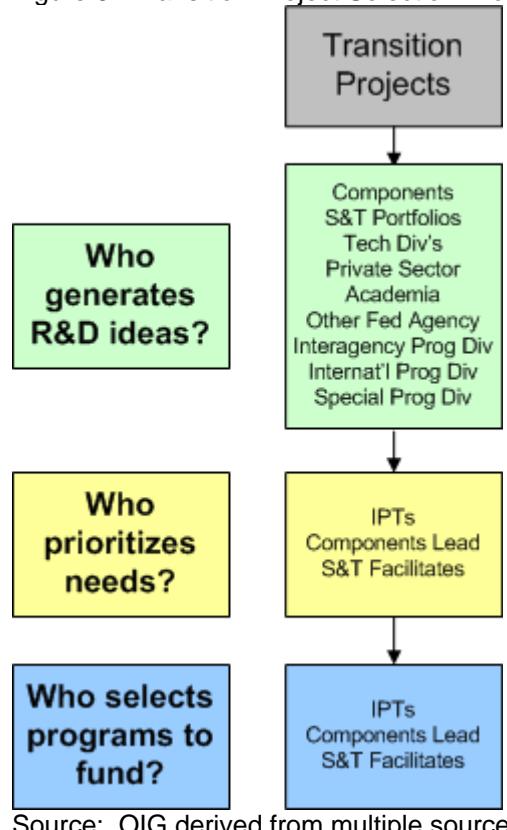Source: OIG derived from multiple sources

Process for Selecting Transition Projects Is Rational and Repeatable

DHS components now identify, prioritize, and select the transition projects
that S&T will fund. Accordingly, the new process will improve S&T's ability
to meet the components' needs for new technologies. Additionally, the results
of the process influence the selection of basic research, HIPS and HITS, and
SBIR projects. This cascading effect will further enhance the directorate's
success in developing new technologies that will have a direct effect on the
components' operations. The process is modeled after one that the Under
Secretary developed at the Office of Naval Research, and is documented and
repeatable. Given that approximately half of S&T's R&D budget is allocated

to transition projects, having a strong project selection process is important to its success and the success of the organizations it supports.

As a result of the Strategy, Policy, and Budget division's review and transfer of projects to the new organizational structure, the technical divisions inherited projects that consumed their FY 2007 and FY 2008 transition project budgets. Therefore, they did not have to identify and select projects for those years. However, to select projects for FY 2009 and beyond, the technical divisions and the Transition portfolio implemented a new IPT process. Figure 6 plots the path that transition projects take from identifying potential projects through prioritizing and selecting them. The key change in the new process is that DHS components are now responsible for identifying, prioritizing, and selecting transition projects.

Figure 6: Transition Project Selection Process

Source: OIG derived from multiple sources

The Under Secretary established IPTs for major areas of interest for homeland security, each with its own budget for funding transition projects. IPT membership consists of a lead entity or entities, which is always one or more DHS components; the S&T technical division that most closely corresponds to the IPT's area of interest; and an acquisition staff member from the lead component. Some end-users may attend IPT meetings, but nonfederal end-users generally are not invited. End-users are nonvoting members. The

components most closely aligned with the end-users are supposed to represent their interests. Any DHS component may attend any meetings, but they cannot vote. S&T facilitates the meetings, but also does not vote. Figure 7 shows the composition of the IPTs.

Figure 7: S&T Transition Integrated Product Teams

IPT	Component Lead / Co-lead	Acquisition Lead	S&T Division Facilitator	End User
Border Security	United States Customs & Border Protection / United States Immigration & Customs Enforcement	DHS Component	Borders & Maritime Security	Agents
Cargo Security	United States Customs & Border Protection	DHS Component	Borders & Maritime Security	Officers / Industry
Chem/Bio Defense	Office of the Chief Medical Officer / Office of Infrastructure Protection	DHS Component	Chemical & Biological	Policy
Cyber Security	National Protection & Programs	DHS Component	Command, Control, & Interoperability	Infrastructure Owners / Operators
Explosives Prevention	Transportation Security Administration / United States Secret Service	DHS Component	Explosives	Agents
Incident Management	Federal Emergency Management Agency	DHS Component	Infrastructure & Geophysical	First Responders
Interoperability	Federal Emergency Management Agency / National Protection and Programs – Office of Emergency Communications	DHS Component	Command, Control, & Interoperability	Emergency Responders
Information Sharing	Office of Intelligence Analysis	DHS Component	Command, Control, & Interoperability	Office of Operations Coordination / Homeland Security Infrastructure Threat & Risk Analysis Center
Infrastructure Protection	Office of Infrastructure Protection	DHS Component	Infrastructure & Geophysical	
Maritime Security	United States Coast Guard	DHS Component	Borders & Maritime Security	
People Screening	Screening Coordination Office / United States Citizenship & Immigration Service	DHS Component	Human Factors	

Source: Figure derived from S&T documents

The IPTs meet at least four times to identify and select projects. During the first two meetings, the component members identify gaps in their capabilities that correspond to the IPT's subject focus and then prioritize the gaps.

In the interim, S&T technical division staff members research whether technology is already available or research is occurring elsewhere to address the prioritized gaps identified in the first two meetings. Regardless of the outcome, S&T develops a high-level plan for R&D approaches to resolve the gaps, and it identifies funding requirements. During the third and fourth meetings, the IPTs review S&T's plans and determine which projects to undertake given budgetary limits and the estimated funding required for each proposed project.

To ensure that they are serious about their investments and will transition the projects, S&T asks the components to sign Technology Transfer Agreements. Technology Transfer Agreements are the culmination of negotiations to solidify the program's specifications, schedule, and acquisition.

To ensure they align with homeland security priorities, the Technology Oversight Group reviews the IPT's project selections. Members of this senior DHS technology review committee include the Deputy Secretary, who serves as chairman; the DHS Chief Financial Officer; the Under Secretaries of National Protection and Programs (formerly, Preparedness) and Management; and the Under Secretary for Science and Technology, who is a nonvoting member (see Figure 8).

Figure 8: Technology Oversight Group

Source: Figure derived from S&T documents

In addition to reviewing the IPTs' lists of transition projects to fund, this year the Technology Oversight Group had a $35 million realignment budget to fund projects it considered important, but which the IPT budgets were unable to fund. The group used the realignment budget to fund 18 FY 2009 programs for seven IPTs.

Once the Technology Oversight Group finalizes the list of projects, Project IPTs meet to refine project plans, specifications, and schedules and monitor their progress once they have been initiated. The IPT representatives delegate staff to serve on the project IPTs.

The components are very enthusiastic about the IPT process, especially their role in identifying and prioritizing gaps and selecting appropriate technology solutions. The components expressed minor concerns about some process issues, which should be resolved as the process matures. For example, S&T scheduled the initial IPT meetings too closely together, some information needed to be distributed better, and it was not entirely clear what S&T intended as next steps following the IPTs. S&T's Transition portfolio is working with the components to address these issues.

In addition, some S&T staff expressed concern that the IPTs did not include state, local, and tribal first responders. The *Homeland Security Act of 2002* directs S&T to transfer technologies to federal, state, local, and tribal governments, and private sector entities.[15] S&T responded that state, local, and tribal partners need not attend the IPTs because the components are in regular contact with these authorities and can represent their interests at the IPT meetings. Additionally, S&T said that the Tech Solutions office accepts suggestions for technology improvements directly from all first responders, thus providing them with a forum for voicing their capability gaps. As the components may not know all of the first responders' needs and concerns, the IPTs may not identify, prioritize, and select transition projects that address the needs of all. Additionally, Tech Solutions has very little funding to address the first responders' needs. S&T should consider whether to modify the process to incorporate the needs and requirements of state, local, and tribal first responders.

The process has not been completely successful from S&T's perspective either. The components have been reluctant to sign the Technology Transfer Agreements. S&T believes that once the component leads understand the importance of the agreements, they will support them. Some Technology Transfer Agreements may not be signed because the component representatives cannot guarantee the availability of funding in future years. In such cases, the best result may be a good faith agreement that would recognize the component's commitment to transitioning the technology, but would stipulate that potential obstacles outside the control of the agency might affect the transition process. S&T will continue to move the projects forward while it works with the components to secure the Technology Transfer Agreements or good faith agreements.

S&T's inability to secure Technology Transfer Agreements and other issues are relatively small compared to the success of the new IPT process for identifying and selecting Transition projects. The new process is a rational method that ensures that transition projects reflect the needs of components. Successful transition projects will provide the components and other S&T customers with technologies they need to complete their mission.

Process for Selecting Tech Solutions Projects Is Adequate and Evolving

The Transition portfolio's Tech Solutions office has a clear, sustainable process with objective criteria for selecting its R&D projects. The office obtains ideas for projects by asking federal, state, local, and tribal first responders to submit descriptions of gaps in their capabilities to an email box,

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[15] 6 U.S.C. § 182(6).

techsolutions@dhs.gov. However, unlike the IPT process for transition projects, first responders do not prioritize and select the projects to be funded. Instead, the S&T Tech Solutions staff members work with an interagency board that is sponsored by DHS, the United States Department of Justice, and the United States Department of Defense to prioritize and select the projects that meet its criteria of requiring less than $250,000 in S&T funding and less than a year to complete in prototype. In addition, the board weighs the relative need of the projects against each other. The board vets the ideas with S&T technical division staff, DHS components, national laboratories, or the private sector to determine possible solutions, their cost, and completion requirements.

The interagency board is piloting a modified process for prioritizing projects. In addition to cost, speed, and need, the process assesses: the risk of failure, which must be low to medium; and the maturity of the technology, which must be more advanced than basic research.

Tech Solutions provides first responders the opportunity to contribute directly to the project selection process by communicating their gaps in capability to S&T. The process, shown in Figure 9, is repeatable, documented to some degree, and uses clear criteria. It should assist S&T in selecting projects that will be most useful to the first responder community.

Figure 9: Tech Solutions Review Process
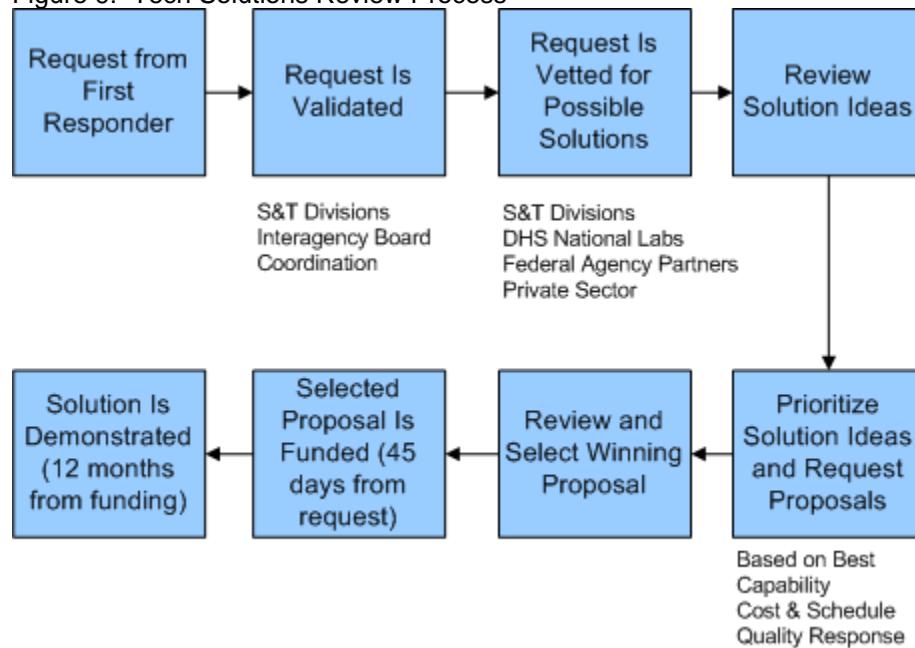
Source: Figure derived from S&T documents

*Basic Research Project Selection Process Needs To Be Defined*

S&T staff and other department officials said that in the past, S&T used the national laboratories to identify basic research projects that the laboratories wanted to undertake. S&T selected those projects with little analysis of overall homeland security needs, according to those staff members. To avoid these problems in the future and to ensure S&T dedicates its basic research budget to the work that is most meaningful to homeland security, it should develop and document a repeatable process with objective criteria for prioritizing and selecting basic research projects.

Basic research projects explore more fundamental areas of science. S&T views basic research as a pipeline of work that in 8 years or less may become transition or innovation projects. Due to their long-term nature, basic research projects do not change much, and S&T does not award new ones often. S&T allotted 10% of the FY 2007 R&D budget to continuing existing basic research projects and initiating a few new projects.

S&T staff said that the technical divisions' research section chiefs will exert considerable influence over the identification and selection of basic research projects. They are division staff who report to their respective division directors, but maintain an informal reporting relationship to the Director of Research.

The research section chiefs will use the IPTs' results as a source of ideas in identifying and prioritizing future basic research projects, and they have already adjusted some of the research projects to align with the capability gaps articulated by the IPTs. Also, the Interagency, International, and Special Programs divisions, as well as the national laboratories, COEs, and the private sector, will serve as sources for basic research project ideas. However, at the time of our fieldwork, S&T had not developed a process or criteria for prioritizing and selecting the basic research projects. Without a clear process and criteria, S&T may not select the projects that are most needed and will remain vulnerable to perceptions that national laboratories or others have too much influence over the process. S&T should develop a clear, repeatable process with objective criteria for identifying, prioritizing, and selecting basic research projects. The selection process for basic research projects is shown in Figure 10.

Figure 10: Basic Research Project Selection Process
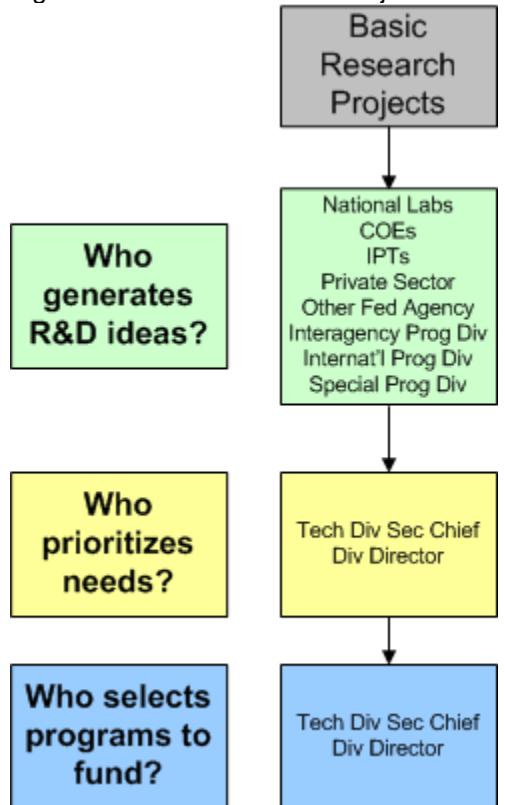
Source: OIG derived from multiple sources

Process for Selecting New HIPS and HITS Projects Needs Stronger Internal Controls

The Under Secretary assumed responsibility for identifying, prioritizing, and selecting the FY 2007 HIPS and HITS projects, but did not document the process or its results. Figure 11 shows the HIPS/HITS project selection process. We learned that the Under Secretary selected three projects that were suggested by business acquaintances from his tenure as Chief of Naval Research, each of whom sought funding to conduct the work. We concluded that the Under Secretary did not select these or any other projects in order to award project funding later to certain industry members. However, the method by which the projects were selected was not documented and the selection criteria were not clear, which cast initial doubt on the fairness of the selection of the three projects.

Figure 11: HIPS/HITS Project Selection Process
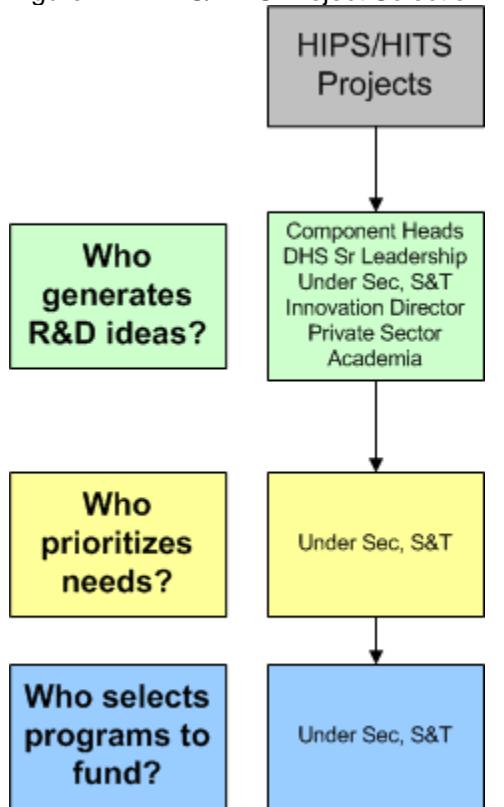
Source: OIG derived from multiple sources

Without a clear system for documenting the reasons for the project selections, S&T remains vulnerable to real or perceived conflicts of interest and abuses of position. S&T should develop a more rigorous process for identifying, prioritizing, and selecting HIPS and HITS projects, and ensure the process documents the reasons behind the selections. Additionally, the Under Secretary should delegate the responsibility for managing the process to the Director of Innovation/HSARPA.

The Under Secretary acquired HIPS and HITS ideas from several sources early in his tenure at S&T. One was from the remarks of senior DHS leaders at an October 2006 offsite meeting hosted by Secretary Chertoff. During the meeting, senior component representatives discussed mission challenges and gaps in capabilities. The Under Secretary said that the information presented by component representatives unexpectedly gave him ideas for developing revolutionary, new technologies to meet the department's needs. Other ideas arose from some of the Under Secretary's acquaintances from private industry and academia, who suggested HIPS and HITS projects to him.

In December 2006, the Under Secretary decided on 15 HIPS and HITS projects that reflected the needs of the components. He did not document the

process or the criteria he used in making the selections, other than that he ensured that each technical division had at least one project to balance innovative advancements across the missions of DHS. He discussed the list with the Director of the Innovation/HSARPA portfolio and with the S&T Corporate Board, which is composed of the Chief of Staff, three portfolio directors, and six technical division directors. They provided their opinions on the proposed projects, but they did not fundamentally change the list. Next, the Under Secretary presented the list to senior DHS leadership, who approved it, and then to Congress, which approved all but one of the projects. Later, the Under Secretary increased the number of projects to 19, but S&T cancelled one project in June 2007.

The Under Secretary selected three projects that had been suggested by some of his business acquaintances from his tenure as Chief of Naval Research. In 2007, S&T awarded two of these projects to the entities that had suggested them. The funding for the third was to be awarded by means of a competitive process in which the industry member who proposed the idea was participating. Some S&T staff members familiar with the projects initially suspected that the Under Secretary had preselected certain industry members and their projects on the basis of his relationships with them, not on the merit of their project proposals. The Under Secretary and members of the Office of Procurement Operations stopped the third procurement when they learned of those concerns. We reviewed the circumstances of the three selections and concluded that they were made for legitimate reasons.

Even though we did not identify any improper FY 2007 HIPS and HITS selections, the initial appearance of unfairness in the selections is problematic. Such appearances could undermine the public's trust in the department. The FAR encourages pre-solicitation engagement with industry,[16] but it cautions that business must be conducted with integrity, fairness, and openness.

> "An essential consideration in every aspect of the System [acquisition system] is maintaining the public's trust. Not only must the System have integrity, but the actions of each member of the Team must reflect integrity, fairness, and openness."[17]

The selection of HIPS and HITS should be the result of an objective, analytical process that ensures S&T does not overlook the most promising revolutionary technologies, and is not, in fact or perception, unduly biased toward any particular provider. The circumstances surrounding the selection of the three projects above were brought on by several factors.

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[16] FAR 15.201.
[17] FAR 1.102-2(c)(1).

- The Under Secretary and S&T had little time to identify all of the HIPS and HITS projects and improvised throughout the process. Time constraints contributed to the Under Secretary not documenting the process and rationale for selecting these projects.
- The Under Secretary's role as both the agency's spokesperson and the official selecting the HIPS and HITS projects put him in a potentially awkward and conflicted position regarding his role as project selection official.
- The Under Secretary's familiarity with the R&D community is extensive, and the same community used those relationships to gain unique access to him, his managers, and potential federal funding.

The need to select projects quickly without a documented process or rationale when combined with the Under Secretary's dual roles and large network of R&D contacts challenged S&T's adherence to acquisition policies and procedures. Although we later learned that our concerns were unfounded, S&T should make changes to avoid the likelihood that similar appearances arise in future selections of HIPS and HITS projects.

One of the Under Secretary's duties as chief S&T executive is to garner the best ideas for improving homeland security. To accomplish this, he engages industry representatives at conferences and meetings, and maintains an "open door policy" to encourage them to provide ideas for homeland security R&D projects. Industry representatives are also eager to meet the Under Secretary to present their ideas and pursue federal funding for their work. The Under Secretary cannot possibly meet everyone who wants to promote their suggestions for R&D projects; yet on the basis of his meetings with industry and DHS officials and without a clear process or criteria, he decided which HIPS and HITS projects to pursue. The Under Secretary's dual responsibilities of encouraging industry to engage with S&T and leading the selection of HIPS and HITS projects were inherently risky when carried out simultaneously as they may raise concerns of favoritism or lack of objectivity.

Furthermore, the Under Secretary said that when he arrived at S&T he intended to reach out to "proven performers," those industry members and academics who had conducted successful R&D projects in the past that could provide ideas and perhaps R&D services. Also, these performers, some of whom were familiar to the Under Secretary from his years at the Office of Naval Research, sought to conduct work for S&T and obtain funding for their projects. Given the Under Secretary's predisposition to rely on proven performers, the pool of ideas for HIPS and HITS was more likely to be limited to those acquaintances and the few others who meet with him. If he relies on proven performers with whom he is already acquainted, he raises the possibility of the appearance of bias in project selection.

We are not advocating that the Under Secretary abandon his open door policy, as federal acquisition regulations allow for and govern such interactions. However, to remove any doubt about S&T's adherence to regulations, S&T needs to incorporate stronger internal controls into the process for selecting the HIPS and HITS. The Under Secretary said he will establish policies and procedures for documenting the selection of future HIPS and HITS projects. In addition, the Under Secretary should remove himself from the selection process, and assign the Director of Innovation/HSARPA to develop objective criteria and oversee the identification and selection of HIPS and HITS projects. Innovation staff should be required to document the rationale for each selected project.

SBIR Project Selection Process Is Evolving

The federal SBIR Program, mandated by the *Small Business Innovation Development Act of 1982* (Public Law 97-219), exists to involve small and disadvantaged businesses in federal R&D work. S&T's former process for identifying and selecting SBIR projects was not rigorous, but the office plans to implement a new program for FY 2008 projects. The new process for identifying programs will involve direct consultations with the IPTs. Figure 12 shows the SBIR project selection process.

Figure 12: SBIR Project Selection Process
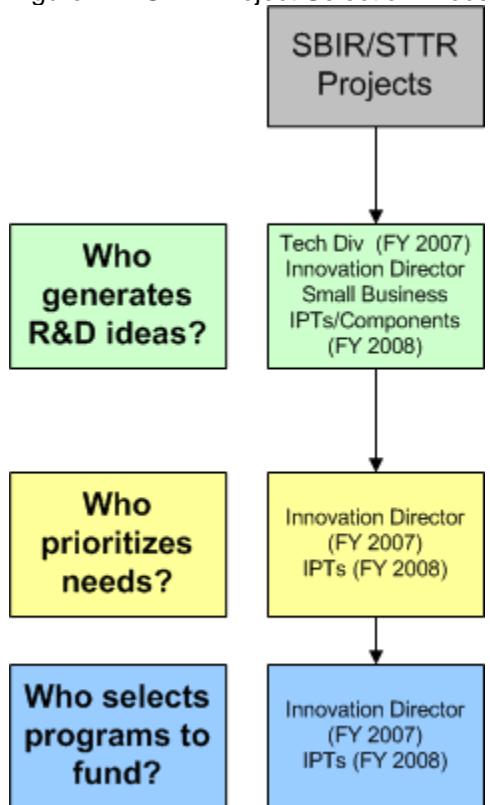
Source: OIG derived from multiple sources

For FY 2007, the SBIR office asked each of S&T's six technical divisions to submit a prioritized list of potential SBIR projects. The Director of Innovation/HSARPA selected the top priority topic from each of the divisions using the criteria of whether the project would fill the needs of multiple DHS components and other homeland security providers. In FY 2008, the SBIR office will ask the IPTs to identify their top priorities for SBIR projects. The S&T representative to the IPTs will evaluate the IPTs' submissions. S&T officials said that they will probably select one project from each IPT, using criteria similar to that used in FY 2007. However, the SBIR office may choose not to select an IPT's choice, should the proposed project not have a strong justification. As a component of the Innovation portfolio, the SBIR office may also consider selecting a project from the list of HIPS and HITS.

The SBIR Program's proposed method for identifying new programs in FY 2008 and beyond will reflect the interests of the components as communicated to them through the IPTs, which is a positive change from the former process. As SBIR refines its project identification processes, it should develop further and document the criteria for prioritizing and selecting projects.

Recommendations

We recommend that the Under Secretary for Science and Technology:

Recommendation #1: Determine whether the IPT process is satisfying the needs of state, local, and tribal first responders. If their needs are not being considered adequately, S&T should develop processes for including the first responders' gaps in capabilities in its IPT processes.

Recommendation #2: Direct the Director of Research to work with the technical division directors and their Research Section Leads to develop and document clear, repeatable processes with objective criteria for prioritizing and selecting basic research projects.

Recommendation #3: Transfer responsibility for identifying, prioritizing, and selecting the HIPS and HITS to the Director of the Innovation/HSARPA portfolio and charge the director with developing and documenting clear, repeatable processes with objective criteria for identifying, prioritizing, and selecting HIPS and HITS projects.

Management Comments and OIG Analysis

S&T provided technical and formal comments to our report. In his letter transmitting those documents, the Under Secretary provided comments, as well. S&T concurred with our recommendations, but also suggested some changes. We evaluated all of the comments and modified the report where appropriate. Appendix B provides a copy of S&T's formal comments and the Under Secretary's letter. We summarized those comments and provided our analysis of them in the following paragraphs.

Recommendation #1: Determine whether the IPT process is satisfying the needs of state, local, and tribal first responders. If their needs are not being considered adequately, S&T should develop processes for including the first responders' gaps in capabilities in its IPT processes.

S&T Response: S&T concurred with the recommendation and suggested that activities it has undertaken satisfied this recommendation. S&T commented that it has increased its outreach to the state, local, and tribal governments, as well as the information it transmits to the IPTs on behalf of those groups. For example, S&T expanded the title and responsibilities of one of its management positions to Director of Interagency and First Responder Programs, which now serves as a liaison to national and international first responder associations in addition to other duties. S&T also established a liaison position in the California Governor's Office of Homeland Security,

and it may initiate similar programs with other states if this pilot program in California is successful. Additionally, S&T continues to conduct national interagency outreach to coordinate federal, state, local, and tribal collaboration. S&T will update the IPTs with information gathered from each of these activities.

OIG Analysis: S&T has satisfied this recommendation. S&T has established formal lines of communication that should enhance the IPT's understanding of the state, local, and tribal first responders' needs.

Accordingly, this recommendation is resolved and closed. No other action is required.

Recommendation #2: Direct the Research section chiefs to work with their technical division directors to develop and document a clear, repeatable process with objective criteria for prioritizing and selecting basic research projects.

S&T Response: S&T concurred with our recommendation in general, but suggested that we modify the wording to:

> Direct the Director of Research to work with the technical division directors and their Research Section Leads to develop and document clear, repeatable process[es] with objective criteria for prioritizing and selecting basic research projects.

In addition, S&T noted that the Director of Research recently completed a review of the divisions' basic research programs and processes, and is currently assessing whether S&T's portfolio of basic research projects is complete and free of redundancies. The Director of Research is refining and documenting the processes by which S&T identifies, prioritizes, and selects basic research projects. Additionally, S&T has established a Research Council to coordinate a consistent approach to planning and executing basic research projects, which would include project selection. In addition, the National Academy of Sciences is helping S&T determine a better means of measuring effectiveness of the portfolio.

OIG Analysis: We agree with S&T's suggestion and we modified the recommendation (see page 33).

S&T has indicated that it is undertaking steps to fulfill the recommendation. In its action plan, S&T should provide evidence that it has implemented clear, repeatable processes with objective criteria for selecting basic research projects. The recommendation is resolved and open.

Recommendation #3: Transfer responsibility for identifying, prioritizing, and selecting the HIPS and HITS projects to the Director of the Innovation/HSARPA portfolio and charge the Director with developing and documenting clear, repeatable processes with objective criteria for identifying, prioritizing, and selecting HIPS and HITS projects.

S&T Response: While the Under Secretary disagreed with information conveyed in this section of the report, S&T concurred with recommendation #3 and reported it has taken steps to satisfy it. The Under Secretary disagreed with our characterization of the HIPS and HITS selection process as unfair, especially because we determined that no legal or regulatory violations were committed. He briefed DHS leadership, the Office of Management and Budget, and Congress about the projects, which brought objectivity and fairness to the process. The Under Secretary recommended that, absent a violation of statute or regulation, we should limit our discussion in this section to a recommendation that S&T establish and document a more formal and repeatable process. S&T proposed several changes to our report to reflect these concerns.

In its formal comments, S&T noted that it has established a formal process for identifying and prioritizing new HIPS and HITS projects. The Director of Innovation will review project ideas and brief the S&T Corporate Board, the Deputy Under Secretary, and the Under Secretary, who will be given an opportunity to modify the list. The Under Secretary will brief the list to the Technology Oversight Group.

OIG Analysis: We reviewed the Under Secretary's comments on the Selection of HIPS and HITS section of our draft report and modified the section, where appropriate. We understand that the Under Secretary vetted the list of HIPS and HITS projects with senior DHS management, the Office of Management and Budget, and Congress. However, those actions did not overcome the causes of our initial concern. Although we concluded that no regulatory or statutory violations occurred, S&T is not fulfilling the FAR's direction that the actions of each person involved in an acquisition reflect "integrity, fairness, and openness" in order to maintain the public's trust. The Under Secretary emphasized that he does not have acquisition authority. Yet, the planning and selection processes are the initial steps in an acquisition. By engaging in those actions, the Under Secretary avails himself to the provisions of the FAR.

Without an objective, documented process to provide the underlying rationale for his decisions, the Under Secretary's selections of three HIPS and HITS projects initially appeared unfair. We discussed the three incidents because they illustrate the impact of not having such a process. However, we modified

this section to state more clearly that the Under Secretary's actions did not violate any statutes or regulations.

In its action plan, S&T should provide: (1) documentation of the new process, including the criteria that will be used to identify, prioritize, and select new HIPS and HITS projects; and (2) documentation showing that S&T has transferred responsibility for the HIPS and HITS project selection to the Director of Innovation/HSARPA, and charged the Director with establishing a repeatable and objective project selection process.

This recommendation is resolved and open.

This report is responsive to two congressional requests, one from the Honorable Tom Davis, then Chairman of the House Committee on Government Reform, and the other from the then minority staff of the House Committee on Homeland Security. The requests directed us to look at the manner in which S&T executes its R&D programs.

The purpose of our review was to examine the processes S&T uses to identify, prioritize, select, and manage R&D investments and balance the funding between basic, innovative, and transition research and the entities that conduct it. Our report is based on interviews with key S&T officials and staff as well as senior leaders of other relevant DHS agencies and institutions, and a review of applicable laws, regulations, and documents.

Our fieldwork was conducted from January 2007 to November 2007. During this period, we conducted more than 120 interviews, including 12 senior officials in seven DHS components who provided insights into the effectiveness of S&T's new IPT process. We also interviewed S&T officials and staff to learn about the current and former organizational structure and management processes. In addition, we interviewed a number of senior staff at national laboratories and S&T program partners at certain Centers of Excellence to obtain their perspectives of current and former S&T operations.

We reviewed and analyzed extensive documentation. We studied related laws, regulations, executive orders, and DHS management directives. We reviewed S&T guidelines and procedures, and analyzed S&T financial documents. Lastly, we examined reports from the General Accountability Office, relevant speeches, testimony, and news articles.

Due to the classified nature of the Special Programs division's projects in S&T, we did not review how these programs are identified, selected, awarded, or managed.

This review was conducted under the authority of the *Inspector General Act of 1978*, as amended, and according to the *Quality Standards for Inspections* issued by the President's Council on Integrity and Efficiency.

Under Secretary for Science and Technology

U.S. Department of Homeland Security
Washington, DC 20528

Homeland
Security

May 8, 2008

Carlton I. Mann
Assistant Inspector General for Inspections
Office of the Inspector General
Department of Homeland Security
Washington, D.C. 20528

Dear Mr. Mann:

The Department of Homeland Security's Science and Technology (S&T) Directorate appreciates
the opportunity to review and comment on the Office of the Inspector General's (OIG) draft
report titled "The Science and Technology Directorate's Processes for Selecting and Managing
Research and Development Programs."

I believe the draft report accurately captures the substantial progress we have made over the last
21 months toward putting in place a combined organization and research portfolio strategy
supportive of a broad and balanced range of activities aimed at identifying, enabling and
transitioning new homeland security capabilities to our customers, the operating components of
DHS and our Nation's first responder community. I agree with the recommendations contained
in the draft report, and suggest only minor modifications. These suggestions as well as action I
have taken on your recommendations is attached.

I am, however, very concerned about the draft report's unnecessary discussion of unfounded
"ethical concerns" with the selection of some projects, particularly in the Innovation portfolio.
The draft report raises and then dismisses concerns that some projects were improperly selected,
yet goes on to state without foundation that "the method by which the projects were selected was
not transparent, objective, or fair." I agree that we need to formalize and better document the
process used to select Innovation portfolio projects thus ensuring greater transparency, and I
have taken steps to ensure that the selection process will be better documented in the future.
Your thorough and comprehensive draft report notes that I do not have any acquisition authority
within the DHS procurement organization, and <u>ALL</u> Innovation portfolio projects were fully and
repeatedly briefed to Department leadership, the Office of Management and Budget and the
Congress which approved and resourced their expedited accomplishment to help make the
Nation safer. For these reasons, I do not agree with your assertion that project selection lacked
objectivity or fairness.

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Good project ideas can come from almost anywhere including from our customers, our own staff, academia, laboratories, industry, our international partners, or the general public. Ideas may be either solicited in the form of formal announcements in *Federal Business Opportunities* or may be offered to us without solicitation, and each avenue has its own set of governing regulations. This is a complex and important topic, and deserves a more thorough explanation than the draft report contains. Unless your inspection found that some statute or regulation was violated, I respectfully request that the discussion in the final report be limited to the need for establishing and documenting a more formal and repeatable process. I have attached a proposed redraft of this section of the report that focuses on this issue. I understand that you are preparing another report on broader acquisition and procurement issues; perhaps there you can offer a more thorough explanation of the complexities and risks associated with the various solicitation and award processes permitted by the Federal Acquisition Regulations.

Thank you again for the opportunity to comment on the draft report. I request that a copy of this letter be including as an Annex or Appendix to the final report.

Sincerely, *Very respectfully,*

Jay M. Cohen
Under Secretary for Science and Technology

I appreciate the professionalism and thoroughness of your organization in this important area.

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Recommendation #1: Determine whether the IPT process is satisfying the needs of state, local and tribal first responders. If their needs are not being considered adequately, S&T should develop processes for including the first responders' gaps in capabilities in its IPT process.

In addition to the Tech Solutions program discussed in your draft report which directly benefits first responders by providing them a web-based portal that allows them to identify directly to us their technology needs, we have other initiatives underway that will help S&T better connect with the needs of the Nation's first responders.

Most importantly, the role of the Director of Interagency Programs has been renamed Director of Interagency and First Responder Programs and expanded to include first responder liaison focused on national and international first responder associations (e.g., International Association of Fire Chiefs, National Sheriffs' Association, etc.) who understand the broad scope and scale of the Nation's public safety organizations. Also, we established the first S&T liaison position within the California Governor's Office of Homeland Security, and expect many of the experiences of this successful pilot to be used as a working model for engaging with our state, local and tribal customers. We will continue to conduct national interagency outreach through site visits, meetings, conferences and symposia to promote Federal, state, local, and tribal interoperability, collaboration, and coordination in the area of Science and Technology.

To the extent that requirements identified in these kinds of outreach and liaison efforts inform the IPT process, they will be included. Additionally, the S&T Chief Commercialization Officer has established a program called System Efficacy through Commercialization, Utilization, Relevance and Evaluation (SECURE) that is designed to help the private sector better identify the product needs and technical requirements across the Homeland Security enterprise, including the needs of the first responders, and articulate them in a way that allows commercial investment in this very large market. We are piloting this program now.

Recommendation #2: Direct the Research section chiefs to work with their technical division directors to develop and document clear, repeatable process with objective criteria for prioritizing and selecting basic research projects.

Suggested modification: *Direct the Director of Research to work with the technical division directors and their Research Section Leads to develop and document clear, repeatable process with objective criteria for prioritizing and selecting basic research projects.*

Basic research is primarily conducted at universities and government laboratories, and is focused in thrust areas where there are capability gaps identified by our customers but no near-term (transition portfolio) or innovative solutions. Long-term investment in these thrust areas is necessary so that we can develop the understanding of the relevant science that will allow us to eventually provide the technical solutions our customers need. Over the past several months the Director of Research has begun efforts to refine and

document the processes for prioritizing, selecting, and determining the success of basic research projects within DHS S&T.

In February 2008, DHS S&T established the Research Council, responsible to coordinate basic research efforts within S&T, facilitate implementation consistent approaches that reflect "best practices" in the planning and execution of the basic research portfolio. The Research Council is chaired by the Deputy Director of Research and is comprised of the Research Section Leads of each of the six technical divisions, the Director of the Office of University Programs, the Director of the Office of National Laboratories, and the Office of International Cooperation Programs which also sponsors some basic research projects.

The Director of Research recently completed a comprehensive review of the basic research portfolio. The Research Section Leads and Division Heads of each of the six technical divisions briefed the Director of Research, the other portfolio directors, and the S&T Chief of Staff on their basic research plans. These briefings addressed the division's approach to basic research, including the divisions' basic research thrust areas, approach to project selection, and information about each of the basic research projects currently being executed. We are in the process of reviewing the thrust areas for overlap and completeness, and we have asked the National Academies of Science to help us determine better means of measuring the effectiveness of the portfolio.

Recommendation #3: Transfer responsibility for identifying, prioritizing, and selecting the HIPS and HITS to the Director of the Innovation/HSARPA portfolio and charge the director with developing and documenting clear, repeatable process with objective criteria for identifying and selecting HIPS and HITS projects.

Over the past year, S&T has established a formal process for the identification, prioritization, approval of new HIPS and HITS projects, and continuation of current HIPS and HITS projects.

The new process tasks the Director of Innovation/ HSARPA to develop a prioritized list of future projects for the HIPS and HITS portfolios with potential to radically improve homeland security. Projects can originate from any of the S&T divisions, the three DHS S&T portfolio managers, the 22 DHS Components and Agencies through the Integrated Project Team (IPT) process, DHS Leadership, Industry, International Partners, Academia, and other government organizations through various means including solicitations.

These efforts will be reviewed by the Director of Innovation to make sure they meet the general requirements of a HIPS or HITS project in terms of scope, risk, and potential return on investment. The Director of Innovation will brief the S&T Corporate Board semi-annually (or more often as urgent requirements are determined) on proposed HIPS and HITS projects. Members of the Corporate Board will be allowed to make recommendations for changes in content and priorities to projects on the list. Once complete the Director of Innovation will brief the Deputy Under Secretary and the Under Secretary for S&T. The Under Secretary will propose the HIPS and HITS projects to the

Technology Oversight Group (TOG) consisting of the Deputy Secretary, the Under Secretary of NPPD, and the Under Secretary for Management (as voting members), as well as the DHS operational component heads, the DHS Chief Financial Officer and the Under Secretary for S&T (as non-voting members) for approval, prioritization, and funding as part of the DHS budget development process. The status of ongoing HIPS and HITS projects will also be briefed to the TOG.

Homeland Innovative Prototypical Solutions (HIPS):

- Deliver prototype-level demonstrations of game-changing technologies in 2 to 5 years
- Moderate to high risk, with high payoff

Explosives	Chemical & Biological	Command, Control, & Interoperability	Borders & Maritime Security	Human Factors	Infrastructure & Geophysical
Project CHLOE: High altitude aerial platform existing above civil aviation airspace. • PM from Innovation • Funding: $18M over 2 years	None	**Scalable Common Operating Picture Experiment (SCOPE):** Leverage Global Observer JCTD. • PM from Innovation • Funding: $4M over 2 years	**Scalable Composite Vessel Prototype (SCVP):** Lightweight, composite material with high-speed hull. • PM from Innovation • Funding: $17M over 3 years	**Future Attribute Screening Technology Mobile Module (FAST M2):** Relocatable lab to test for behavioral / physiological cues of "hostile intent." • PM from Innovation • Funding: $38M over 5 years	**Resilient Electric Grid (REG):** System to prevent cascading effects of power surge on electrical grids. • PM from Innovation • Funding: $27M over 4 years
SENSIT: System to identify numerous liquids in baggage. • PM from Innovation • Funding: $7.8M over 4 years			**SAFE Container (SAFECON):** 90-second container screening device. • PM from Innovation • Funding: $23M over 4 years		**Levee Strengthening & Rapid Repair:** Rapidly stop breach in levee. • PM from Innovation • Funding: $13.5M over 4 years
IED & Vehicle-Borne IED Defeat: Detect, prevent, mitigate & counter IEDs. • PM from Division • Funding: $22M over 5 years					**Storm Surge Mitigation:** Limit & mitigate storm surge. • PM from Innovation • Funding: $9M over 3 years

Source: OIG derived from multiple sources

High Impact Technology Solutions (HITS):
- Proof-of-concept answers within 1 to 3 years that could result in high-payoff technology breakthroughs
- Considerable risk of failure, but offer the potential for significant gains in capability

Explosives	Chemical / Biological	Command, Control, & Interoperability	Borders & Maritime Security	Human Factors	Infrastructure & Geophysical
None	**Real Time Bio Detect:** DNA sequencing for high speed bio sensing. • PM from Division • Funding: $2M over 2 years	**First NET:** First responder reliable relay link. • PM from Innovation • Funding: $1.5M over 2 years Cancelled 06/08/07	**Tunnel Detection:** Detect & confirm illegal underground border structures & activities. • PM from Innovation • Funding: $3M over 2 years	**Document Validator:** High proficiency scanner to identify fraudulent documents. • PM from Innovation • Funding: $1.5M over 2 years	**Critical Infrastructure Change Detection:** Monitor critical infrastructure. • PM from Research • Funding: $2M over 2 years
	Cell All: Ubiquitous chemical / biological agent detector. • PM from Innovation • Funding: $4M over 3 years	**Multi-Band Radio:** Interoperable & inexpensive hand-held radios. • PM from division • Funding: $6.275M over 1 year		**Biometric Detector:** High proficiency, small biometric scanner. • PM from Innovation • Funding: $2M over 2 years	**Resilient Tunnel:** Tunnel protection / blast mitigation. • PM from Research • Funding: $4.5M over 3 years

Source: OIG derived from multiple sources

Appendix D
Major Contributors to this Report

William McCarron, Chief Inspector

Elizabeth Kingma, Senior Inspector

Kirsten Murray, Inspector

Jonathan Davis-Olo, Inspector

Department of Homeland Security

Secretary
Deputy Secretary
Chief of Staff
Deputy Chief of Staff
General Counsel
Executive Secretary
Director, GAO/OIG Liaison Office
Assistant Secretary for Office of Policy
Assistant Secretary for Office of Public Affairs
Assistant Secretary for Office of Legislative Affairs
S&T OIG Liaison

Office of Management and Budget

Chief, Homeland Security Branch
DHS OIG Budget Examiner

Congress

Congressional Oversight and Appropriations Committees, as appropriate

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