



DHS Science and Technology Directorate

Strategic Plan
2011



Homeland
Security

Science and Technology

**“THE PROBLEMS THAT EXIST
IN THE WORLD TODAY CANNOT
BE SOLVED BY THE LEVEL OF
THINKING THAT CREATED THEM.”**

- Albert Einstein

Letter from the Under Secretary

I am pleased to present the Science and Technology Directorate (S&T) Strategic Plan. Beginning in 2010, S&T articulated its top strategic goals. We have since elaborated on the specific objectives under these goals, articulated the value-added proposition S&T brings to the Homeland Security Enterprise (HSE), and embodied this value-added proposition in the functions and activities defined in the organization realignment that was executed in late 2010. Our lodestone in this journey has been the first DHS Quadrennial Homeland Security Review, which lays out the Department's strategic framework for achieving its key missions and vision of a safe and secure homeland.

Many people have contributed to the ideas in this document. We conducted a survey of S&T staff. We held small group meetings with representative program managers, support staff, and senior management. We interviewed and received input from Congress, first responders, DHS operational components, and other members of the Homeland Security Enterprise. This feedback process has itself been enlightening, and we are grateful for the time taken to respond and for the many suggestions and reflections that made the plan stronger and more meaningful.

The mission of DHS S&T is to *strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise*. Congress created the Science and Technology Directorate as part of the Homeland Security Act of 2002, to "conduct basic and applied research, development, demonstration, and testing and evaluation activities relevant to any or all elements of the Department."¹ S&T also has a statutory responsibility to transfer useful technologies and information to first responder communities, to state and local governments, and to critical infrastructures owned by the private sector. S&T also has responsibilities related to understanding and creating solutions to biological and chemical threats, and to conducting the research and development (R&D) required to meet homeland cybersecurity needs.

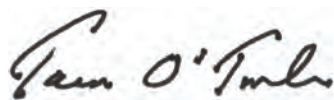
S&T has undergone many changes since 2002 and continues to evolve. The extraordinary breadth and diversity of DHS's missions require S&T to address a wide range of programs and activities, and to do so in the context of a dynamic threat landscape. DHS is primarily an operational agency, and the components are especially in need of analyses and technologies that provide new capabilities and near-term improvements in operational effectiveness. In addition to new technologies, S&T also provides the HSE with knowledge products – assessments of operational problems and feasible solutions, objective tests of potential technologies, acquisition assistance, and the creation of consensus standards that enable cost-effective progress across many fields.

In the past two years, S&T has focused fiercely on planning and execution across the entire directorate. We have realigned our organizational structure and enacted an ongoing review of our entire R&D portfolio to ensure our projects are high impact, high priority for our partners, and not duplicative of other work. These reviews have allowed us to weather severe funding cuts while preserving critical R&D in those areas for which S&T is the primary source of funding; specifically: bio-defense, cybersecurity, explosive detection in aviation environments, and first responder technologies.

S&T is the core source of scientific and engineering talent within the Department. The breadth and importance of S&T's contributions to the HSE are captured in our value-added proposition:

- S&T provides the HSE with new capabilities through new technology and operational process enhancements.
- S&T provides innovative, systems-based solutions to complex HSE problems.
- S&T has the technical depth and reach to discover, adapt, and leverage scientific and engineering solutions developed by federal agencies and laboratories; state, local, and tribal governments; universities; and the private sector – across the USA and internationally.

This document signifies the end of a new beginning to an ongoing journey. Strategic planning must be a continuous process of assessment, discovery, and response. The only constant is change. The scale, scope, and urgency of the HSE missions make the Department an unusually challenging place to work. The people of S&T accept this challenge, relish it, and rise, again and again, to meet it. To the outstanding people of S&T: Thank you for all you do on behalf of U.S. security.



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Under Secretary for Science & Technology
Department of Homeland Security

¹ 6 U.S.C. Sec. 182(4)



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**“A homeland that is safe, secure, and resilient
against terrorism and other hazards where American
interests, aspirations, and way of life can thrive.”**

**- *Quadrennial Homeland Security Review Report,*
*February 2010***

Strategic Overview

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) was mandated by Congress to provide innovative problem solving to challenges to our homeland security; it is the core source of scientific and engineering expertise for the Department and uniquely postured to enhance our nation's security and resiliency. Through collaboration and partnerships within both the directorate and the Homeland Security Enterprise (HSE)—the federal, state, local, tribal, territorial, nongovernmental, and private-sector entities, and individuals, families, and communities who share a common national interest in the safety and security of America and the American population—S&T has been able to reach beyond the resources of DHS and rapidly deliver technologies to use in the field. These partnerships provide the foundation for the future and allow us to comprehensively identify capability gaps and exploit the knowledge and expertise within the HSE to address them.

S&T operates in a dynamic environment where new threats and natural hazards suddenly emerge, political perspectives and government priorities shift, and budgets continue to shrink. We have taken steps to ensure we can achieve our goals; however, we fully recognize that this plan and our approach may have to shift to adapt to new circumstances and priorities. In addition to aligning our organization along clear lines of business and developing interdisciplinary teams, we adhere to the strategic principles of partnership, collaboration, and technology foraging. As we meet the ever-evolving risks and opportunities before us, we will work closely with our key constituents to provide the innovation, flexibility, and adaptability our nation's security needs.

Developing a 2011 strategic plan for S&T has been complicated by an uncertain budget environment, followed by extensive reductions to the directorate's research and development budget. After conducting a thorough analysis of both the Quadrennial Homeland Security Review Report (February 2010) and the complementary DHS Bottom-Up Review Report (July 2010); identifying lessons learned and best practices; and consulting with the S&T staff and external stakeholders, we have set our course for the future. Our mission and strategic goals were established to provide the base we need to guide our work over the next five years, while at the same time giving us the flexibility we need to deal with the uncertainty of the future.

DHS S&T's Mission:

Strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise.

Value-Added Proposition

S&T helps provide the HSE the capability to prevent, protect against, respond to, and recover from manmade and natural threats. It is organized and uniquely postured to provide the HSE strategic and focused technology options and operational process enhancements; seek innovative, systems-based approaches to complex homeland security problems; and discover, adapt, and leverage technology solutions developed by other governmental and private-sector entities against threats and hazards to our security. S&T's focus is making the best possible use of scarce resources by balancing the requirements for near-term, incremental solutions with the necessity for investments in potentially game-changing technologies that will take longer to mature.

New technological capabilities and the design of sound analytical processes and acquisition decisions are essential, potentially powerful, cost-saving tools that offer solutions to many of the challenges confronting the Department. S&T brings innovation to solution sets and remains involved throughout a project's lifecycle, including assisting in



“America’s scientific leadership has always been widely admired around the world, and we must continue to expand cooperation and partnership in science and technology.”

**- *National Security Strategy, May 2010,
The White House***

Value-Added Proposition continued

the development of technically specific and feasible requirements, providing systems engineering support, and conducting testing and evaluation. This process ensures that programs reviewed for acquisition have been thoroughly and appropriately vetted, meet the documented operational requirements, and provide the required capability.

S&T conducts technology foraging to discover, adapt, and leverage technology solutions developed by other governmental and private-sector entities to address risks to our security. Technology foraging is the complex process of scanning the horizon for technologies that are already in use or being developed, and adopting them for new purposes, for new environmental conditions, or at new scales. It leverages the work being done by industry, in other federal agencies, at universities, and by our international partners. S&T will implement a disciplined and comprehensive approach to technology foraging that requires a thorough review of technologies identified as having the potential to meet the HSE's needs.

Constituency

Homeland security is a widely distributed and diverse national enterprise. The term *enterprise* refers to the collective efforts and shared responsibilities of those involved in maintaining critical homeland security capabilities. S&T considers the HSE and our international partners as our constituency – those we work with and for – to enhance our nation's security and resiliency.

As the primary R&D arm of DHS, S&T possesses the scientific, engineering, and acquisition knowledge, experience, and capability to help those who are at the front lines of homeland security carry out their work more effectively. By forging true partnerships within the HSE, we increase our understanding of the risks and opportunities facing us. The challenge for the enterprise is to balance the diverse needs and priorities of its members, while focusing on shared interests and responsibilities to collectively secure our homeland.

DHS Components and Staff

DHS is the third-largest cabinet department, composed of seven components and a headquarters staff with missions ranging from aviation security to emergency response.

First Responders

First responders regularly interact with the public; are responsible for public safety and security; own and operate our nation's critical infrastructure and services; and keep watch against, prepare for, and respond to emerging threats and disasters.

Federal Partners/the Interagency

S&T scientists lead and serve on committees and working groups that examine the full range of homeland security issues, such as chemical, biological, radiological/nuclear, and explosives detection and recovery, infrastructure protection, and homeland security policy.

International Community

International projects provide a cost-effective, collaborative approach to common homeland security problem sets and capitalize on our international partners' expertise and resources.

Industry

S&T's coordinated outreach to the private sector fosters integration, promotes our research efforts, and results in companies investing their own internal research and development funds to bring S&T-developed technology to the market.

Private Citizens

Every citizen plays an important role in enhancing our nation's security and building the resiliency required to respond to the risks and take advantage of the opportunities we meet on a daily basis. S&T brings a level of skill, knowledge, and experience that is unparalleled within the Department. It provides innovation, technology, systems analyses, and knowledge products to our stakeholders, ensuring the most effective employment of our constrained budget.

S&T Strategic Goals



Strategic Goals

Five strategic goals will guide S&T's effort over the next five years. S&T is well-positioned to accomplish its mission of strengthening America's security and resiliency by providing knowledge products and innovative solutions to the HSE. As a direct result of the austere budget climate, we have focused our research and development on understanding and creating solutions to biological and chemical threats, cybersecurity needs, explosives detection, and support to first responders. S&T has seized the opportunity to find new, innovative, and collaborative solutions to assist the Department in accomplishing its mission. Our goals not only articulate our priorities, but also provide the construct necessary to accomplish our mission.

S&T's five goals are:

1. **Rapidly develop and deliver knowledge, analyses, and innovative solutions that advance the mission of the Department.**
2. **Leverage technical expertise to assist DHS components' efforts to establish operational requirements and select and acquire needed technologies.**
3. **Strengthen the Homeland Security Enterprise and first responders' capabilities to protect the homeland and respond to disasters.**
4. **Conduct, catalyze, and survey scientific discoveries and inventions relevant to existing and emerging homeland security challenges.**
5. **Foster a culture of innovation and learning, in S&T and across DHS, that addresses the challenges with scientific, analytic, and technical rigor.**

“The United States has always excelled in our ability to turn science and technology into engineering and products, and we must continue to do so in the future.”

**- National Security Strategy, May 2010,
The White House**



“We do not carry out the homeland security mission alone, and we can succeed only with the help of all levels of government, the private sector, academia and the general public.”

- DHS Strategic Plan FY 2008-2013

Execution

“Maturing and strengthening the homeland security enterprise includes enhancing shared awareness of risks and threats, building capable communities, fostering unity of effort, and fostering innovative approaches and solutions through leading-edge science and technology.”

- Quadrennial Homeland Security Review Report, 2010²

The challenges facing the HSE are multiple, complex, and ever-changing, requiring wide-ranging capabilities to resolve them. Since its inception S&T has built on the achievements of DHS to create an organization with a growing ability to help the HSE achieve its mission. We continue to build strong partnerships with first responders and the DHS components to gain a deeper understanding of their top needs and operational environments. We focus our technology development process to ensure the rapid delivery of technologies and knowledge products to use in the field and collaborate with others in the federal government, universities, the private sector, and international community to identify their technology investments that might meet homeland security needs. Our expanded application of the technical talent of our engineers and scientists includes the assessment of operational problems and acquisition requirements, significantly enhancing our value added to the HSE.

The mission of DHS S&T is to strengthen America’s security and resiliency by proving knowledge products “precuts” and innovative technology solutions for the Homeland Security Enterprise. Our challenges include safeguarding against terrorism; securing our borders against expanding transnational criminal organizations; fortifying our infrastructure; preventing widespread international cyber attacks; and improving our preparation for, response to, and recovery from disasters, such as Hurricane Katrina, the H1N1 virus, and the Gulf Coast oil spill.

As these threats and hazards have continued to evolve, so has S&T continued to mature and develop. We have grown as an organization and realigned ourselves to increase our efficiency, effectiveness, and ability to interface with our stakeholders. Our efforts are based on the overarching principles of partnership, collaboration, innovation, and technology foraging. We conduct periodic reviews of each of our projects and measure them against six imperatives—impact, transition, technical positioning, customer alignment, customer involvement, and innovation—to make strategic, long-term budget decisions; ensure the efficient delivery to the component or end user; and nurture effective communications throughout the process.

² In February 2010, DHS released the first-ever Quadrennial Homeland Security Review. The QHSR emerged out of a need for a shared understanding of and coordinated strategy for homeland security. It offers a new vision for a secure homeland, specifies key mission priorities, and underscores the critical role science and technology will play in strengthening and maturing the HSE.



“...today, more than ever before, **science** holds the key to our survival as a planet and our security and prosperity as a nation. It is time we once again put **science** at the top of our agenda and worked to restore America’s place as the world leader in science and technology.”

- President Barack Obama

Realignment

In late 2010 S&T realigned itself to enhance its ability to strategically contribute to the DHS HSE mission, operations, and strategy. This organizational realignment implemented the framework necessary to accomplish our strategic goals by instituting four groups that work together to ensure each aspect of S&T’s work is given the appropriate amount of emphasis. This construct allows for the efficient interaction among the four “group leads” and creates a dynamic that fosters partnership and collaboration both within S&T and throughout the HSE.

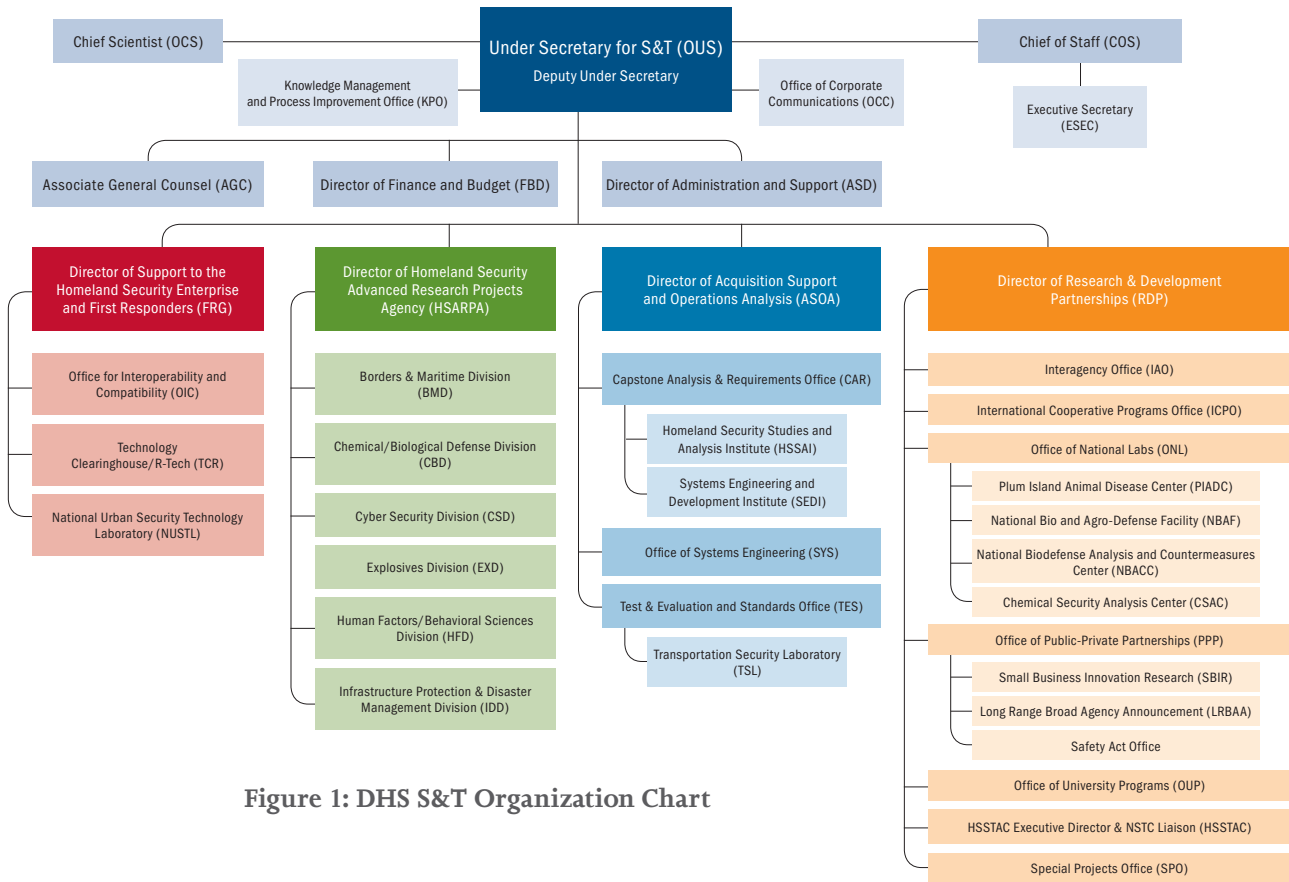


Figure 1: DHS S&T Organization Chart

The four Groups are:

- *Homeland Security Advanced Research Projects Agency (HSARPA)* - HSARPA executes S&T’s research and development programs. It directs the activities of six technical divisions, thereby encouraging collaboration and enabling the multidisciplinary work that is required for today’s R&D.
 - The Borders and Maritime Security Division focuses on preventing contraband, criminals, and terrorists from entering the United States while permitting the lawful flow of commerce and visitors.
 - The Chemical/Biological Defense Division focuses on detecting, protecting against, responding to, and recovering from biological or chemical events.
 - The Cyber Security Division focuses on creating a safe, secure, and resilient cyber environment.
 - The Explosives Division focuses on the detection, prevention, and mitigation of explosive attacks against people and infrastructure.
 - The Human Factors/Behavioral Sciences Division focuses on identifying and analyzing threats, enhancing societal resilience, and integrating human capabilities in technology development.
 - The Infrastructure Protection and Disaster Management Division focuses on strengthening our situational awareness, emergency response capabilities, and critical infrastructure protection.

Realignment continued

- *Homeland Security Enterprise and First Responders Group (FRG)* - This office is the primary interface with first responders and other members of the HSE. It facilitates S&T's ability to effectively respond to the different needs, acquisition methods, implementation requirements, and management structure of first responders. FRG focuses on identifying best practices, developing standards for equipment and interoperability, and information sharing.
 - The Office for Interoperability and Compatibility provides local, state, tribal, state, and federal stakeholders the tools, technologies, methodologies, and guidance to improve interoperability at all levels of government.
 - Technology Clearinghouse/R-Tech provides information, resources, and technology solutions that address needs identified by first responders.
 - The National Urban Security Technology Laboratory tests, evaluates, and analyzes homeland security capabilities while serving as a technical authority to first responders and state and local entities in protecting our cities.
- *Acquisition Support and Operations Analysis Group (ASOA)* - ASOA leverages S&T's critical mass of technical capability within DHS and works with the Under Secretary for Management to aid the components in developing high-fidelity, testable operational requirements for their acquisitions; aid in executing an analysis of alternatives to ensure that the most appropriate technical approach is taken; and partner with the components throughout an acquisition so that user needs are translated into real capabilities that can be validated upon delivery and deployed without delay.
 - The Capstone Analysis and Requirement Office ensures the execution of an effective and efficient Capstone Integrated Product Team (IPT) process and provides operations analysis services. It is the executive agent for DHS federally funded research and two federally funded research and development centers (FFRDCs), which ensure the Department has ready access to professional analytical and systems engineering expertise and capacity:
 - The Homeland Security Studies and Analysis Institute (HSSAI)
 - The Homeland Security Systems Engineering and Development Institute (HSSEDI)
 - The Office of Systems Engineering provides systems engineering advice and services to other DHS components and the Science and Technology Directorate to strengthen the DHS acquisition processes.
 - The Test and Evaluation and Standards Office is responsible for establishing policies and programs to support the development, coordination, and operational management of test & evaluation and standards for assigned infrastructure.
 - The Transportation Security Laboratory (TSL) conducts applied research, development, integration, and validation of cutting-edge science and technology solutions for the detection and mitigation of explosives and conventional weapons.
- *Research and Development Partnerships Group (RDP)* - RDP acts as a critical portal to S&T, providing commercial entities with easy access to information on DHS needs, while enabling S&T program managers to make connections across the entire horizon of R&D in government, in universities, in the private sector and abroad.
 - The Interagency Office establishes processes and mechanisms for the directorate to hear directly and routinely from organizations external to DHS, obtaining input directly from state, local, tribal, and territorial representatives on their capability gaps and creating sustainable partnerships between DHS S&T and the Interagency.
 - The International Cooperative Programs Office catalyzes the connectivity among the international science and technology community and provides the strategic framework to establish, facilitate, and sustain effective international partnerships that support homeland security research, development, test, and evaluation.
 - The Office of National Labs provides a coordinated, enduring core of productive science, technology, and engineering laboratories, organizations, and institutions which can provide knowledge and technology to secure the nation.
 - The Plum Island Animal Disease Center (PIADC) operates as a Biosafety Level 3 Agricultural (BSL-3Ag) facility, as well as a BSL-3 and BSL-2 laboratory facility, developing diagnostic tools and preventatives (such as vaccines and antivirals) for foreign and domestic animal diseases.

Realignment continued

- The National Bio and Agro-Defense Facility (NBAF) will be a state-of-the-art biocontainment facility for research; diagnostic development; development of vaccines and other countermeasures; and veterinarian training in foreign animal, emerging, and zoonotic (transmitted from animals to humans) diseases that threaten U.S. animal agriculture, the economy, and public health. NBAF will be our nation's only large-livestock BSL-4 biocontainment facility for the study of high-consequence diseases.
 - The National Biodefense Analysis and Countermeasures Center (NBACC) is one of the nation's seven BSL-4 laboratories; it applies science to challenges critical to defending our nation against bioterrorism. Two centers comprise NBACC: the National Bioforensic Analysis Center, which provides the national capability to conduct forensic analysis of evidence from biocrimes and terrorism, and the Biological Threat Characterization Center, which conducts laboratory experiments and studies to learn more about current and future biological threats, assess vulnerabilities, and determine potential impacts to guide the development of biodefense countermeasures.
 - The Chemical Security Analysis Center (CSAC) provides a scientific basis for the awareness of chemical threats and the attribution of their use. It provides a centralized compilation of chemical hazard data and uses this data in an organized effort for threat analytical purposes.
- o Office of Public-Private Partnerships (PPP)
 - The Commercialization Office focuses on developing and implementing programs that identify, evaluate, and commercialize technologies into products or services that meet the requirements of the Department of Homeland Security's stakeholders.
 - The Small Business Innovation Research (SBIR) Program provides awards to innovative and creative small businesses in federal research/research and development (R/R&D) programs that challenge industry to bring innovative homeland security solutions to reality, focusing on near-term commercialization and delivery of operational prototypes to federal, state, and local emergency responders and managers.
 - The Support Anti-terrorism by Fostering Effective Technologies (SAFETY) Act Office provides incentives for the development and deployment of anti-terrorism technologies by creating systems of risk and litigation management.
 - The Long-Range Broad Agency Announcement (LRBAA) Office provides a standing, open invitation for researchers and scientists to contribute their best ideas that address DHS capability gaps.
 - o The Office of University Programs engages the academic community to conduct research and analysis and provide education and training to enhance the Department's homeland security capabilities.
 - o The Homeland Security Science and Technology Advisory Committee (HSSTAC) provides independent scientific and technical advice to the Under Secretary for Science and Technology. Its activities focus on the DHS S&T mission to strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise.
 - o The Special Programs Office provides the Intelligence Community (IC), the Homeland Security Enterprise, and other government agencies with programmatic and technical expertise in emerging and disruptive technologies that may be directed or especially sensitive, be classified, or require an elevated degree of security protection or clearance level.

Collaboration and Building New Partnerships

S&T is dedicated to forging true partnerships between our technical teams and the operators in the field. Innovation requires a deep, precise understanding of the problem to be solved. This requires insights from operators, who best know the needs and constraints of the operational reality, and technical experts, who have a grasp of the range of available solutions and how to analyze possible trade-offs. We will focus most of our resources in areas where operators – whether they are DHS components or first responders – are willing to actively collaborate on the project. We will detail S&T staff to the components for varying time periods, in order to better understand mission needs and translate these needs into system analyses, acquisition requirements, and technology foraging objectives.

The extraordinary breadth and diversity of DHS's missions require S&T to address a wide range of challenges, including the components' near-term needs for new operational capabilities and improved operational effectiveness, efficiency, and safety. Additionally, we must focus on research that is essential to DHS and which no one else is pursuing, e.g., biodefense, cybersecurity, explosive detection in aviation security, and first responder needs. Our R&D efforts will be balanced between developing near-term, incremental solutions and investing in potentially game-changing technologies that will take longer to mature.

S&T's work extends beyond technology development. Equally important are the directorate's contributions to homeland security in the form of operational analyses, requirements generation, test and evaluation, and acquisition support. The operational analyses include an evaluation of alternate technological options; assessments of complex issues, such as the relative risk of different biological or chemical threat agents; operational testing and evaluation of technologies proposed for acquisition; and the creation of consensus standards, which enable cost-effective progress across many fields.

In order to create a balanced, high-impact R&D portfolio, S&T is developing the S&T Resource Allocation Strategy (STRAS). This strategy is highly collaborative and based on focused interactions with partner organizations and a rigorous examination of the problems at hand. It consists of a systems analysis that explicitly maps how the operational process functions and highlights potential capability gaps. Based on the analysis and an understanding of ongoing R&D efforts, a strategic plan will be jointly developed and agreed-to by the component and S&T. A formal, written agreement will codify the joint effort. Periodic updates will ensure that projects are progressing and will ultimately lead to fielding an operational capability, including, if appropriate, the transition of research products and prototype technologies into field pilots and acquisition plans.

S&T has been formally incorporated into DHS's new integrated investment lifecycle and we will be assisting in the development of technically specific and feasible requirements, thereby greatly improving the odds of a successful transition at the end of the program. S&T's testing and evaluation program ensures that programs are thoroughly and appropriately vetted, meet operational requirements, and provide the required capability before the Department makes significant investment into the final production and fielding of the acquired system.

Committed to getting a high return on investment, S&T aggressively searches for R&D activities that others have already funded, or are considering pursuing, that can be adopted, adapted, or further developed to satisfy the needs of the HSE. Partnering with the private sector is one of S&T's highest priorities. Small business is an important engine of innovation and job creation and S&T uses a variety of ways to engage the private sector. S&T's Small Business Innovation Research Program actively works to develop technology solutions to homeland security issues that are innovative and accelerate transitions into the marketplace.

S&T plays a critical role in strengthening America's security and resiliency by providing knowledge products and innovative technology solutions for the HSE and constitutes its core source of technical expertise. We have made it our first priority to achieve the rapid transition of research and development projects to use in the field. We are committed to harnessing science to serve human purpose and to producing innovative technologies that create new capacities to transform costly and dangerous goals into feasible activities.



S&T Mission, Goals, and Objectives

Mission:

Strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise.

Strategic Goals

As the technical core and R&D arm of DHS, S&T strives to provide cutting-edge scientific knowledge, technical analysis, and innovative technologies to our nation's third-largest federal agency, to first responders, and to the HSE. Some of our most important contributions are not technology alone, however, but rather are knowledge products – assessments of technical problems or feasible solutions; analyses of complex issues; objective tests of proposed technologies; and the creation of consensus standards – which enable cost-effective progress across many fields. Our goals and objectives have been crafted to ensure we can accomplish our mission and assist DHS components and first responders in accomplishing their missions.

Goal 1:

Rapidly develop and deliver knowledge, analyses, and innovative solutions that advance the mission of the Department.

S&T is uniquely postured to provide the HSE with strategic and focused technology options and operational process enhancements. New technological capabilities and the design of sound analytical processes and acquisition decisions offer solutions to many of the challenges confronting the Department. S&T is focused on research and development that is essential to DHS and that no one else is working. By building strong partnerships with our stakeholders, we gain a deeper understanding of their needs, priorities, and operational environments, which will result in faster transitions. We develop clear assessments and design the knowledge, technologies, and science-based solutions necessary to meet the ever-evolving risks to our nation's security and exploit new opportunities as they become available.

Objectives

- 1.1 **Provide knowledge, technologies, and science-based solutions that are integrated into homeland security operations, employing DHS's new, integrated investment lifecycle process:** The directorate will impact DHS component operations by focusing its technology development process to rapidly deliver technology to the field. S&T has the expertise and experience to address the wide range of programs executed by the DHS components and the first-responder community. Additionally, S&T personnel possess the highly technical and specialized training required to understand and create solutions across the HSE.
- 1.2 **Strengthen relationships with DHS components and the first-responder community to better understand and address their requirements:** Incorporating best practices learned from our Apex project pilots, S&T understands success is dependent on top-level commitment, collaborative partnerships, and multidisciplinary teams. By forging strong relationships between S&T's technical teams and front-line operators, we gain a more comprehensive understanding of both their challenges and the operational environment. This foundation allows S&T to develop operational options and bring innovation to the HSE. S&T will be more likely to invest its resources in areas where operators are willing to actively collaborate on the project.
- 1.3 **Focus on high-priority needs, through rigorous project selection and regular review of the entire R&D portfolio:** All R&D projects, including proposed new starts, undergo evaluation using a portfolio review process to ensure that they are supported by operational partners, are technically sound, have the potential to make a meaningful mission impact, and are progressing adequately. Each project is judged against specific metrics or our six strategic imperatives—impact, transition, technical positioning, customer alignment, customer involvement, and innovation—to ensure it supports the DHS mission. Measuring all of our projects against this framework provides a transparent and shareable view of all R&D within S&T; enables more strategic, longer-term budget decisions; ensures efficient delivery to the component or end user; and nurtures effective communication throughout the process.

Goal 2:

Leverage technical expertise to assist DHS components' efforts to establish operational requirements and select and acquire needed technologies.

S&T's efforts go far beyond technology development. We provide operational analysis, requirements generation, test and evaluation, and acquisition support. S&T's systems analysis explicitly maps how the operational process functions and highlights potential capability gaps. This strategic approach will ensure the most efficient expenditure of S&T's resources; the development of technologies that are tailored to the HSE challenges; and the flexibility to support "out-of-cycle" or emergent component requests for assistance.

2.1 **Use S&T's technical expertise to provide analytical support to DHS:** S&T conducts operational analysis, requirements generation, test and evaluation, and acquisition support. Using the DHS integrated investment lifecycle, we will assist in the development of specific and feasible requirements on the front end of the project; provide systems engineering support to assist with risk management and concept-of-operations development; and perform testing and evaluation to ensure that programs that come before the Investment Review Board have been thoroughly and appropriately vetted.

2.2 **Implement processes that strengthen project management, evaluation, and accountability within the directorate:** The directorate will identify and implement project management best practices to ensure project quality, consistency, focus, and results. S&T will also evaluate the impact of its solutions after deployment. As part of an ongoing improvement effort, accomplishments and lessons learned from S&T projects will be systematically documented and distributed. S&T will make sure funding decisions are transparent and, as appropriate, available to the public.

2.3 **Incent owners of critical infrastructure and key resources to adopt technologies and reduce vulnerabilities and increase resilience:** S&T will work with critical infrastructure and key resource owners and sector partners to understand and prioritize risks to critical infrastructure, including stand-alone facilities and interdependent systems and networks. Through the National Protection and Programs Directorate's established councils, we will promote the adoption of other technologies, such as advanced materials that fortify our nation's critical infrastructure and key resources against disruption or exploitation. Additionally, we will explore expanded use of the SAFETY Act Program to further incentivize private-sector development of security technologies.



Goal 3:

Strengthen the Homeland Security Enterprise and first responders' capabilities to protect the homeland and respond to disasters.

First responders – at all levels – are critical to the safety and resiliency of our nation. Their functions, operational requirements, resources, and access to information about effective technologies and best practices vary widely. To strengthen the knowledge of first responders, S&T created the First Responders Group – a line of business dedicated to partnering and collaborating with first responders to develop a comprehensive understanding of their missions, operational environments, needs, and priorities. S&T works closely with the operators in the field to ensure its knowledge products and technologies are fully integrated and meet operational demands.

- 3.1 **Create high-impact technologies and knowledge products – such as standards and protocols – that facilitate the safety, effectiveness, and ease with which first responders do their work:** To help alleviate first responder resource constraints, S&T will use internal resources and leverage the research and scientific advancements of external agencies to create technologies and provide information that enhances their work. S&T will provide easy-to-use, affordable technologies that will have immediate impact on how first responders respond to disasters.



- 3.2 **Provide the link between operators in the field and the evolving world of research and development:** The First Responders Group is entirely focused on connecting with and addressing the needs of first responders. We use a variety of nationwide outreach methods to ensure that technology, training, and policy investments by S&T are aligned with required response capabilities and best support the priorities of the first-responder community.
- 3.3 **Increase first responders' access to information on best practices and product performance standards:** Having access to key information resources enables the HSE to respond effectively during a crisis. S&T will develop and provide best practices and product performance standards to improve ease of access to needed information. S&T will encourage ongoing dialogue throughout the HSE by providing continual information updates and rapid response to information requests. S&T will support first responders by conducting equipment evaluations that support a wide variety of operational environments.

Goal 4:

Conduct, catalyze, and survey scientific discoveries and inventions relevant to existing and emerging homeland security challenges.

S&T is committed to achieving as high a return on investment of resources as possible by identifying R&D activities in which industry, other federal agencies, universities, and our international partners have already invested, and by adopting, adapting, or further developing them to satisfy the needs of the HSE. We use technology foraging, the complex process of scanning the horizon for technologies that are already in use or being developed, to achieve this goal. S&T's collaboration with other agencies at both the policy and programmatic level enables us to reach beyond the resources of DHS alone to better provide capabilities that strengthen our homeland security efforts.

- 4.1 **Leverage the investment and expertise of other government agencies, the private sector, academia, and international partners:** The austere budget realities facing the United States and our allies will likely encourage collaboration as organizations seek to augment their own R&D investments with outside resources. To this end, and to rapidly deliver products to use, S&T is using technology foraging to identify those technologies that may make a significant impact on our efficiency and effectiveness. We will implement a disciplined and comprehensive approach that requires a thorough review of technologies identified as having the potential to meet the HSE's needs.



- 4.2 **Leverage academia to address homeland security needs and nurture the future technical workforce of the HSE:** S&T will leverage the work conducted by our network of university centers of excellence (COE) to increase the research capacity of the HSE. S&T will strengthen the alignment of the COEs' research to S&T core research areas to better focus their work on advancing homeland security efforts. S&T will continue to support the maturation of the COEs so that they are capable of providing support as technology and homeland security risks and opportunities evolve. In addition, S&T will continue to find promising scientists to strengthen the pipeline of scientists necessary to drive scientific and technological innovation in the future.
- 4.3 **Participate in ongoing federal interagency efforts at both the policy and programmatic level:** S&T scientists serve on committees and working groups across the interagency to develop policy and strategic plans for homeland security research and development. These working groups and committees examine the full range of homeland security issues, such as chemical, biological, radiological/nuclear, and explosives detection and recovery; infrastructure protection; and homeland security policy. As the lead R&D arm of DHS, S&T spearheads the effort to ensure that the national research agenda is coordinated and aligned with homeland security priorities.
- 4.4 **Execute bilateral agreements to leverage funds, manpower, and facilities in support of our mission:** International projects provide a cost-effective, collaborative approach to common homeland security problem sets, capitalizing on our international partners' expertise and resources. S&T has bilateral agreements that enable DHS and other agencies in the HSE to leverage funds, manpower, and facilities in support of our mission.

Goal 4 continued

- 4.5 **Encourage the private sector, with a focus on small business engagement, to develop technologies relevant to the HSE:** Partnering with the private sector is one of S&T’s highest priorities. Small business is an important engine of innovation and job creation and S&T utilizes a variety of approaches to engage the private sector. We use the SBIR Program to develop technology solutions to homeland security issues that are innovative and accelerate transition into the marketplace.
- 4.6 **Improve S&T’s knowledge and use of relative national and international research and facilities with a focus on Department of Energy (DOE) National Labs and DOE efforts:** The R&D world is expansive, with national and international counterparts having already encountered (and in some cases, successfully addressed) certain problems now facing the United States. We will deepen our awareness of external research efforts, including the capabilities of the DOE National Labs and international efforts, and leverage findings that advance the work of the HSE.
- 4.7 **Leverage the scientific expertise, knowledge, and capabilities of the S&T labs, as well as the DOE and international laboratories, to provide advanced and innovative knowledge, analyses, and solutions in support of the HSE.** This extensive network of laboratories houses some of the most advanced scientific expertise and capabilities in the world, oftentimes funded by others. S&T will leverage, transfer, and apply this wealth of expertise, analytic tools, and knowledge to inform policy, improve operations, and advance research in support of the homeland security enterprise.
- 4.8 **Ensure effective construction and utilization of S&T laboratories in support of homeland security missions.** The S&T labs were established as a national resource and an enduring capability to provide a scientific foundation for addressing critical and emerging threats to homeland security. To ensure they continue to provide the highest-caliber scientific expertise, research, and technical solutions, S&T will rigorously operate, review, maintain, and where needed, construct and upgrade infrastructure to most effectively meet the nation’s emerging needs. We will deepen our awareness of external research efforts, including the capabilities of the DOE national labs and international efforts, and leverage findings that advance the work of the HSE.

“Scientific R&D generates innovation, cutting edge technologies, and new products to drive economic development and job creation. R&D is also a critical element of the department’s mission to strengthen America’s security and resiliency by providing knowledge products and innovative technology solutions to bolster our homeland defenses.”

**- Rep. Daniel Lungren (R-CA), Chairman,
Homeland Security Committee Subcommittee on Cybersecurity,
Infrastructure Protection, and Security Technologies**

Goal 5:

Foster a culture of innovation and learning, in S&T and across DHS, that addresses challenges with scientific, analytic, and technical rigor.

The people of S&T constitute the core source of technical expertise available to the HSE. As we continue to build an ecosystem of innovation within S&T, we are increasing our abilities to identify, understand, and confront challenges to our national security and increase our flexibility and adaptability in exploiting opportunities.

- 5.1 **Evolve our understanding of current and future homeland security risks and opportunities and foster a culture of innovation:** S&T's expertise lies in its highly skilled staff, including some of our nation's finest engineers and scientists. Among the many roles the directorate fulfills within the Department is that of integrator. By building strong partnerships with our stakeholders at the local, tribal, state, and federal levels, we gain a deeper understanding of the current and future homeland security risks and opportunities, as well as our stakeholders' needs, priorities, and operational environs. We will use the Apex model to forge true partnerships between our technical teams and the operators to ensure success and integrate new technologies and analytical approaches into the whole system that makes up the operational reality.
- 5.2 **Increase S&T and DHS's awareness of cutting-edge research and technology developments pertinent to DHS missions:** Through S&T's membership and leadership on numerous ongoing federal interagency efforts at both the policy and programmatic levels, it has been able to form and maintain relationships with other science and technology organizations that can be translated into collaborative programs that maximize and leverage available expertise and resources.
- 5.3 **Promote a culture of openness, continual learning, innovation, and collaboration within the directorate and across DHS:** S&T will strengthen its capacity to quickly adapt and respond to new challenges. Solving tough problems requires staff to think in highly innovative ways, openly discuss new ideas, and continuously share and improve their knowledge. S&T will provide collaboration tools that facilitate communication and transparency in decision-making across the HSE. Internally and across the Department, S&T will promote innovation, encourage collaboration, and support learning by encouraging multidisciplinary and team-based approaches.
- 5.4 **Internally promote synergies and eliminate programmatic redundancies by creating mechanisms and processes to increase information sharing:** Having access to robust sources of information ensures that staff members are well-equipped to make critical decisions. S&T uses a knowledge management program to increase information sharing and grow the directorate's knowledge base. Working together fuels the innovation required to develop and integrate new technologies and analytical approaches to the systems that make up our operational reality.



“Our renewed commitment to science and technology—and our ability to apply the ingenuity of our public and private sectors toward the most difficult foreign policy and security challenges of our time—will help us protect our citizens and advance U.S. national security priorities.”

**- *National Security Strategy, May 2010,*
*The White House***

Fiscal Realities

S&T must be a responsible steward of taxpayers' dollars while addressing the critical technological challenges facing the Homeland Security Enterprise of today and tomorrow in an efficient and cost-effective manner. This is particularly important when making R&D decisions, where the time between initial research investments and usable products is typically measured in years or even decades, and where risk and the possibility of failure are necessarily parts of the picture. We are seeking to diverge from this paradigm and are working to develop and transition capability for our components and the HSE more rapidly to close emergent capability gaps. We will focus our efforts on our four core mission areas as a result of constrained funding: biodefense, cybersecurity, explosives detection, and support to the first responder community. However, even these S&T areas are impacted due to budget constraints.

Between FY 2010 and FY 2012, S&T's overall budget as enacted by Congress was reduced by 34 percent, with our discretionary R&D budget dropping by 54 percent. Through our portfolio review process, we will continue to provide a transparent and shareable view of all R&D within S&T; make more strategic, longer-term budget decisions; and develop strategic and focused technology options and operational process enhancements.

By using technology foraging to the greatest extent possible, S&T will be able to commit its limited resources to R&D in areas critical to its homeland security mission and not being conducted by others. Additionally, we will work closely with DHS components – S&T's primary customers – to help them identify requirements and strengthen their program management and acquisition processes, thus overcoming some of the traditional pitfalls R&D organizations encounter in transitioning technologies into operational use.

Conclusion

S&T will continue to work hand-in-hand with our partners to provide innovative, systems-based solutions to complex homeland security challenges and evolve the nation's understanding of current and future homeland security risks and opportunities. We have realigned our structure and revised many of the processes by which we choose and pursue our work to ensure we are providing the technological capabilities and knowledge products our partners need. We will leverage both the solutions developed by other federal agencies and laboratories, state, local, and tribal governments, universities, and the private sector and the diverse expertise of our directorate and the research community to enhance our nation's readiness and security.

Moving forward, S&T will focus its resources on fewer projects with higher technology readiness levels – or items that are ready for application by their intended users. In doing so, the directorate will cut down on the number of technologies in the pipeline and invest limited funds more strategically. Additionally, we will work closely with the first responder community to identify their needs and priorities and assist them in bringing innovation and new technologies to the field. This plan, coupled with the hard work and expertise of our people, will allow us to continue to take the steps necessary to improve our nation's security and resiliency.



Appendix

Appendix: Acronyms and Abbreviations

AGC	Associate General Counsel
ASD	Administration and Support Division
ASOA	Acquisition Support and Operations Analysis
CAR	Capstone Analysis & Requirements Office
CBD	Chemical/Biological Defense Division
CI/KR	Critical Infrastructure/Key Resources
COE	Center of Excellence
COS	Chief of Staff
CSAC	Chemical Security Analysis Center
CSD	Cyber Security Division
DHS	Department of Homeland Security
DOD	Department of Defense
DOE	Department of Energy
ESEC	Executive Secretary
EXD	Explosives Division
FBD	Finance and Budget Division
FRG	Homeland Security Enterprise and First Responders Group (FRG)
HFD	Human Factors/Behavioral Sciences Division
HSARPA	Homeland Security Advanced Research Projects Agency
HSE	Homeland Security Enterprise
HSSAI	Homeland Security Studies and Analysis Institute (formerly known as the Homeland Security Institute, HSI)
HSSTAC	Homeland Security Science & Technology Advisory Council
IPT	Integrated Product Team
IAO	Interagency Office
ICPO	International Cooperative Programs Office
IDD	Infrastructure Protection & Disaster Management Division
KPO	Knowledge Management and Process Improvement Office
Lab	Laboratory
LRBAA	Long Range Broad Agency Announcement
NBACC	National Biodefense Analysis and Countermeasures Center
NBAF	National Bio and Agro-Defense Facility
NPPD	National Protection and Programs Directorate
NUSTL	National Urban Security Technology Laboratory
OCC	Office of Corporate Communications
OIC	Office for Interoperability and Compatibility

Appendix: Acronyms and Abbreviations continued

ONL	Office of National Labs
OSTP	Office of Science and Technology Policy
OUP	Office of University Programs
OUS	Office of the Under Secretary
PIADC	Plum Island Animal Disease Center
PPP	Office of Public-Private Partnerships
QHSR	Quadrennial Homeland Security Review
R&D	Research and Development
RDP	Research and Development Partnerships
SBIR	Small Business Innovation Research
S&T	Science and Technology Directorate
SEDI	Systems Engineering and Development Institute
SPO	Special Projects Office
SYS	Office of Systems Engineering
TCR	Technology Clearinghouse/R-Tech
TES	Test & Evaluation and Standards Office
TSL	Transportation Security Laboratory

