



Leveraging Public-Private Partnership Models and the Free Market System to Increase the Speed-of-Execution of High-Impact Solutions throughout State and Local Governments

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August 2011



**Homeland
Security**

Science and Technology

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BACKGROUND and DIRECT APPLICABILITY to MAYORS and their CHIEF INFORMATION OFFICERS

Our respective backgrounds in the areas of senior business and government leadership, public service, and First Responder service have enabled us to understand and solve problems using a myriad of perspectives. We have found that both state and local governments frequently face complex problems that require cost effective and efficient solutions that are often constrained by time and fiscal pressures not often seen in large corporations or federal government agencies. Our objective in this paper is to share--in an open and transparent way--how state and local governments can team to leverage their marketing and purchasing power to rapidly increase the deployment of a wide range of technologies, products and/or services to the benefit of the taxpayer.

Most government entities do not recognize, let alone leverage their true market attractiveness to the private sector. Experience shows us that the private sector is ready, willing and able to assist the government if they are provided two things—neither of which are money. The first deals with the ability to articulate in a clear and concise way what a given problem is (through the use of detailed operational requirements) and the second is a conservative estimate of the potential available market. The reader will recognize that existing models and programs like the Department of Homeland Security Science and Technology Directorate's (DHS S&T) System Efficacy through Commercialization, Utilization, Relevance and Evaluation (SECURE) program can substantially increase their awareness of a worldwide spectrum of solution providers in a broad set of trade spaces—like Information Technology, emergency services and beyond. It will be obvious upon completion of this paper that the SECURE program is an ideal

process for leveraging the potential available market represented by users of products and services germane to cities across the United States.

The real challenge for US Mayors, Chief Information Officers (CIOs) and other state and local government officials is to—as a group—prioritize the unsatisfied needs/wants of their particular regions. The Interagency Office (IAO) of the Research and Development Partnership (RDP) Group of DHS S&T is well-positioned to aid all state and local government officials to place detailed operational requirements, concepts-of-operations and a conservative estimate of the potential available market (PAM) for products/services needed collectively by cities (and extended at the state level if needed). The IAO has already accomplished this for segments within the massive first responder communities throughout the United States and can assist your community as well. In an analogous way, DHS can assist city CIOs, Mayors and other officials to ensure that they work closely with the private sector through partnership models like the SECURE program to obtain the highest performance/price products and/or services at a speed-of-execution not typically seen at the local government level. This paper also summarizes a substantial collection of publications (see Bibliography) that substantiate these models as well as provides many useful templates and guides to make the SECURE process simple and easy to use.

Let's examine how to leverage the free market system to develop solutions to well-articulated problems. It all starts with public-private partnerships...

Private-Public Partnerships are the Future

A public-private partnership is an agreement between a public agency and a private sector entity that combines skills and resources to develop a technology, product and/or service that improves the quality of life for the general public. The private sector has been called upon numerous times to use its resources, skills and expertise to perform specific tasks for the public sector. Historically, the public sector has frequently taken an active role in spurring technological advances by directly funding the private sector to fulfill a specialized need that cannot be completed by public sector itself.

The public sector has found it necessary to take this active role to lead and enable the development of a given technology or capability in situations where the business case for the private sector's investment in a certain area is not apparent. In these cases, the public sector

relied on the private sector to develop needed capabilities, but had to pay the private sector to divert its valuable (and limited) resources to an area that did not necessarily show a strong potential to provide an acceptable return-on-investment (ROI) for a company. This could be caused by a number of issues ranging from a high cost to perform the research and development (R&D) to a limited PAM that may have prevented the company from making sufficient profit and returns to the company and its shareholders.

Increasingly, however, users in the public sector are now viewed as stable markets – i.e., a sizeable enough customer base for the private sector to warrant investments of time and money. A commercialization-based public-private partnership has the same goal as more traditional public-private partnerships, but the method is inspired to leverage positive attributes of the free market system. The introduction of a commercialization-based public-private partnership, developed and implemented at DHS, provides benefits for three constituents of the Homeland Security Enterprise (HSE): the private sector, the public sector and the taxpayer. This is a desirable scenario where there is a “win-win-win” environment created in which all participants are in a position to benefit.

In the free market system, private sector companies and businesses must sell commercial products that consumers want to purchase. Commercialization is defined as the process of developing markets and producing and delivering products and/or services to address the needs of those targeted markets. The development and understanding of markets is a critical undertaking for many companies seeking to gain share of a market, with companies directing significant amounts of money and resources to these activities in addition to its product development efforts. Sometimes a company does not understand the correct needs or demand data of a market or market segment and their product(s) does not sell well. The company’s investment in designing, manufacturing and advertising the product can be, and is in many cases, a waste of time and money if the company “misses the mark.”

What a commercialization-based public-private partnership offers to the private sector is detailed information and opportunity. The public sector is not only the “consumer” in this free market scenario, but an informed and communicative consumer who literally gives the private sector a detailed description of what they need, as well as insight into which agencies would be interested in potentially purchasing a product/service that fulfills these requirements. While it

remains prudent business to verify this kind of information, there is considerable value for the private sector to obtain these details from DHS because four things are provided to the private sector that would not happen in normal market dynamics: 1) a decrease in resources spent researching the market; 2) an increase in available time and money that can now be focused on product design and manufacturing; 3) a reduction in risk of the research data being incorrect, and 4) an estimate as to how large the potential market can be for a known and funded entity.

The development and communication of detailed requirements or needs is the real cornerstone to the success of these public-private partnerships. The public sector's ability to collect the needs of its stakeholders will catalyze and support the future actions of the partnership. Requirements definition creates a method in which appropriate decisions about product or system functionality and performance can be made before investing the time and money to develop it. Effective communication with, and access to, the stakeholders of a given agency will bring greater clarity and understanding to the challenges that they face. Understanding requirements early in the search for solutions removes a great deal of guesswork in the planning stages and helps to ensure that the end-users and product developers are "on the same page." The Requirements Hierarchy (Figure 1) shows how the definition of requirements must remain traceable to the overall Mission to be accomplished, helping ideas stay on track and working toward a common goal.

Requirements Hierarchy (TSA example)

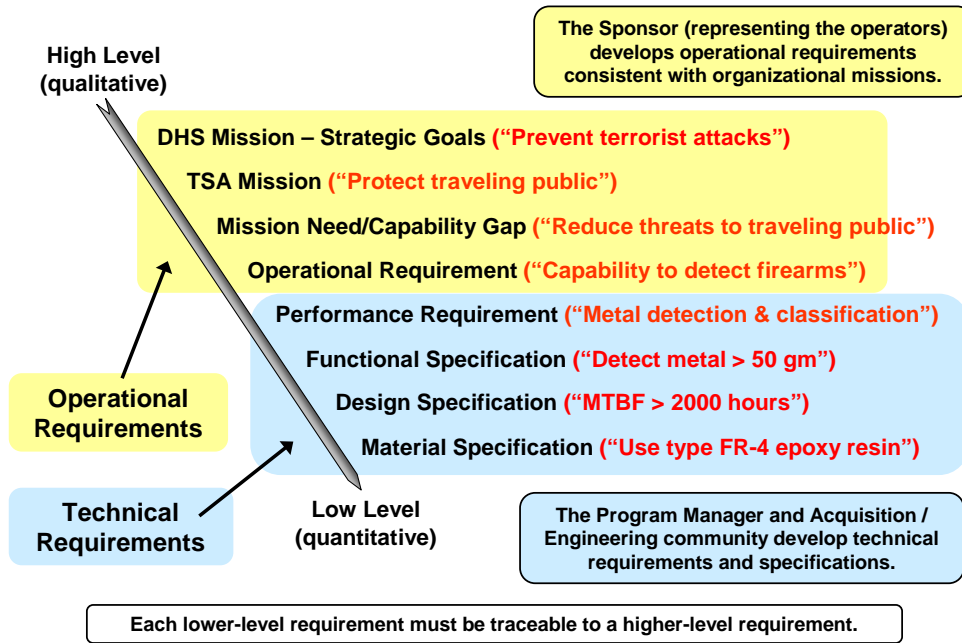


Figure 1. This “requirements hierarchy” shows the evolution of requirements from a high-level macro set of operational requirements to a low-level micro set of technical requirements. Note that each lower level requirement stems directly from its higher requirement so that all requirements are traceable to the overall DHS Mission.

In this partnership model, the proactive articulation and sharing of requirements and needs provides the necessary starting point to begin effective communication with private sector partners. Openly publishing the needs or requirements of public sector stakeholders has a number of ancillary benefits for those involved. A common challenge for solution developers has been a general lack of insight into the exact needs of public sector stakeholders. Instead, the private sector attempts to develop solutions to problems that may not exist and try to sell products based on the merit of its capabilities and features rather than its ability to solve the specific problem of the users. This is a situation commonly referred to as solution push where “a solution defines a problem” that it can solve, rather than the problem guiding the development of a solution to close a “capability gap.”

Requirements provide criteria against which potential solutions can be tested and evaluated. They offer detailed metrics that can be used to objectively measure a possible solution’s effectiveness. Detailed operational requirements will guide product development so that solutions’ specifications actively and demonstrably solve the stated problem(s). The

effective articulation of the requirements creates the mindset in which fulfilling requirements becomes the focus of product development. This requirements-led method places the users' need at the center of all future actions so that solutions are developed and delivered quickly and efficiently. We have developed a number of reference guides and resources to assist with the development and articulation of detailed requirements. Please visit http://www.dhs.gov/files/programs/gc_1234200779149.shtm for more information.

Department of Homeland Security Leverages Public-Private Partnerships

With more knowledge about the needs and requirements of their potential customers, the private sector is in a better position to consider how their current technology offerings align to needed capabilities. The next thing that must be considered is how many potential users are in a given market to determine if investment of additional resources to develop the solution will provide the necessary returns. In many cases, the market for a commercialization-based public-private partnership is substantial, potentially composed of millions of funded users. In addition, many government agencies across the federal, state, and local government levels may share similar requirements for products and services (if the ability to modify and add or take away options is available). Furthermore, the products developed for the government can often be sold in civilian markets such as critical infrastructure and key resources owners and operators. Even if the government does not purchase a specific company's product, in many cases it can still be useful and have value for non-governmental applications.

Innovative ideas flow freely in the private sector, most especially from small businesses. There is a demand for these innovative technologies as other private sector companies begin to position themselves to address these newly emerging commercial markets. Mergers and acquisitions continue to take place in the private sector as larger companies and investors seek to build their enterprises. Discovering the potential benefits of partnering with the public sector has demonstrated its attractiveness to investor communities like venture capitalists and angel investors. This investment has created more opportunities for those innovative ideas to grow and develop into fully deployable products. Sharing information like needs and requirements provides a defined target that allows those private sector partnerships to take hold. These strategic partnerships are becoming more common and it is now a regular event for these

strategic partners to approach the public sector together to engage and demonstrate new technology offerings.

A commercialization-based public-private partnership benefits the public sector because the private sector competes in an open and transparent way to garner the public sector’s purchase potential and business. By sharing information about the requirements or needs of an identified market openly, multiple companies may make products/services that meet requirements, while competitive market forces impact price points to achieve the lowest cost to the potential buyer. The end user benefits by being able to purchase the best product at the lowest price.

The taxpayer wins in a commercialization-based public-private partnership because their tax money is not spent on research and development that could be accomplished by the private sector. With government-provided needs and requirements, the private sector realizes significant reductions in R&D risks, another important consideration in generating a business case for investment. In a commercialization-based public-private partnership, the research and development of the product is *not* paid by government. It is the private-sector that invests its own money on research and development, and then sells the product to the government at the lowest price. This results in saving the taxpayer money as well and, in fact, expands the net realizable budgets of the public sector. Table 1 outlines these various benefits:

Benefit Analysis – “Win-Win-Win”		
Taxpayers	Public Sector	Private Sector
1. Citizens are better protected by DHS personnel using mission critical products	1. Improved understanding and communication of needs	1. Save significant time and money on market and business development activities
2. Tax savings realized through private sector investment in DHS	2. Cost-effective and rapid product development process saves resources	2. Firms can genuinely contribute to the security of the Nation
3. Positive economic growth for American economy	3. Monies can be allocated to perform greater number of essential tasks	3. Successful products share in the “imprimatur of DHS”; providing assurance that products really work
4. Possible product “spin-offs” can aid other commercial markets	4. End users receive products aligned to specific needs	4. Significant business opportunities with sizeable DHS and DHS ancillary markets
5. Customers ultimately benefit from COTS produced within the Free Market System – more cost effective and efficient product development	5. End users can make informed purchasing decisions with tight budgets	5. Commercialization opportunities for small, medium and large business

Table 1. The benefits of commercialization-based public-private partnerships are evident for all participants.

Given the current economic situation facing our country, it becomes increasingly important for the public sector to make wise investments of its time, money and resources. Most government agencies do not have the budgets necessary to complete every research and development project that they would like to undertake. The effective prioritization of programs is critical to managing the limited resources available to various agencies. Rigorously developed requirements for each project facilitate these prioritization efforts and increase the ability to perform critical analyses of alternatives (AoAs) used in determining the best course of action to solve a problem. An analysis of alternatives will uncover a great deal of information on potential solutions that may already exist and is a necessary consideration before pursuing a commercialization-based public-private partnership. When successful, the option to utilize commercialization-based public-private partnerships to solve a problem frees resources for those projects that cannot be addressed without significant government involvement and expenditure of resources.

DHS S&T's SECURE program leverages the resources, experience and expertise to develop and deliver fully deployable solutions aligned to the detailed operational requirements of DHS' many stakeholders. The SECURE program covers the needs of all of the DHS stakeholders including the operating components (FEMA, TSA, CBP, Secret Service, ICE, USCIS and Coast Guard), but most especially first responders (local police and fire department, hospitals, rescue teams) and CIKR owners and operators, representing a large market for potential private sector partners. It is the role of DHS to ensure that these stakeholders are provided with the mission-critical capabilities that they need in order to perform their jobs well. In terms of state and local governments, DHS has organizational elements within its agency to assist in both the development and widespread dissemination of requirements. For example, within S&T the Interagency Office works closely through its regional offices with state, local and tribal entities to generate and prioritize requirements and needs for use in the SECURE program.

The SECURE program was developed as a way to address requests for assistance from DHS stakeholders to find better solutions to their problems. These stakeholders were used to a culture where vendors present "solutions looking for problems" and wanted to find a better way to not only have solutions developed to address their needs, but also to have some assurance that the products being sold to them have been thoroughly tested and evaluated in real operational

environments. The requirements of these stakeholders are gathered and articulated in a Commercialization Operational Requirements Document (C-ORD).

It is important to stress the relationship that DHS has with its non-federal stakeholders in the first responder and CIKR communities. DHS has direct authority over its operating components and can directly influence acquisition activities. This same relationship does not extend to its non-federal stakeholders who are responsible for managing their own budgets and purchasing decisions. Because the SECURE program is not a procurement activity, DHS is able to share valuable information about its non-federal stakeholders to the private sector and gain knowledge about potential solutions without the need for contracts or monetary exchanges. First responders and non-federal stakeholders now have a unified voice to convey their needs or requirements and gain from the collective size as potential available markets.

The SECURE program, in addition to leveraging cooperative public-private partnerships, incorporates a rigorous review process based on rigorous operational test and evaluation (OT&E) to ensure that the operational performance of a system is directly aligned to stated stakeholder requirements, but also that the system meets or exceeds the stated performance of the private sector vendor or supplier. This review process analyzes capability requirements in addition to an evaluation of the systems safety record, quality assurance criteria, performance limitations and other considerations to ensure that when a system is deployed in the field it is both effective and safe.

Through the SECURE program, DHS provides potential solution providers detailed operational requirements and a conservative estimate of the PAM offered by DHS stakeholders. When appropriate, approved C-ORDs and related conservative PAM estimates are posted online so that potential solution providers or vendors with capability offerings may apply for participation in the SECURE program. In an open and freely competitive way multiple vendors are able to offer potential solutions to provide the required capabilities outlined in a given C-ORD. In exchange for this valuable information, the private sector offers deployable products and services (along with recognized third party test and evaluation data) that meet these stated requirements in an open and free way that creates an ergonomic “clearinghouse of solutions” available to DHS’ stakeholders.

After providing independent third-party testing and evaluation of potential products, services or technologies to show they do in fact meet or exceed the requirements listed in the detailed operational requirements, private sector entities can potentially enter into a partnership with the Department in order to deliver commercial-off-the-shelf (COTS) products to the Department's stakeholders. This testing and validation of potential solutions is especially valuable for its non-federal stakeholders who do not have the resources and expertise necessary to conduct thorough solution evaluation activities. DHS provides all of its stakeholders with the tools and information needed to make informed purchasing decisions on quality solutions that fill their exact requirements giving the much needed assurance to the First Responder and CIKR communities that a certified product or service works as specified and is aligned to a requirements document.

The products that are developed through this partnership (even the ones that were not purchased by DHS) can be offered to other private sector entities, such as airport security, school and university security, and security for professional sports and concerts, many of whom support the defense of critical infrastructure and key resources nation-wide. There is then an increase in public safety and security, all while the private sector, public sector and taxpayer benefit from the partnership.

Because of the success and “win-win-win” nature of this program in that it provides benefits for the American taxpayer, the private sector and DHS, DHS S&T recently introduced the FutureTECH Program that describes the long-term capabilities/technologies required by DHS stakeholders (see Figure 2: Product Realization Guide) to address future capability gaps.. FutureTECH identifies the future needs of the Department as fully deployable technologies and capabilities, which in some cases are not readily available in the private sector or Federal government space. While the SECURE program is valuable to all DHS operating components, organizational elements and DHS stakeholders, FutureTECH is intended for DHS S&T use only, particularly in the fields or portfolios related to Research and Innovation.



DHS S&T Portfolio	N/A	Basic Research			Innovation and Transition						
Technology Phase	Needs Assessment	Science			Technology Development			Product Development			
Technology Readiness Level (TRL)	N/A	TRL 1 – TRL 3			TRL 4 – TRL 6			TRL 7 – TRL 9			
Manufacturing Readiness Level (MRL)	N/A	MRL 1 – MRL 3			MRL 4 – MRL 6			MRL 7 – MRL 10			
Key Objectives	<ul style="list-style-type: none"> Identify S&T needs or capability gaps Rough draft operational requirements are developed (if appropriate) Market Survey Technology Scan Assess technology-based solutions to address gaps. Investigate the value proposition Establish technical objectives and milestones. Conduct preliminary IP review. Initiate Congressional Appropriations Memo, Technology Transition Agreements (TTAs), Technology Commercialization Agreements (TCAs), Program Descriptions (Research and Innovation) and Feasibility Studies 	TRL 1 <ul style="list-style-type: none"> "Back of the envelope" environment – new approach Research hypothesis formulated Basic scientific principles observed Physical laws and assumptions used in new technologies/sciences defined Have some concept in mind that may be realizable Paper studies support basic principles (literature search) Formulation of concepts that might be realizable (draft road map) – "If – then" statements Has a Feasibility Study White Paper been developed? Has a potential DHS mission space been identified? Identify interest in technology/science, e.g., sponsor, funding source (users/participants: researchers, national/international, private, government, academia, military) Know who will perform research and where it will be done 	TRL 2 <ul style="list-style-type: none"> Basic elements of science/technology identified (math/physics/ chemistry/ analysis/ algorithm) Components of technology/science partially characterized Rigorous analytical studies confirm basic principles Paper studies show that application is feasible Potential system or component application(s) identified – proof of principle Individual parts of the technology work Develop research plan Qualitative idea of risk areas (cost, schedule, performance) Identify DHS area supported Requirement tracking system defined-slow requirements creep Begin market research (Who is interested, outreach, market survey) Develop a Technology Roadmap. 	TRL 3 <ul style="list-style-type: none"> Science known to extent that models and simulations are possible Preliminary system performance characteristics and measures have been identified and estimated Predictions of elements of technology capability validated by Analytical Studies Experiments carried out with small representative data sets Laboratory experiments verify Scientific feasibility Scaling studies have been started (size, environment, component integrations) Customer/user identified and participates in requirements definition/ generation. Risk areas and mitigation strategies identified Global Research Services search performed Develop Quality Control Plan standards conformance, reliability Develop Marketing Plan to include market size and research. 	TRL 4 <ul style="list-style-type: none"> All required technology components integrated for Proof of Concept Proof of Concept conducted The customer briefed on the Proof of Concept results Cross-technology uses assessed and identified FRD finalized SEMP finalized and updated (TRL 4, 5, & 6) TEMP completed and updated (TRL 4, 5, & 6) Configuration Management Plan exists PMP updated (TRL 4, 5, and 6) Risk Management Plan updated (TRL 4, 5, and 6) Program Cost Analysis updated (TRL 4, 5, and 6) Quality Assurance Plan exists Begin transition planning. 	TRL 5 <ul style="list-style-type: none"> ORD and CONOPS developed Security Assessment updated OMB 300 and Acquisition Plan completed (if required) IPT certified readiness for the transition of the Technology Program Transition Manager assisted in transition documentation development Technology scan and market survey (ongoing) Analysis of Alternatives developed and updated (TRL 5 & 6) Entry Criteria Checklist completed and delivered to the TM PDD created, approved, and signed (TRL 5 & 6) Director approved the transition 	TRL 6 <ul style="list-style-type: none"> Execute TTA / TCA as applicable Program Manager identified. Successful T&E in a simulated operational environment conducted. End user / customer briefed on the results of T&E. Initial Security Guidelines developed Draft Program Assessment Rating Tool (PART) plan exists, if required National Environmental Policy Act (NEPA) plan / assessment Interoperability Assessment 	TRL 7 <ul style="list-style-type: none"> S&T and the end-user / customer develop final transition plan: (TRL 7 and 8) Technology successfully demonstrated in an operational environment. (TRL 7 and 8) Updates made to the ORD. Risk Management Plan, Program Cost Analysis and PMP updated. Strategic Program Planning conducted. Operations and Maintenance Manual completed / updated. Security Manual developed. Interoperability demonstrated. MDs reviewed for compliance. 	TRL 8 <ul style="list-style-type: none"> Technology components are form, fit, and function compatible with an operational system. Technology production addressed and planned by DHS and the end-user / customer. Training Plan developed and implemented. (TRL 8 and 9) Operational Test Report completed. Limited User Test (LUT) Plan developed. Physical and functional interfaces clearly defined 	TRL 9 <ul style="list-style-type: none"> All critical program documentation completed. Planning underway for the integration of the next generation technology into the existing program components. End-user fully demonstrates the technology in CONOPS. Lessons Learned completed. After Action Review completed. Sustainment Plan is completed. 	
		MRL 6 <ul style="list-style-type: none"> Capability to produce system prototype in product relevant environment. Production cost drivers and goals analyzed and set 	MRL 7 <ul style="list-style-type: none"> Production pilot begins Producibility of system in production representative environment 	MRL 8 <ul style="list-style-type: none"> Manufacturing pilot complete, ready for low-rate production 	MRL 9/10 <ul style="list-style-type: none"> Manufacturing processes established and deliver quality products MRL 10 – System is at full production rate. Products meet all engineering, performance, quality and reliability requirements. 						
Key Deliverables	<ul style="list-style-type: none"> Preliminary market assessment and technology scan. Congressional Appropriations Memo, Technology Transition Agreements, Program Descriptions (Research and Innovation), and Feasibility Studies lead to Program and Budget Execution. 	<ul style="list-style-type: none"> Feasibility Study (White Paper) Initial scientific observations reported in journals/conference proceedings/technical reports Literature search report Road Map (draft) Written report of findings and recommendations (preliminary product plan). Feasibility Review meeting. 	<ul style="list-style-type: none"> Program Cost Analysis Study showing application is feasible Modeling & Simulation Report used to verify physical principles Market survey identifying potential customer interest Analytical studies reported in scientific journals/conference proceeding/technical reports Qualitative idea of risk areas (cost, schedule, performance, impacts of idea) 5 year Investment Strategy/Funding requirements documented Preliminary product plans (approved and ongoing). New Technology roadmaps (approved for further development and implementation). Updated market assessment and technology scan. Demonstrate ability to manufacture prototype components 	<ul style="list-style-type: none"> Technology Maturity Assessment Program Cost Analysis (updated) Functional Requirements (draft) Proof of Concept Program Management Plan (PMP) draft User/Customer Status Review Analytical study/test reports. Detailed product and marketing plan. Quality control plan. Optimization Review meeting. Manufacturing concepts defined 	<ul style="list-style-type: none"> Proof of Concept Report. Functional Requirements Document. SEMP (TRL 4, 5, and 6) TEMP (TRL 4, 5, and 6) Quality Assurance Plan. Configuration Plan Management. PMP (updated). (TRL 4, 5, & 6) Risk Management Plan (updated). (TRL 4, 5, and 6) Program Cost Analysis (updated). (TRL 4, 5, and 6) End-user / Customer Status Review. 	<ul style="list-style-type: none"> ORD and CONOPS. Security Assessment (updated). Program Definition Document (PDD). OMB 300 Capital Asset Plan. Acquisition Plan. Entry Criteria Checklist. Analysis of Alternatives. (TRL 5 and 6) Initial producibility of component technology completed Initial Manufacturing Plan developed. 	<ul style="list-style-type: none"> Technology Transition Agreement (TTA), or Technology Commercialization Agreement (TCA) as applicable Initial Security Guidelines. Draft Program Assessment Rating Tool (PART) plan, if required. National Environmental Policy Act (NEPA) initial assessment, if required. Interoperability Assessment. 	<ul style="list-style-type: none"> Transition Plan (draft). ORD / FRD Documentation Risk Management Plan Program Cost Analysis PMP (updated). Strategic Program Planning Documentation (if conducted). Operations/Maintenance Manual Security Manual. Finalized Interoperability Assurance Report. (TRL 7 and 8) 	<ul style="list-style-type: none"> Limited User Test (LUT) Plan. Deployment or Transition Plan. Training Plan. Operational Test Report. Customer Acceptance Document. Initial Systems-level Metrics Assessment. 	<ul style="list-style-type: none"> Customer Feedback. Lessons-learned. After-action Review. Sustainment Plan is completed (a. Spiral Development Assessment, b. Preplanned Product Improvement, c. Emerging Threat(s) Assessment, d. Technology Refresh / Insertion, e. Quality Assurance / Metrics Report, f. Risk Management Reassessment) 	
		<ul style="list-style-type: none"> Engineering documentation release Updated marketing plan. Test plan for quality control. Development Phase Review meeting. 	<ul style="list-style-type: none"> IP Protection and Licensing. Manufacturing and sales plan release package is to be distributed. Pilot Phase Review meeting 	<ul style="list-style-type: none"> Demonstrate that a defect-free product can be produced on schedule and at a cost within the target price points. 	<ul style="list-style-type: none"> Finalized product plan sales release package is to be distributed. Sales Release Phase Review mtg. Execution of acceptance, shipment, and after-sales support of the product. 						
RDP Partnership Opportunities and Vehicles	<ul style="list-style-type: none"> Special Projects Office Interagency Office National Labs and S&T Labs Research and Development Long Range Broad Agency Announcement University Program Grants and Research Development SBIR Phase I ICPO International Research Grants ICPO International Agreements FutureTECH Program (TRL 1-6) 				<ul style="list-style-type: none"> SBIR Phase II SECURE Program (TRL 5-9) SAFETY Act Developmental T&E:TRL 6-7 Designation: TRL 7-9 & Certification: TRL9 						

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Legend:
 Black Type – Primary Public Sector
 Blue Type – Primary Private Sector
 Red Type – Manufacturing related activities
 Definition of acronyms on reverse page.

We have demonstrated through the SECURE¹ and FutureTECH² programs that the federal government can engage and influence - in a positive way - the private sector by offering detailed requirements and conservative estimates of potential market(s). The reason that these partnerships are successful is simple and straightforward: firms spend significant resources in trying to understand market needs and potentials through their business and market development efforts. By offering this information, government saves the private sector both time and money while demonstrating its genuine desire to work cooperatively to develop technologies and products to meet DHS stakeholders' needs in a cost-effective and efficient way.

Execution and Action

The success of the SECURE and FutureTECH pilot programs was the result of effective communication, fostering cooperative relationships and sticking to the plan. The Commercialization Office learned a great deal from the execution of the pilots and from listening with an open mind to the suggestions and recommendations received from partners, colleagues and leadership. Based on this valuable feedback, the Commercialization Office created a detailed flow process and documented the roles and responsibilities for those involved with the program. This is shared in an open and free way and provides a roadmap to potential certification. The processes were developed with the mindset of “keeping it simple and making it easy” for all participants to understand their roles and what is expected of them and when.

This detailed process describes the necessary actions for the successful execution of the SECURE and FutureTECH programs at full participation by DHS stakeholders. As discussed previously, both programs begin with a detailed analysis of the needs and requirements for specific problems facing groups of stakeholders. After an analysis of the needs and requirements, DHS conducts extensive internal evaluations to prioritize potential programs and determine the alignment of these needs to the overall mission of DHS. A number of resources have been created at DHS for the relative prioritization of programs using value-based metrics to quantify the value gained from pursuing a given program.

¹ Cellucci, Thomas A. “Commercialization Office: Offering Transformational Change Beyond DHS,” June 2009.

² Cellucci, Thomas A. “FutureTECH: Guidance to Understanding Future DHS S&T Critical Research/Innovation Focus Areas,” April 2009.

The Department then publishes approved C-ORDs and PAMs. It is at this time that the private sector is able to take advantage of the open and cooperative relationship to develop potential solutions and consider entering into a partnership with DHS. These partnerships are formalized utilizing cooperative research and development agreements (CRADAs) that describe in detail the relationship, roles and responsibilities and deliverables for each party. CRADAs allow for an open exchange of information from all parties to facilitate effective advancement of technology development and evaluation. Through the CRADA, the private sector partner will be able to submit third party, recognized, independent operational testing and evaluation (IOT&E) for review by DHS and its subject matter experts (SMEs). Certification will be granted to those technologies, products and or services that meet or exceed the operational performance claimed by the private sector partner and are aligned to the needs/requirements contained in the posted 5W or C-ORD documents. The following pages lay out this straightforward process.

SECURE Program: Public-Private Product Certification Process

6/28/2011

	C-ORD Creation/Vetting Phase	Partners Selection Phase	CRADA Development and Execution Phase	Technical Review Phase	SECURE Certification Phase
	<p>Objective: Develop detailed operational requirements (with concepts of operations) for new material capabilities needed by DHS stakeholders</p> <p>Inputs: Mission Needs Statement/Capability Gap/Enhanced Homeland Capability (EHC), DOTMLPF –RGS analysis, requirements elicitation from broad range of DHS stakeholders</p> <p>Output: Representative and well-vetted Commercialization - Operational Requirements Document (C-ORD)</p>	<p>Objective: Identify potential private sector partners capable of delivering required capabilities which can be validated</p> <p>Inputs: Applications from private sector entities seeking to provide solutions to a C-ORD</p> <p>Output: Detailed analysis of a given company's capabilities, technology/manufacturing maturity and commercialization capabilities and experience</p>	<p>Objective: Outline roles and responsibilities for DHS and private sector partners</p> <p>Inputs: Discussions with Private Sector Partners to develop CRADA and supporting documents</p> <p>Output: Binding CRADA agreement between DHS and private sector partner includes: SOW, Detailed Test Plan, Milestones & Deliverables</p>	<p>Objective: Determine ability of proposed solutions to meet stated requirements and performance specifications</p> <p>Inputs: T&E data from operational tests conducted by recognized third party T&E entity or DHS sponsored test facility</p> <p>Output: Detailed report of T&E data review for operational performance alignment to requirements and performance specifications</p>	<p>Objective: Provide SECURE Certification, if appropriate</p> <p>Inputs: Detailed report on certification package containing T&E data review, vetted ORD, PAM, MNS, AOA, DOTMLPF analysis</p> <p>Output: Determination on granting certification for a potential solution</p>
Requirements Sponsor (e.g. First Responder, CIKR, ...)	<ul style="list-style-type: none"> Elicit needs and requirements from stakeholders (approx. 2-4 months) Communicate with national user associations/organizations Develop Mission Needs Statement (MNS) Conduct DOTMLPF-RGS analysis Ensure requirements are representative of user community Represent user community as necessary Grants development with DHS customer/stakeholder, if required 		<ul style="list-style-type: none"> Provide input on operational considerations necessary to conduct effective operational testing and evaluation (IOT&E) 	<ul style="list-style-type: none"> Assist PM/POC as necessary to evaluate efficacy and alignment of operational performance data to meet/exceed stated C-ORD requirements 	<ul style="list-style-type: none"> End users/customers notified of Certified products
Commercialization Office	<ul style="list-style-type: none"> Assist in C-ORD drafting by offering requirements development materials Assist in analyzing potential available market (PAM) and program prioritization index model (PPI) Assist in analysis of alternatives, technology scans and market scans Continue outreach on "How to do Business with DHS" with private sector Engaged internal and/or external subject matter expert(s)/FFRDC/Non-S&T organization(s) to assist in review of C-ORD, detailed test plan and T&E data Post approved C-ORD and PAM to SECURE Program website, if/when approved by SECURE Review Panel and Internal Review Router 	<ul style="list-style-type: none"> Provide resources to assist in technology/manufacturing maturity assessments and business analysis Manage incoming applications to posted C-ORDs Assist with business analysis of potential partners: experience in commercializing products, business history, likeliness to achieve TRL-9 etc. (approx. 1 week per company) Notify private sector partners of selection or non-selection within one week after decisions are made 	<ul style="list-style-type: none"> Assist PM/POC to develop CRADA and necessary documentation (e.g. SOW, detailed test plan, milestones and deliverables) 	<ul style="list-style-type: none"> Provide resources and materials to develop the criteria necessary for thorough review of IOT&E data. Provide recommendation on certification 	<ul style="list-style-type: none"> Assist PM/POC in preparation of certification package New COTS SECURE Certified product marketed by private sector with DHS support, and oversight of Certification mark usage
PM/POC*	<ul style="list-style-type: none"> Collect and support requirements data/information/documentation articulation from Requirements Sponsor Determine alignment to mission needs/capability gaps Conduct an analysis of alternatives (AOA) and research similar efforts Conduct feasibility study with support from subject matter expert(s), if necessary Identify external sources of information (e.g. subject matter expert(s)) Prepare C-ORD and potential available market (PAM) documents for review by SECURE Review Panel and Internal Review Router Ensure conformance/inclusion of any necessary regulation(s) or standard(s) 	<ul style="list-style-type: none"> Establish timeline for application acceptance cycles Conduct due diligence review of potential partners with assistance of Commercialization Office <ul style="list-style-type: none"> Verify current TRL/MRL of potential solution Analyze likelihood of potential solution to provide desired capability and capability alignment to C-ORD Recommend future action with potential partners to SECURE Review Panel (to be completed within one month of acceptance cycle closing) 	<ul style="list-style-type: none"> Draft CRADA with OGC, Tech Transfer Manager and Commercialization Office (approx. 2-3 weeks) <ul style="list-style-type: none"> Work with private sector partner to determine milestones and deliverables Develop Statement of Work Develop detailed test plan with private sector partner with input from T&E representative Verify TRL-9 maturity is achieved prior to operational test, based on requirements for certification 	<ul style="list-style-type: none"> Provide analysis of capability alignment to stated requirements Evaluate efficacy and alignment of operational performance data to meet/exceed stated C-ORD requirements Communicate questions/comments or clarification needs to private sector partner Provide recommendation on certification 	<ul style="list-style-type: none"> Prepare and present to SECURE Review Panel the supporting documentation in certification package and provide recommendation for certification, if appropriate
SECURE Review Panel**	<ul style="list-style-type: none"> Ensure requirements alignment and priority to overall mission objectives based on MNS, EHC, Capstone IPT Capability Gap Review DOTMLPF-RGS analysis and AOA Accept or decline initial package from PM/POC into SECURE Program prior to reviews by Internal Review Router 	<ul style="list-style-type: none"> Confirm PM/POC analysis of potential private sector partner Approve/Recommend course of action with potential partner(s) to PM/POC 	<ul style="list-style-type: none"> Review documentation and provide approval on CRADA and appendices Authorize final approval of CRADA Approved CRADA signed by Director – SR&D Partnerships and partner 	<ul style="list-style-type: none"> Review analysis from PM/POC and T&E Team to ensure that all data verifies TRL 9/MRL 10 compliance, alignment to ORD and that operational performance meets or exceeds published vendor specifications 	<ul style="list-style-type: none"> Review certification package and recommendation from PM/POC Make final decision on certification of a given product/service
Internal Review Router*	<ul style="list-style-type: none"> Review technical merit of C-ORD accepted by SECURE Review Panel: Are requirements testable, measurable, specific, achievable and solution agnostic? Express opinions with recommendations to SECURE Review Panel Ensure requirements alignment and priority to overall DHS stakeholder mission 				
Subject Matter Expert(s)*	<ul style="list-style-type: none"> Review technical merits of C-ORD accepted by SECURE Review Panel: Are requirements testable, measurable, specific, achievable and solution agnostic? Ensure requirements are representative of user community Provide insight into any similar efforts and leverage existing information/research 		<ul style="list-style-type: none"> Provide input on operational considerations necessary to conduct effective IOT&E 	<ul style="list-style-type: none"> Provide analysis of capability alignment to stated requirements 	
Third Party Independent T&E Team*	<ul style="list-style-type: none"> Review technical merit of C-ORD: Are the requirements testable, measurable, specific, achievable, feasible and solution agnostic? Express opinions with recommendations to SECURE Review Panel 		<ul style="list-style-type: none"> Assist in reviewing detailed test plan to include measures of reliability, safety, and quality assurance Provide input on technical considerations necessary to conduct effective product testing Provide recommendation on necessary DHS participation during IOT&E Review and modify detailed test plan as required prior to inclusion in CRADA 	<ul style="list-style-type: none"> Validate operational performance data meets/exceed stated specifications Ensure test results and procedures followed detailed test plan Pose questions/comments to PM/POC to relay to partner Provide assessment of whether C-ORD requirements are met 	
Deliverables	<p>Deliverables: (Typical Time Frame: 4-6 months)</p> <ol style="list-style-type: none"> Written report/brief by PM/POC justifying participation in SECURE program including MNS, DOTMLPF-RGS analysis, PAM, AOA and C-ORD is to be distributed and reviewed by SECURE Review Panel (approx. 3-6 months) C-ORD review and feedback loop to confirm accuracy, feasibility and level of detail of requirements performed by SECURE Review Panel and Internal Review Router (approx 3-4 weeks for initial reviews) Preliminary operational testing procedures and potential performers considered Approved C-ORDs will be posted online to the SECURE Program website by the Commercialization Office Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 2 Months)</p> <ol style="list-style-type: none"> Management of interest and questions from potential private sector partners offering their solutions to the stated requirements by Commercialization Office and PM/POC. Conduct detailed analysis of potential solution technology and manufacturing maturity levels and review business standing of potential partners Select private sector partners that demonstrate ability to deliver required capabilities timely and effectively Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 1-2 Months)</p> <ol style="list-style-type: none"> Work in close collaboration with selected private sector partners to develop CRADA, SOW, detailed test plan based on proposed solution Formalize Detailed Test Plan and determine IOT&E sponsorship and responsibilities PM/POC to oversee and monitor progress of private sector partners to achieve milestones and deliverables PM/POC and T&E Team to observe/oversee IOT&E as necessary Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 3-4 weeks)</p> <ol style="list-style-type: none"> The results of performed IOT&E are to be distributed to the PM/POC, T&E Team and Subject Matter Expert(s) as necessary for detailed review and report on findings of IOT&E data. Whenever possible, a paper review of IOT&E data will be used to analyze whether operational performance to address requirements and meet/exceed stated specifications. SECURE Review Panel will review reports written by PM/POC and T&E Team to evaluate conformance of operational performance Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 2-3 Months)</p> <ol style="list-style-type: none"> The finalized certification package and recommendation for certification prepared by PM/POC to be reviewed by SECURE Review Panel Director – R&D Partnerships analyzes recommendations of SECURE Review Panel signs certification, if appropriate Prepare disclaimers/waivers to be signed by private sector partner if certified Publish certification notice on public websites and approved lists, as appropriate.

* **Internal Review Router** consists of: PM/POC, S&T Portfolio Manager, S&T Division Director, Third Party Independent T&E Team, DHS Testing & Standards Division, and Subject Matter Expert(s)

** **SECURE Review Panel** consists of: S&T Deputy Under Secretary; Director – HSARPA; Director – First Responders Group; Director – Acquisition Support and Operational Analysis; Director – R&D Partnerships (Final sign-off)

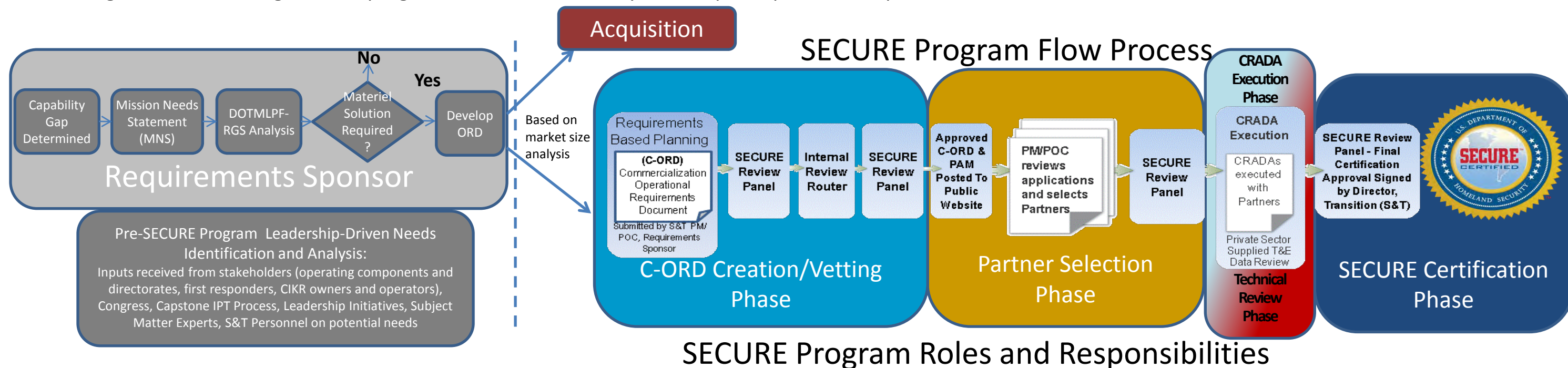
Acronym Legend:
DOTMLPF-RGS: Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities – Regulations, Grants, Standards
AOA: Analysis of Alternatives
MNS: Mission Needs Statement

IOT&E: Independent Operational Testing and Evaluation
EHC: Enabling Homeland Capability
PAM: Potential Available Market
C-ORD: Commercialization – Operational Requirements Document
PM/POC: Program Manager/Point of Contact

TRL/MRL: Technology Readiness Level/Manufacturing Readiness Level
SOW: Statement of Work
CRADA: Cooperative Research and Development Agreement
CIKR: Critical Infrastructure & Key Resources
PPI: Program Prioritization Index

SECURE: System Efficacy through Commercialization Utilization Relevance and Evaluation

The SECURE Program is an innovative public-private partnership designed to leverage the experience, expertise and resources of the private sector to develop required capabilities for Department stakeholders efficiently, cost-effectively and with an emphasis on speed of execution. The SECURE Program's primary focus is on the non-federal first responders and critical infrastructure/key resources (CIKR) owners and operators. The Commercialization Office is responsible for the management and oversight of the program and will work closely with all participants in the process.



SECURE Program Roles and Responsibilities

Commercialization Office Resource Library

- Product Realization Guide (TRA/MRA Guidelines)
- TSD's TRL Guide
- Program Prioritization Index (PPI) Model
- C-ORD Template
- CRADA Template
- Due Diligence Questions for Potential Partners
- Nationally Recognized Testing Laboratories (NRTLs) List
- SECURE Overview and Concept of Operations
- External and Internal SECURE Application Forms
- SECURE Certification Document (Under OGC Review)
- Market Analysis Templates [PAMs]
- SECURE Program Flow Process Brief
- SECURE Program Swim Lane Chart
- DHS S&T RL Calculator and User's Manual, Ver. 1.1
- Decision Point Checklists – 8 Total

Requirements Sponsor: A Requirements Sponsor represents the operational needs of the cognizant organizational element and ultimately the end-users of the required system. The Sponsor conducts mission analysis, identifies capability gaps, conducts requirements analysis, and participates in long range planning process and the prioritization of needs. The Sponsor's final requirements are formally documented in an Operational Requirements Document. The Sponsor participates in all phases of the development to ensure that the item or system being developed meets operational requirements. In many contexts, the word "Sponsor" refers to the sponsoring organization, and the term "Sponsor's representative" is the person empowered to represent the Sponsor for a given investment.

Program Manager (PM)/Point of Contact (POC): The PM/POC will be the S&T representative responsible for managing the execution of the SECURE Program Flow Process. The PM/POC will coordinate with the requirements sponsor to determine the capability gaps and requirements of the stakeholder community. PM/POC will also conduct DOTMLPF analysis to ensure that a materiel need exists and that the SECURE program is a viable option to realize product development. PM/POC will be responsible for creating and maintaining the certification package over the course of executing the Program. PM/POC will provide necessary briefs to SECURE Review Panel, manage interactions with the private sector and serve as the central point of contact for questions relating a particular C-ORD. The PM/POC will provide recommendation on certification to the Director – R&D Partnerships.

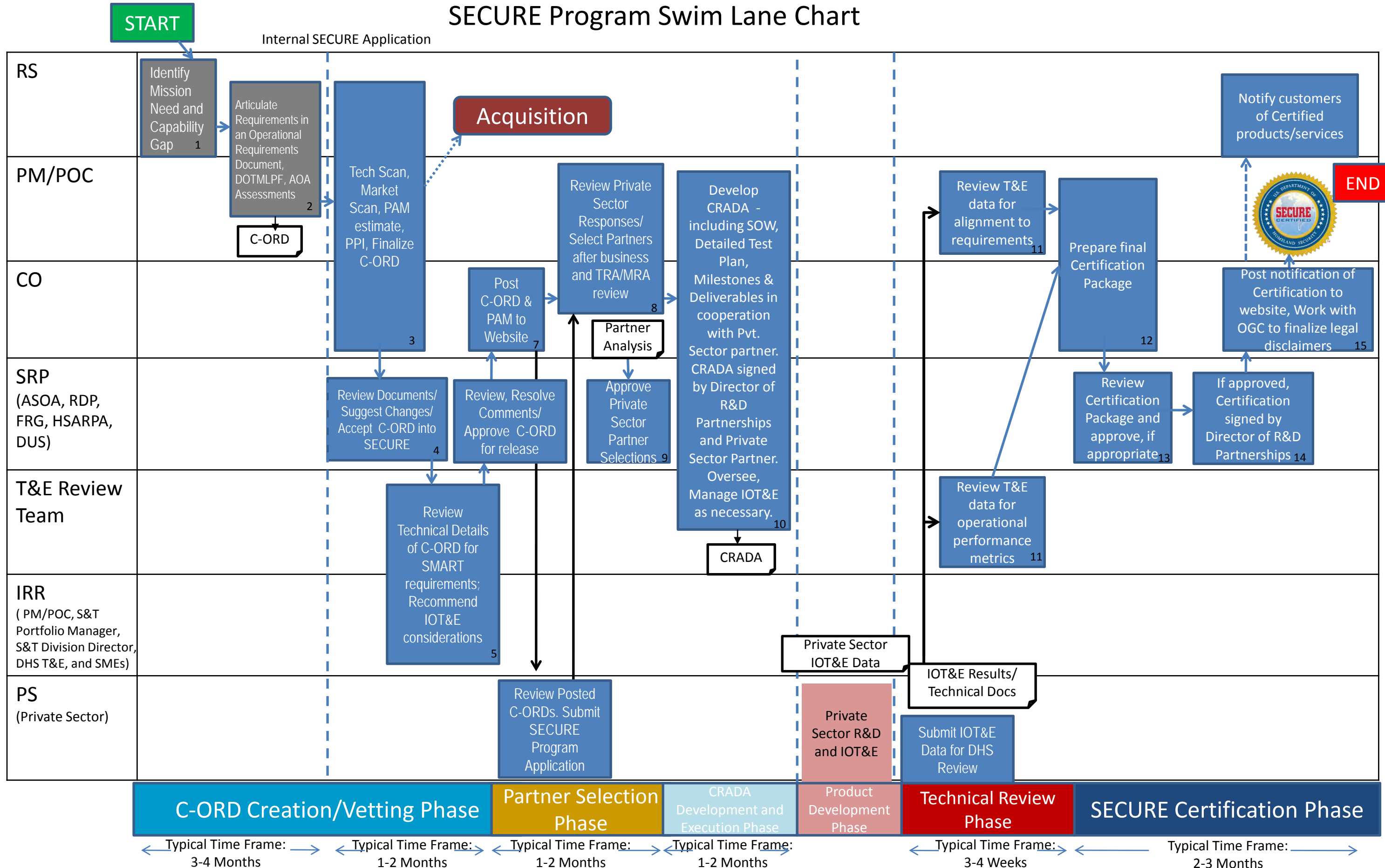
SECURE Review Panel: The Panel is a group familiar with the strategic goals and mission of the Department and its stakeholders. The Panel is responsible for accepting C-ORDs for inclusion in the SECURE Program based on C-ORD alignment of overall mission needs and priorities. The Panel also determines whether a materiel solution is best to address a capability gap and that the SECURE Program is a viable option for the development of new products and/or services for Department stakeholders. The Panel also participates in the review of CRADAs and T&E reports and will advise the Director – R&D Partnerships with recommendations for certification.

Internal Review Router: The Internal Review Router will provide a technical review of C-ORDs accepted into the SECURE Program by the SECURE Review Panel. The Internal Review Router members will provide technical feedback and recommended changes to the SECURE Review Panel and PM/POC. Members will review C-ORDs to ensure that the requirements are specific, achievable, testable, measurable, feasible and are solution agnostic. (Note: Individual members of the Internal Review Router may have additional roles and responsibilities within the SECURE Program process. For example, DHS TSD and subject matter experts may participate in the review of IOT&E Data)

Third Party Independent T&E Team: The Third Party Independent T&E Team will provide subject matter expertise on the necessary test and evaluation considerations related to the SECURE Program. The T&E Team, as a member of the Internal Review Router, reviews C-ORDs for technical merit and ensure compliance or conformity to any relevant standards and regulations. The T&E Team will also confer with the SECURE Review Panel for the preliminary discussions on operational test and evaluation considerations. The T&E Team is responsible to review and modify the detailed test plan, developed by the PM/POC and selected private sector partners. A T&E representative may elect to observe/oversee the conduct of operational testing and evaluation as warranted by the type of testing required. The T&E Team also contributes to the paper review of T&E data submitted by the private sector and ensures that all testing was performed in accordance with the written detailed test plan and that the data contained in the T&E results demonstrate that the operational performance of a system meets or exceeds the stated specifications of a potential private sector partner and provides an assessment of whether C-ORD requirements are met..

Commercialization Office: The Commercialization Office is responsible for the overall execution of the SECURE Program. The Commercialization Office will assist during all phases of the SECURE Program to ensure uniform guidelines and resources are available to facilitate the completion of all phases. The Commercialization Office will work closely will all participants of the SECURE Program and address any questions that may arise. The Commercialization Office is also responsible for the continued private sector outreach to promote and enhance the engagement of the private sector in the SECURE Program. The Commercialization Office will also assist the PM/POC in conducting market analyses and evaluating potential private sector partners.

SECURE Program Swim Lane Chart



FutureTECH Program: Public-Private Technology Certification Process

	Research/Innovation Focus Area Creation/Vetting Phase	Partners Selection Phase	CRADA Execution and Technology Development Phase	T&E Data Review Phase	FutureTECH Certification Phase
	<p>Objective: Develop research/innovation focus areas/needs for potential materiel capabilities needed by DHS stakeholders</p> <p>Inputs: Mission Needs Statement/Capability Gap/Enhanced Homeland Capability (EHC), DOTMLPF-RGS analysis, preliminary requirements elicitation from broad range of DHS stakeholders</p> <p>Output: Representative and well-vetted research/innovation focus area documents</p>	<p>Objective: Identify potential private sector partners capable of delivering required capabilities which can be validated</p> <p>Inputs: Applications from private sector entities seeking to provide capabilities/technologies to a research/innovation focus area/need</p> <p>Output: Detailed analysis of a given company's capabilities, technology/manufacturing maturity, capabilities and experience</p>	<p>Objective: Outline roles and responsibilities for DHS and private sector partners</p> <p>Inputs: Discussions with Private Sector Partners to develop CRADA and supporting documents</p> <p>Output: Binding CRADA agreement between DHS and private sector partner includes: SOW, developmental test plan/TRA, Milestones & Deliverables</p>	<p>Objective: Determine ability of proposed technologies to meet stated research/innovation focus areas /needs and performance specifications</p> <p>Inputs: T&E data from developmental test plan/TRA conducted by recognized third party T&E entity or DHS sponsored test facility</p> <p>Output: Detailed report of T&E data review for performance alignment to research/innovation focus areas /need and performance specifications</p>	<p>Objective: Provide FutureTECH Certification, if appropriate</p> <p>Inputs: Detailed report on certification package containing T&E data review, vetted research/innovation, focus area document, MNS, AOA, DOTMLPF analysis</p> <p>Output: Determination on granting certification for a potential technology</p>
DHS Sponsor (e.g. First Responder, CIKR stakeholder, etc.)	<ul style="list-style-type: none"> Elicit needs and preliminary requirements from stakeholders (approx. 2-4 months) Communicate with national user associations/organizations Develop Mission Needs Statement (MNS) Conduct DOTMLPF-RGS analysis Ensure preliminary requirements are representative of user community Represent user community as necessary Grants development with DHS customer/stakeholder, if required 		<ul style="list-style-type: none"> Provide input on developmental considerations necessary to conduct effective developmental test plan/TRA 	<ul style="list-style-type: none"> Assist PM/POC as necessary to evaluate efficacy and alignment of performance data to meet/exceed stated research/innovation focus areas/needs 	<ul style="list-style-type: none"> End users/customers notified of Certified technologies/capabilities
Commercialization Office	<ul style="list-style-type: none"> Assist in research/innovation focus area drafting by offering requirements development materials Assist in analyzing program prioritization index model (PPI) Assist in analysis of alternatives, technology scans and market scans Continue outreach on "How to do Business with DHS" with private sector Engaged internal and/or external subject matter expert(s)/FFRDC/Non-S&T organization(s) to assist in review of research/innovation focus area document, developmental test plan/technology readiness assessment (TRA) and T&E data Post approved research/innovation focus area document to FutureTECH Program website, if/when approved by FutureTECH Review Panel and Internal Review Router 	<ul style="list-style-type: none"> Provide resources to assist in technology/manufacturing maturity assessments and business analysis Manage incoming applications to posted research/innovation focus area documents Assist with business analysis of potential partners: experience in technology development, business history, likeliness to achieve TRL-6 etc. (approx. 1 week per company) Notify private sector partners of selection or non-selection within one week after decisions are made 	<ul style="list-style-type: none"> Assist PM/POC to develop CRADA and necessary documentation (e.g. SOW, developmental test plan/TRA milestones and deliverables) 	<ul style="list-style-type: none"> Provide resources and materials to develop the criteria necessary for thorough review of developmental test data/TRA Provide recommendation on certification 	<ul style="list-style-type: none"> Assist PM/POC in preparation of certification package New FutureTECH Certified technology/capability marketed by private sector with DHS support, and oversight of Certification mark usage, if approved
PM/POC	<ul style="list-style-type: none"> Collect and support preliminary requirements data/information/documentation articulation from DHS Sponsor Determine alignment to mission needs/capability gaps Conduct an analysis of alternatives (AOA) and research similar efforts Conduct feasibility study with support from subject matter expert(s), if necessary Identify external sources of information (e.g. subject matter expert(s)) Prepare research/innovation focus area document for review by FutureTECH Review Panel and Internal Review Router Ensure conformance/inclusion of any necessary regulation(s) or standard(s) 	<ul style="list-style-type: none"> Establish timeline for application acceptance cycles Conduct due diligence review of potential partners with assistance of Commercialization Office <ul style="list-style-type: none"> Verify current TRL/TRA/MRL of potential technology Analyze likelihood of potential technology to provide desired capability and capability alignment to research/innovation focus area document Recommend future action with potential partners to FutureTECH Review Panel (to be completed within one month of acceptance cycle closing) 	<ul style="list-style-type: none"> Draft CRADA with OGC, Tech Transfer Manager and Commercialization Office (approx. 2-3 weeks) <ul style="list-style-type: none"> Work with private sector partner to determine milestones and deliverables Develop Statement of Work Develop developmental test plan/TRA with private sector partner with input from T&E team Verify TRL-6 maturity is achieved prior to developmental test plan/TRA based on requirements for certification 	<ul style="list-style-type: none"> Provide analysis of capability alignment to stated research/innovation focus area/need Evaluate efficacy and alignment of performance data to meet/exceed stated research/innovation focus areas /needs Communicate questions/comments or clarification needs to private sector partner Provide recommendation on certification 	<ul style="list-style-type: none"> Prepare and present to FutureTECH Review Panel the supporting documentation in certification package and provide recommendation for certification, if appropriate
FutureTECH Review Panel*	<ul style="list-style-type: none"> Ensure preliminary requirements alignment and priority to overall mission objectives based on MNS, EHC, Capstone IPT Capability Gap Review DOTMLPF-RGS analysis and AOA Accept or decline initial package from PM/POC into FutureTECH Program prior to reviews by Internal Review Router 	<ul style="list-style-type: none"> Confirm PM/POC analysis of potential private sector partner Approve/Recommend course of action with potential partner(s) to PM/POC 	<ul style="list-style-type: none"> Review documentation and provide approval on CRADA and appendices Authorize final approval of CRADA Approved CRADA signed by Director – S&T Transition and private sector partner 	<ul style="list-style-type: none"> Review analysis from PM/POC and T&E team to ensure that all data verifies TRL 6/MRL 7 compliance, alignment to research/innovation focus area document and that performance meets or exceeds published vendor specifications 	<ul style="list-style-type: none"> Review certification package and recommendation from PM/POC Make final decision on certification of a given technology/capability
Internal Review Router**	<ul style="list-style-type: none"> Review technical merit of research/innovation focus area document accepted by FutureTECH Review Panel: Are preliminary requirements testable, measurable, specific, achievable and solution agnostic? Express opinions with recommendations to FutureTECH Review Panel Ensure preliminary requirements alignment and priority to overall DHS stakeholder mission 				
Subject Matter Expert(s)	<ul style="list-style-type: none"> Review technical merits of research/innovation focus area document accepted by FutureTECH Review Panel: Are preliminary requirements testable, measurable, specific, achievable and solution agnostic? Ensure preliminary requirements are representative of user community Provide insight into any similar efforts and leverage existing information/research 		<ul style="list-style-type: none"> Provide input on developmental considerations necessary to conduct effective developmental test plan/TRA 	<ul style="list-style-type: none"> Provide analysis of capability alignment to stated research/innovation focus areas/needs 	
Third Party Independent T&E Team	<ul style="list-style-type: none"> Review technical merit of research/innovation focus area document: Are the preliminary requirements testable, measurable, specific, achievable, feasible and solution agnostic? 		<ul style="list-style-type: none"> Assist in reviewing developmental test plan/TRA to include measures of reliability, safety, and quality assurance Provide input on technical considerations necessary to conduct effective capability testing Provide recommendation on necessary DHS participation during developmental test plan/TRA Review and modify developmental test plan/TRA as required prior to inclusion in CRADA 	<ul style="list-style-type: none"> Validate T&E performance data meets/exceed stated specifications Ensure test results and procedures followed developmental test plan/TRA Pose questions/comments to PM/POC to relay to partner Provide assessment of whether research/innovation s focus areas/needs are met 	
Deliverables	<p>Deliverables: (Typical Time Frame: 4-6 months)</p> <ol style="list-style-type: none"> Written report/brief by PM/POC justifying participation in FutureTECH program including MNS, DOTMLPF-RGS analysis, AOA and research/innovation focus area document is to be distributed and reviewed by FutureTECH Review Panel (approx. 3-6 months) Research/innovation focus area document review and feedback loop to confirm accuracy, feasibility and level of detail of preliminary requirements performed by FutureTECH Review Panel and Internal Review Router (approx 3-4 weeks for initial reviews) Preliminary developmental test plan/TRA procedures and potential performers considered Approved research/innovation focus area documents will be posted online to the FutureTECH Program website by the Commercialization Office Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 2 Months)</p> <ol style="list-style-type: none"> Management of interest and questions from potential private sector partners offering their capabilities to the stated focus areas/needs by Commercialization Office and PM/POC. Conduct detailed analysis of potential technology and manufacturing maturity levels and review business standing of potential partners Select private sector partners that demonstrate ability to deliver required capabilities timely and effectively Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 1-2 Months)</p> <ol style="list-style-type: none"> Work in close collaboration with selected private sector partners to develop CRADA, SOW, developmental test plan based on proposed technology Formalize developmental test plan plan/TRA and determine T&E sponsorship and responsibilities PM/POC to oversee and monitor progress of private sector partners to achieve milestones and deliverables PM/POC and Independent T&E team to observe/oversee T&E as necessary Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 3-4 weeks)</p> <ol style="list-style-type: none"> The results of performed T&E are to be distributed to the PM/POC, Independent T&E team and Subject Matter Expert(s) as necessary for detailed review and report on findings of T&E data. Whenever possible, a paper review of T&E data will be used to analyze whether performance to address requirements and meet/exceed stated specifications. FutureTECH Review Panel will review reports written by PM/POC and Independent T&E team to evaluate conformance of performance. Results/Follow up actions will be communicated/coordinated by the PM/POC 	<p>Deliverables: (Typical Time Frame: 2-3 Months)</p> <ol style="list-style-type: none"> The finalized certification package and recommendation for certification prepared by PM/POC to be reviewed by FutureTECH Review Panel Director – S&T Transition analyzes recommendations of FutureTECH Review Panel signs certification, if appropriate Prepare disclaimers/waivers to be signed by private sector partner if certified Publish certification notice on public websites and approved lists, as appropriate.

* **Internal Review Router** consists of: PM/POC, S&T Portfolio Manager, S&T Division Director, Independent T&E team, Subject Matter Expert(s), and Director – S&T Transition (Final sign-off)

** **FutureTECH Review Panel** consists of: Director - APMD; Director – S&T Transition; Director – S&T Innovation; Director – S&T Basic Research, Technology Transfer Manager; OGC representative (S&T); Chief Commercialization Officer

Acronym Legend:

DOTMLPF-RGS: Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities – Regulations, Grants, Standards

AOA: Analysis of Alternatives

MNS: Mission Needs Statement

OT&E: Operational Testing and Evaluation

EHC: Enabling Homeland Capability

PM/POC: Program Manager/Point of Contact

TRL/MRL: Technology Readiness Level/Manufacturing Readiness Level

SOW: Statement of Work

CRADA: Cooperative Research and Development Agreement

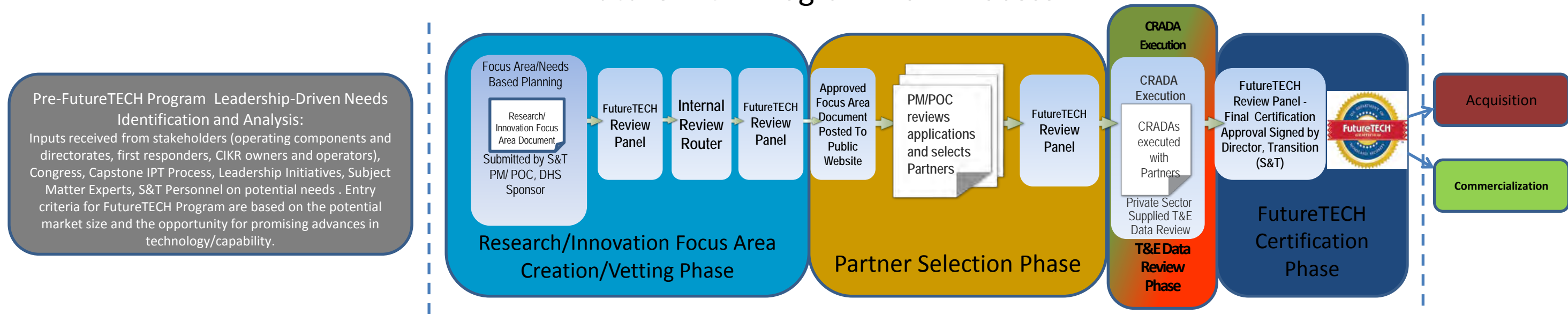
CIKR: Critical Infrastructure & Key Resources

PPI: Program Prioritization Index

FutureTECH

The FutureTECH Program is an innovative public-private partnership designed to leverage the experience, expertise and resources of the private sector to develop required technologies/capabilities for Department stakeholders efficiently, cost-effectively and with an emphasis on speed of execution. The FutureTECH Program's primary focus is on the non-federal first responders and critical infrastructure/key resources (CIKR) owners and operators. The FutureTECH Program is reserved for those research/innovation focus areas that could be inserted eventually into DHS acquisition or commercialization programs when development reaches TRL-6, which is described as a representative model or prototype system or subsystem that is tested in a relevant environment. The S&T Commercialization Office is responsible for the management and oversight of the program and will work closely with all participants in the process.

FutureTECH Program Flow Process



FutureTECH Program Roles and Responsibilities

Commercialization Office Resource Library

- Product Realization Guide (TRA/MRA Guidelines)
- TSD's TRL Guide
- MD on TRAs at DHS S&T
- MD for CRADAs at DHS S&T
- Program Prioritization Index (PPI) Model
- Research/Innovation Focus Area Template
- CRADA Template
- Due Diligence Questions for Potential Partners
- Nationally Recognized Testing Laboratories (NRTLs) List
- FutureTECH Overview and Concept of Operations
- External and Internal FutureTECH Application Forms
- FutureTECH Certification Document (Under OGC Review)
- FutureTECH Program Flow Process Brief
- FutureTECH Program Swim Lane Chart

DHS Sponsor: A DHS Sponsor represents the research/innovation needs of the cognizant organizational element and ultimately the end-users of the required technology/capability. The Sponsor conducts mission analysis, identifies capability gaps, and participates in long range planning process and the prioritization of needs. The Sponsor's final research/innovation focus areas/needs are formally documented in a research/innovation focus area document. The Sponsor participates in all phases of the development to ensure that the technology or capability being developed meets research/innovation focus areas/needs. In many contexts, the word "Sponsor" refers to the sponsoring organization, and the term "Sponsor's representative" is the person representing the Sponsor for a given investment.

Program Manager (PM)/Point of Contact (POC): The PM/POC will be the S&T representative responsible for managing the execution of the FutureTECH Program Flow Process. The PM/POC will coordinate with the DHS sponsor to determine the capability gaps and research/innovation focus areas/needs of the stakeholder community. PM/POC will also participate in DOTMLPF-RGS analysis to ensure that a research/innovation need exists and that the FutureTECH program is a viable option to realize technology development. PM/POC will be responsible for creating and maintaining the certification package over the course of executing the Program. PM/POC will provide necessary briefs to FutureTECH Review Panel, manage interactions with the private sector and serve as the central point of contact for questions relating a particular research/innovation focus area document. The PM/POC will provide recommendation on certification to the Director – S&T Transition.

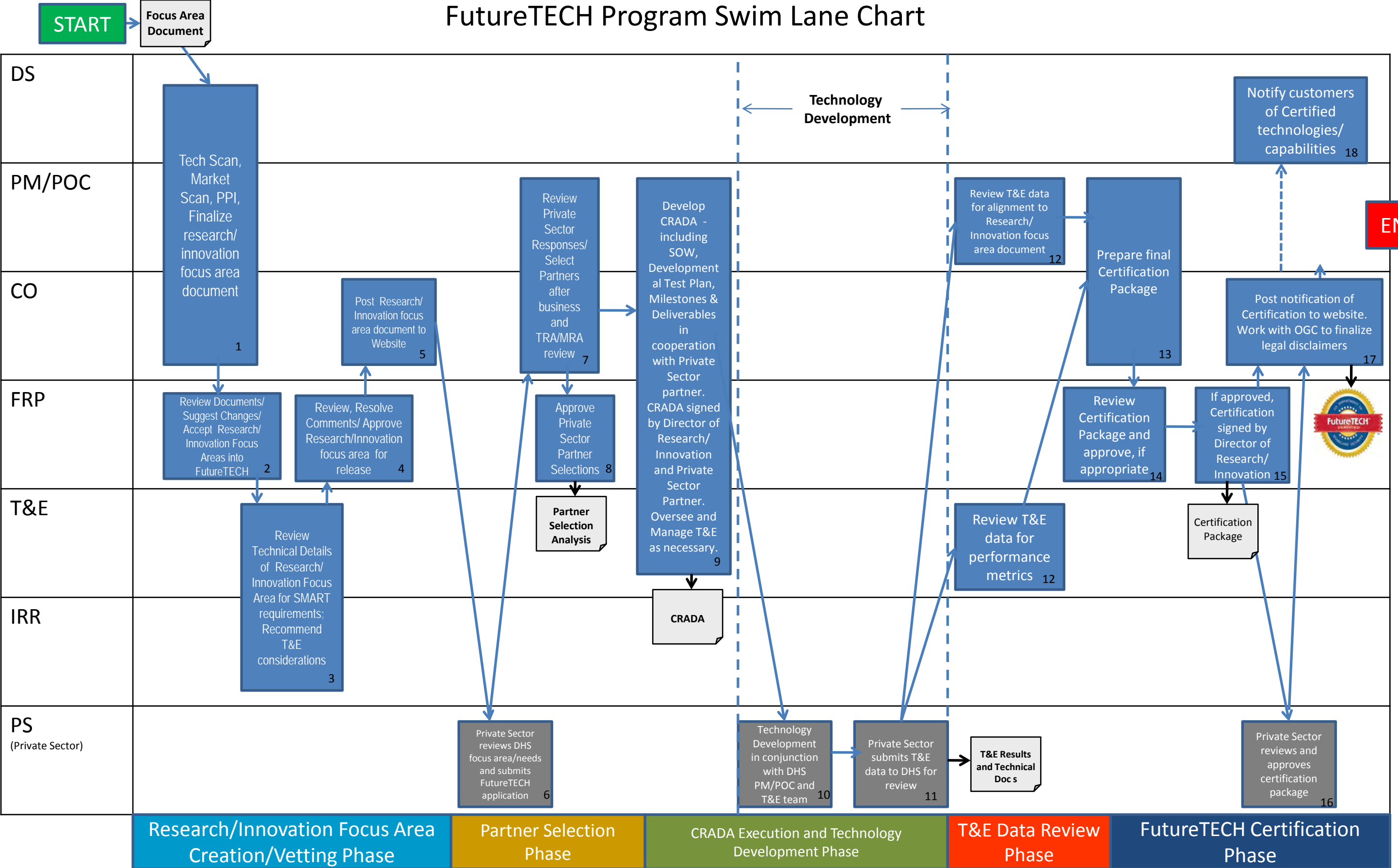
FutureTECH Review Panel: The Panel is a group familiar with the strategic goals and mission of the Department and its stakeholders. The Panel is responsible for accepting research/innovation focus areas/needs for inclusion in the FutureTECH Program based on research/innovation focus area document alignment to overall mission needs and priorities. The Panel also determines whether a technology solution is necessary to address a capability gap and that the FutureTECH Program is a viable option for the development of new technologies/capabilities for Department stakeholders. The Panel also participates in the review of CRADAs and T&E reports and will advise the Director – S&T Transition with recommendations for certification.

Internal Review Router: The Internal Review Router will provide a technical review of research/innovation focus area documents accepted into the FutureTECH Program by the FutureTECH Review Panel. The Internal Review Router members will provide technical feedback and recommended changes to the FutureTECH Review Panel and PM/POC. Members will review research/innovation focus area documents to ensure that the preliminary requirements are specific, achievable, testable, measurable, feasible and are solution agnostic. (Note: Individual members of the Internal Review Router may have additional roles and responsibilities within the FutureTECH Program process. For example, the T&E Team and subject matter experts are critical in providing input on technical considerations necessary to conduct effective capability testing.)

Third Party Independent T&E Team: The Third Party Independent T&E Team will provide subject matter expertise on the necessary test and evaluation considerations related to the FutureTECH Program. The T&E Team, as a member of the Internal Review Router, reviews research/innovation focus area documents for technical merit and ensure compliance or conformity to any relevant standards and regulations. The T&E Team will also confer with the FutureTECH Review Panel for the preliminary discussions on developmental test and evaluation considerations/technology readiness assessments. The T&E Team is responsible to review and modify the developmental plan, developed by the PM/POC and selected private sector partners. The T&E Team may elect to observe/oversee the conduct of testing and evaluation as warranted by the type of testing required. The T&E Team also contributes to the paper review of T&E data submitted by the private sector and ensures that all testing was performed in accordance with the written developmental test plan and that the data contained in the T&E results demonstrate that the performance of a technology/capability meets or exceeds the stated specifications of a potential private sector partner and provides an assessment of whether research/innovation focus area needs are met.

Commercialization Office: The Commercialization Office is responsible for the overall execution of the FutureTECH Program. The Commercialization Office will assist during all phases of the FutureTECH Program to ensure uniform guidelines and resources are available to facilitate the completion of all phases. The Commercialization Office will work closely will all participants of the FutureTECH Program and address any questions that may arise. The Commercialization Office is also responsible for the continued private sector outreach to promote and enhance the engagement of the private sector in the FutureTECH Program. The Commercialization Office will also assist the PM/POC in conducting market analyses and evaluating potential private sector partners. The Chief Commercialization Officer (CCO) is also a member of the FutureTECH Review Panel.

FutureTECH Program Swim Lane Chart



Establishing the Partnership

In the United States today, many public-private partnerships are facilitated through various technology transfer and cooperative research agreements. The most popular agreements are based on official cooperative research and development agreements, or CRADAs. These agreements are executed between federal government agencies and private sector participants, where both parties work on a mutually beneficial project. Each group applies the resource that they agreed to use, such as personnel, equipment, services, and/or facilities. Though the private sector participant may fund portions of the effort, the government agency cannot use federal funds (i.e., cash) to support the private sector directly. The partners are able to share information and leverage each others' technical expertise, ideas and information in a protected environment.

The benefits of having a CRADA are: 1) the private sector participants are able to take advantage of the government agency's analytical capabilities; 2) the government agency and the private sector participants can negotiate on intellectual property disposition, such as rights to patents, the protection of information, and exclusive or non-exclusive licensing of inventions or other intellectual properties developed that are made through the agreement; 3) the government agency and the private sector participants have the opportunity to develop work and business relationships.

Agency and private participants define a project that would benefit both sectors. If the needed resources are available to perform the discussed project, the representative (usually a program manager) of the public sector makes the final decision about whether they will pursue a CRADA opportunity. Funds are not transferred from the government agency to the private sector participant, so most regulations limiting federal procurement do *not* apply. As a result, the CRADA can be put into practice quickly and with little difficulty.

A CRADA is an extremely useful tool to both the public and private sectors. The private sector can receive property and patent rights for an invention, while the public sector benefits because it does not use any taxpayer money to fund the project and may use information gathered by the agreement. There are several other technology transfer mechanisms, including:

Licensing – A license is a contract between a licensor (e.g. the holder of a patent) and a licensee (e.g., an industry partner) that ensures the licensee that the licensor will not sue the licensee for patent infringement. It is the federal government's technology transfer policy to promote the utilization and commercialization of inventions that rise from agency-supported R&D. The licensing of government-owned patents is one of the tools

to achieve this goal. It is important to note that, in granting a license to a government patent, the industry partner must satisfy a number of conditions. This includes completion of a licensing application and a satisfactory business development plan.

Memorandum of Understanding (MOU) - An MOU provides the framework for cooperation and coordination with other agencies. The agreement helps to ensure smooth operations with shared resources or workflow by creating a clear understanding of each party's commitment, purpose and contributions.

Partnership Intermediary Agreement (PIA) - A partnership intermediary is an agency or affiliate of a State or local government that assists, counsels, advises, evaluates or otherwise cooperates with small business firms, institutions of higher education or educational institutions that need or can productively use technology related assistance from a Federal laboratory. Partnership Intermediary Agreements (PIAs) are agreements between DHS and the agency of such a state or local government or a nonprofit entity to allow the Partnership Intermediary to:

- Identify new technologies in the private sector that can be utilized by DHS.
- Facilitate joint projects between DHS and private companies, as well as between agencies and academic institutions, in order to accelerate delivery of technological capabilities to the nation.
- Help existing companies identify DHS technologies that can be licensed and commercialized.

A real-world example of the impact of other cooperative agreements can be found at the United States Air Force Academy (USAFA) Center of Innovation (CoI), which is managed by DHS S&T; designed to create novel capabilities from emerging industry research technologies that eventually enable COTS products. The CoI, the result of a collaborative agreement between USAFA and DHS S&T, has enabled the federal government to conduct cooperative research with private industry technology companies like Intel Corporation. An article about this successful and valuable cooperative partnership is contained in Appendix A.

Understanding the DHS Market

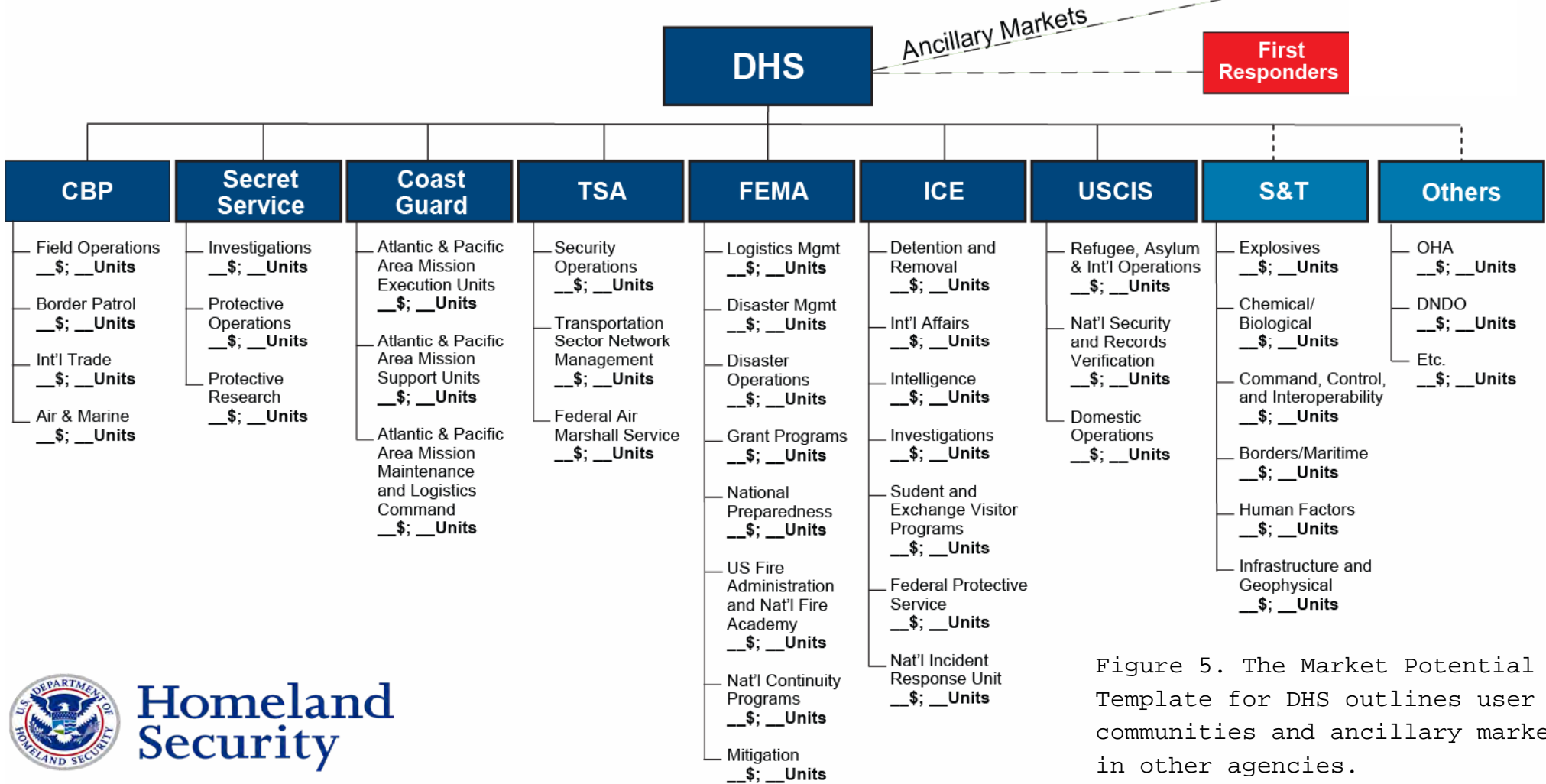
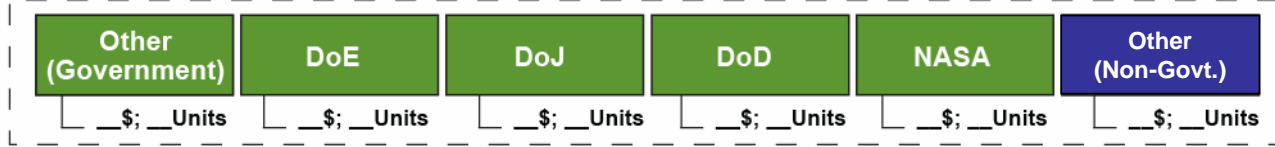
We have shown through the SECURE and FutureTECH programs that the federal government can engage and influence - in a positive way - the private sector by offering detailed requirements and conservative estimates of market potential. The reason that these partnerships are successful is simple and straightforward. Firms spend significant resources in trying to understand market needs and market potential through their business and market development

efforts. By offering this open and transparent information, government saves the private sector both time and money while demonstrating its genuine desire to work cooperatively to develop technologies and products to meet DHS stakeholders' needs in a cost-effective and efficient way that benefits the private and public sectors – but also, most importantly, to the American taxpayers' benefit.

Because of its obvious benefits, it is reasonable to examine the possibility of extending the concepts developed at DHS to other federal, state, local and tribal agencies. Logic dictates that in cases where operational requirements can be developed across agencies, the size of a given potential available market would increase. It is also certainly conceivable that various agencies across government share similar requirements for products and services. An analysis of the DHS stakeholders and the numerous organizational elements and divisions of each stakeholder provides greater detail into the many relevant applications and potential users. The following market maps provide a segmentation of these stakeholders to demonstrate these market potentials. Figure 5 shows how an agency like DHS is related to other government and non-government ancillary markets. The following Figure 6 and Figure 7 delineate the diversity of the other DHS stakeholders in the first responder community and CIKR owners and operators, respectively.

Just as business experts discuss “technology platform” strategies and models, one can envision a detailed requirements document delineating core requirements with additional agency-driven “options” -- analogous to the variety of options offered on automobiles. Just as consumer products are developed with a variety of options (at varying price points), a detailed requirements document could outline all the options required by agencies through a “requirements platform.”

Market Potential Template



Homeland Security

Figure 5. The Market Potential Template for DHS outlines user communities and ancillary markets in other agencies.

First Responders

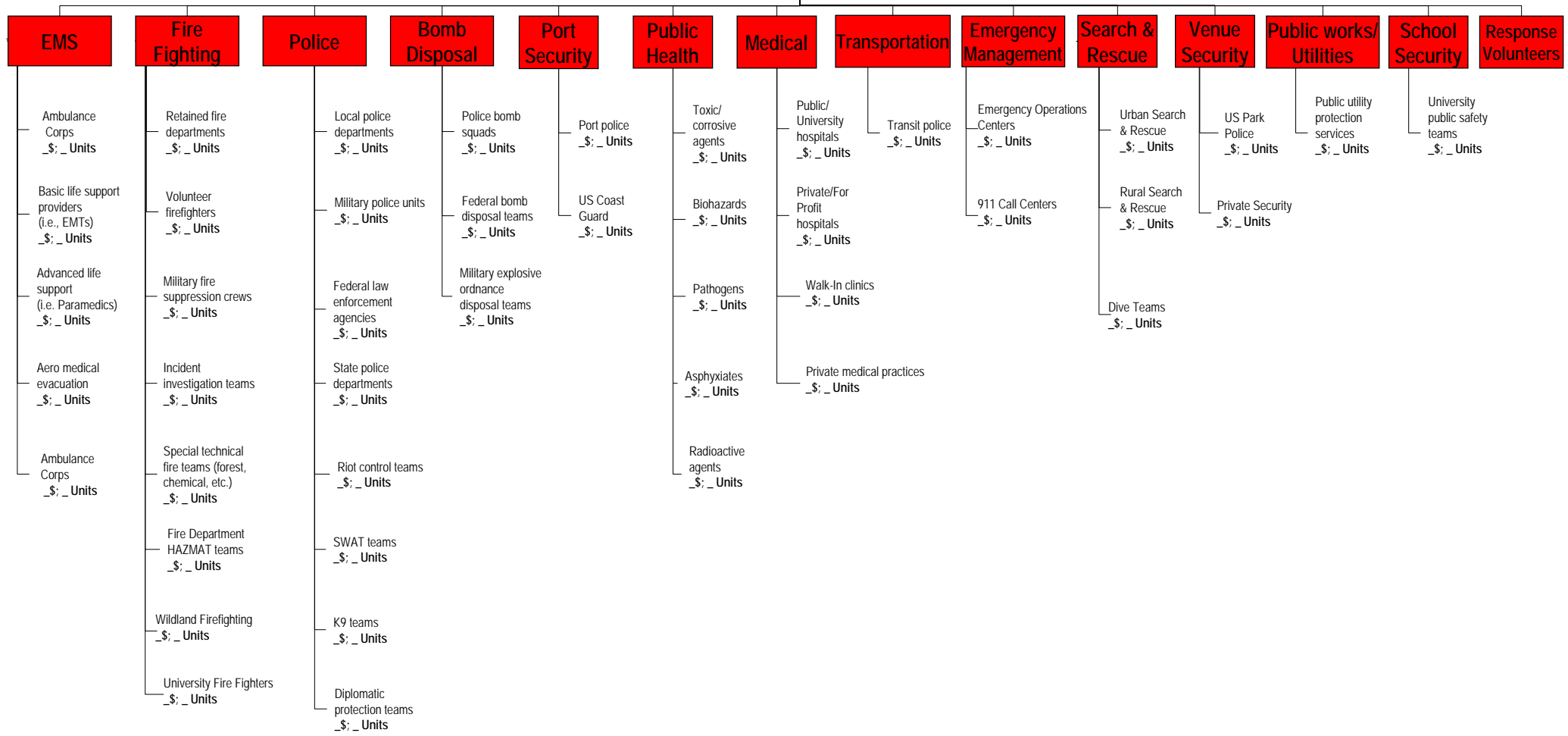


Figure 6. The Market Potential Template for the First Responder Market.

Critical Infrastructure Key Resources (CIKR)

Agriculture and Food	Defense Industrial Base	Energy	Public Health and Healthcare	National Monuments and Icons	Banking and Finance	Water	Chemical	Commercial facilities	Emergency Services	Materials, Reactors and	Telecommunications	Critical Manufacturing	Postal and Shipping Services	Transportation	Information Technology
Food Retail _\$_; _ Units	Defense Contractors _\$_; _ Units	Coal mining operations _\$_; _ Units	Public/University hospitals _\$_; _ Units	Guided tour services _\$_; _ Units	Credit lending institutions _\$_; _ Units	Public utilities _\$_; _ Units	Inorganic chemical production _\$_; _ Units	Hotels _\$_; _ Units	Fire Departments _\$_; _ Units	Electric utilities _\$_; _ Units	Telephone/Cellular services _\$_; _ Units	Iron and Steel mills _\$_; _ Units	United States Postal Service _\$_; _ Units	AMTRAK _\$_; _ Units	Hardware providers _\$_; _ Units
Farm Equipment _\$_; _ Units	Industry analysis _\$_; _ Units	Coal power plants _\$_; _ Units	Private/For Profit hospitals _\$_; _ Units	Travel services _\$_; _ Units	Commercial banking _\$_; _ Units	Desalinization plants _\$_; _ Units	Organic industrial production _\$_; _ Units	Shopping centers _\$_; _ Units	Law enforcement agencies _\$_; _ Units	Reactor and associated materials _\$_; _ Units	Satellite data transmission _\$_; _ Units	Aluminum production and processing _\$_; _ Units	High volume document and parcel shipping _\$_; _ Units	Commuter rail _\$_; _ Units	IT Conglomerates _\$_; _ Units
Meat/Poultry Processing _\$_; _ Units	Think tanks/research institutions _\$_; _ Units	Coal equipment manufacturers _\$_; _ Units	Clinics _\$_; _ Units	Lodging/Hotel _\$_; _ Units	Private equity _\$_; _ Units	Treatment plants _\$_; _ Units	Ceramics _\$_; _ Units	Stadiums and sport arenas _\$_; _ Units	Search and rescue teams _\$_; _ Units	University and educational institutions _\$_; _ Units	Broadcasting entities _\$_; _ Units	Nonferrous metal production and processing _\$_; _ Units	Container shipping services _\$_; _ Units	Intracity rail services _\$_; _ Units	Semiconductor production _\$_; _ Units
Food Processing _\$_; _ Units	University partnership programs _\$_; _ Units	Hydroelectric _\$_; _ Units	Private medical practices _\$_; _ Units	Guest services/tourist hospitality _\$_; _ Units	Consumer banking _\$_; _ Units	Equipment manufacturers _\$_; _ Units	Petrochemicals _\$_; _ Units	Schools _\$_; _ Units	Ambulance companies _\$_; _ Units	Control systems _\$_; _ Units	Broadcast equipment manufacturing _\$_; _ Units	Engine, Turbine and Power transmission _\$_; _ Units	Marine shipping _\$_; _ Units	Commercial airline _\$_; _ Units	Electronics manufacture _\$_; _ Units
Dairy Processing _\$_; _ Units	National laboratories _\$_; _ Units	Dam operations _\$_; _ Units	Medical laboratories _\$_; _ Units	People moving services _\$_; _ Units	Building societies/Private banks _\$_; _ Units	Pipe and water control device manufacturers _\$_; _ Units	Agrochemicals _\$_; _ Units	Commercial office buildings _\$_; _ Units	Mountain/Cave/ Mine rescue teams _\$_; _ Units	Nuclear safety systems _\$_; _ Units	Radio equipment manufacturing _\$_; _ Units	Electrical Equipment manufacturing _\$_; _ Units	Trucking industry _\$_; _ Units	Private air services _\$_; _ Units	IT services _\$_; _ Units
Dairy Farms _\$_; _ Units		Wind power _\$_; _ Units	Pharmaceutical _\$_; _ Units	Queuing equipment makers _\$_; _ Units	Merchant banks _\$_; _ Units		Polymers _\$_; _ Units	Museums _\$_; _ Units	Other technical rescue teams _\$_; _ Units	Waste disposal services _\$_; _ Units	Internet equipment manufacturing _\$_; _ Units	Motor Vehicle manufacturing _\$_; _ Units	Airborne shipping _\$_; _ Units	Cruise lines _\$_; _ Units	Server and network hardware _\$_; _ Units
Ranching _\$_; _ Units		Solar power _\$_; _ Units	Health insurance _\$_; _ Units	Private security _\$_; _ Units	Global financial services firms _\$_; _ Units		Elastomer production _\$_; _ Units	Zoos and Aquariums _\$_; _ Units	Bomb disposal units _\$_; _ Units	Uranium processors _\$_; _ Units	High speed data transmission _\$_; _ Units	Electrical Equipment manufacturing _\$_; _ Units	Trucking _\$_; _ Units	Subway systems _\$_; _ Units	Display/digital TV _\$_; _ Units
Organic Farming/Sustainable Agriculture _\$_; _ Units		Public utilities companies _\$_; _ Units	Medical material providers _\$_; _ Units		Community development _\$_; _ Units		Oleochemicals _\$_; _ Units	Public Libraries _\$_; _ Units	Blood/Organ transplant supply _\$_; _ Units	Protective garment manufacturers _\$_; _ Units	Internet service providers _\$_; _ Units	Aerospace product & parts manufacturing _\$_; _ Units	Distribution services _\$_; _ Units	Long-haul maritime shipping _\$_; _ Units	Software production _\$_; _ Units
Traditional Planting _\$_; _ Units		Oil companies _\$_; _ Units	Medical equipment manufacturers _\$_; _ Units		Community banks _\$_; _ Units		Explosives _\$_; _ Units	Amusement parks _\$_; _ Units	Amateur radio emergency comms _\$_; _ Units	Print media _\$_; _ Units	Railroad rolling stock _\$_; _ Units	Railroad rolling stock _\$_; _ Units	Airborne shipping _\$_; _ Units	Freight rail service _\$_; _ Units	Gaming _\$_; _ Units
Commercial fishing _\$_; _ Units			Medical technology manufacturers _\$_; _ Units		Savings and Loans _\$_; _ Units		Fragrance production _\$_; _ Units		Public utility protection providers _\$_; _ Units	Internet technology providers _\$_; _ Units	Other Transportation equipment _\$_; _ Units	Freight rail service _\$_; _ Units	Bus services _\$_; _ Units	Information security _\$_; _ Units	Information security _\$_; _ Units
			Biotechnology _\$_; _ Units		Credit unions _\$_; _ Units		Chemical wholesale _\$_; _ Units		Emergency Road services _\$_; _ Units			Freight rail service _\$_; _ Units	Freight rail service _\$_; _ Units	Automobile travel _\$_; _ Units	Semiconductor equipment _\$_; _ Units
					Insurance companies _\$_; _ Units		Exotic chemicals _\$_; _ Units		Emergency Social services _\$_; _ Units				Freight rail service _\$_; _ Units	Roads, Highways, bridges and tunnels _\$_; _ Units	
					Insurance brokerages _\$_; _ Units				Community emergency response teams _\$_; _ Units						
					Reinsurance companies _\$_; _ Units				Disaster relief _\$_; _ Units						
					Stock brokerages _\$_; _ Units				Famine relief teams _\$_; _ Units						
					Capital market banks _\$_; _ Units				Poison Control units _\$_; _ Units						
					Custody services _\$_; _ Units				Animal control teams _\$_; _ Units						
					Angel investment _\$_; _ Units				Wildlife services _\$_; _ Units						
					Venture capital _\$_; _ Units										

Figure 7. The Market Potential Template for the Critical Infrastructure & Key Resources Market



Transformational Change beyond DHS

While it is gratifying that our commercialization process and private sector outreach programs are being incorporated and mandated by DHS it is worth noting that this model can be readily extended to and adopted by other agencies in the federal, state, local and tribal government arenas. Further expanding requirements generation and collecting information on market potential across all of government can have transformative effects on the way government conducts business. Examination of Table 2 clearly shows how the incorporation of Commercialization adds a “valuable tool to an agency’s toolbox” in providing increased speed-of-execution in deploying technologies/products/services to solve problems, as well as providing an increase in the net realizable budget of an agency. In addition, as evidenced by Table 3, the potential ROI of these commercialization-based public-private partnerships can yield impressive results.

S&T Commercialization Office -- Four Major Activities

Parameter	Requirements Development Initiative	Commercialization Process	SECURE Program	S&T Private Sector Outreach
1) Increase speed-of-execution of DHS programs/projects				
2) DHS and its stakeholders receive products more closely aligned to specific requirements/needs				
3) Increase effective and efficient communication				
4) End users can make informed purchasing decisions				
5) Large savings of cost and time for DHS and its stakeholders				
6) Increase goodwill between taxpayers, private sector and DHS				
7) Foster more opportunities for small, medium and large businesses				
8) Large taxpayer savings				
9) Possible product “spin-offs” in and other commercial markets				
10) Promote open and fair competition				

Return-on-DHS Investment is LARGE!

Table 2. The major activities of the Commercialization Office demonstrate positive results for taxpayers, the private sector and DHS.

Commercialization Office - Return on Investment (ROI)

Assumptions for Conservative ROI Projections:

- > Return on Investment – (Gain on Investment/Cost Savings – Cost of Investment) / Cost of Investment
- > Gain on Investment/Cost Savings – conservative estimate of potential savings of nominally expended R&D dollars at S&T; in general, estimated savings is 75% of given/related FY09 enabling homeland capability (EHC), which is identified through Capstone IPT process
- > SECURE Program – Cost of Investment – 20% of Commercialization Office personnel salary + (10% Other expenses such as OGC, OPA, OOD, etc.); divided by 20 operational requirements documents (ORDs) completed and publically released in given year
- > R&D Funds at DHS S&T – R&D funds do not include labor or overhead (not fully burdened cost of managing program/projects/EHCs)

SECURE Program – ORD	Market Size	ROI
Blind Resilient Autonomous Video Equipment (BRAVE) ORD Requirements for a forensic camera deployed in public transportation vehicles to assist in incident cause analysis.	Over 1.5 million units	290
National Emergency Response Interoperability Framework and Resilient Communication System of Systems ORD Requirements for a system to provide interoperable communications on a national framework for remote use by first responders.	Over 2,000 units	525
Interoperable Communications Switch ORD Requirements for an interoperability switch-based communications system that provides networked communications between any number of agencies and personnel.	Over 230 units	525
Crisis Decision-Support Software ORD Requirements for a system with a user-centric approach matched with an extensive database of past decisions and a proven method to quickly reach critical decisions in high pressure environments for wide operational use.	Approx. 50,000 units	1023
Blind Mitigation of Fuel Tank Explosions ORD Requirements for an explosion suppression system to protect fuel containers. A "fuel container" ranges from fuel tanks found in vehicles, boats or trains to fuel storage tanks at airports, seaports and the neighborhood gas station.	Over 1 million units	727
Integrated Intrusion Protection ORD Requirements for an adaptable, scalable surveillance capability that provides automated, real-time protection for a wide range of operational scenarios.	Over 41,000 units	290
Predictive Modeling for Counter-Improvised Explosive Devices (IED) ORD Requirements for a system to predict the threat of an IED attack and further data fusion from law enforcement, intelligence partners and other sources to support the common operating picture.	Over 250,000 seats in US alone	870

Return on DHS investment is LARGE when compared to Angel investors (4x to 7x) and Venture Capitalists (5x to 20x)

Table 3. The use of Commercialization has the potential to realize significant Return-on-Investment (ROI) values as evidenced by the SECURE pilot program at DHS.

Communities of Practitioners and Dual-Use Technologies

The prevalence of national associations for various stakeholder communities drives the creation of a significant amount of information relative to the challenges, needs and requirements of their representative membership. Government can play a vital role in communication with these associations to gather this critical information. Providing opportunities to engage larger audiences and creating a nation-wide understanding of the problems has increased the awareness and identification of similar requirements in a number of user communities. The more cross-cutting a set of requirements becomes, the more opportunities exist to save taxpayers’ resources. How could this be accomplished in a practical way? The answer is simple: It has already begun... DHS is planning to utilize deployable technology to create a Community of Practitioners (CoP) in order to gather and communicate requirements across such a large-scale community of users.

The Department of Defense, for example, has invested in these kinds of technologies. Technology will enable users to reach not only the millions of first responders but also other potentially authorized stakeholders and members of the HSE (other federal agencies, private sector, venture community, etc). Advanced technologies like the semantic web 3.0 will aid in the communal and open development of detailed operational requirements, potential available market sizing/applications, etc. There are plans to initiate a pilot program to harness these technologies to engage various user communities to enable broad-based development of widely accepted operational requirements. Figure 8 shows graphically the evolution of developing detailed requirements culminating in the establishment of CoPs. As cooperative partnerships increase between the public and private sector, sharing information becomes the most important tool to improve the effectiveness of the relationship.

Evolution of Change: DHS Providing Better Information about its Needs

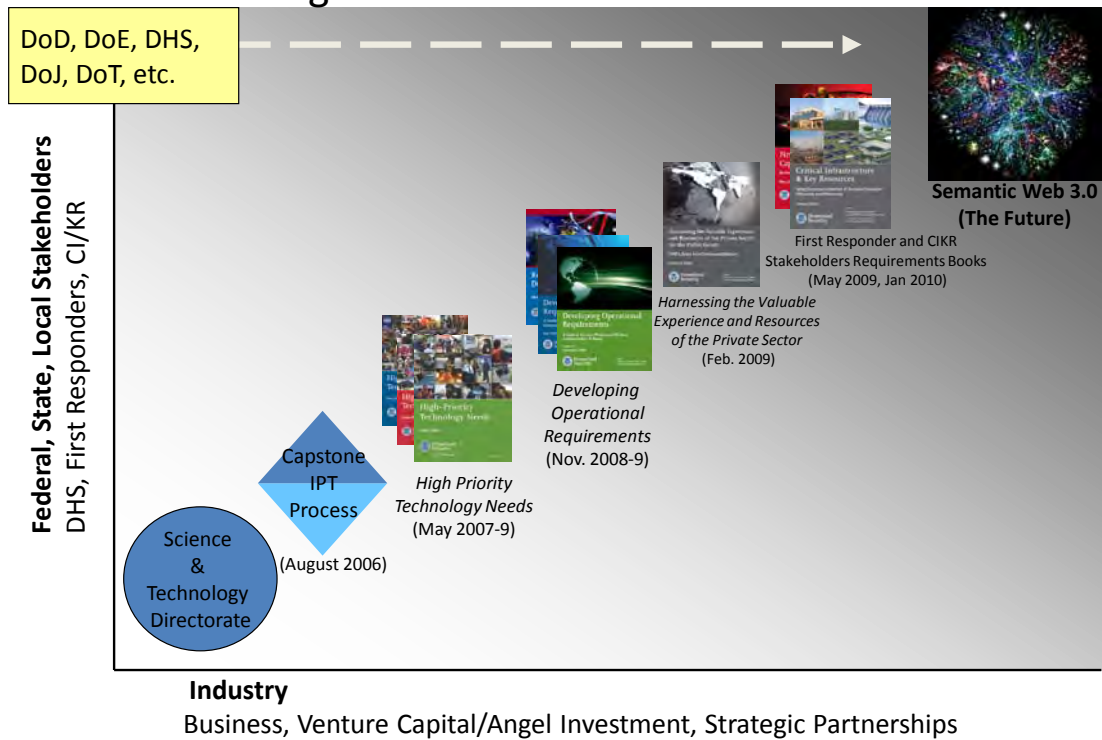


Figure 8. DHS is transforming the way that it reaches out to its stakeholders to learn about their needs. Advanced social networking technologies have the potential to greatly enhance communications and the understanding of needs to allow open and free competition to provide the best solutions at the best price for government.

CoPs can be developed at a number of levels to gather information from all government stakeholders at the federal, state, local and tribal levels. Open communication can gather information from stakeholders regionally as well as capturing the unique needs of localities that may be large urban centers, widespread townships, or coastal cities, for example. CoPs will enhance connections between personnel in a number of mission-spaces who may find similarities in capability gaps or share information on best-practices and possible standards that can facilitate coordinated responses to incidents involving users from a number of jurisdictions.

Uncovering common requirements across stakeholder communities highlights the connections between ancillary markets and the possibility for a technology to work in varied applications. Dual-use technologies provide useful capabilities to a larger market of potential users. It follows that addressing additional markets increases the potential benefits to solution providers who can distribute their company's capabilities to a wider audience, increasing sales volumes and driving prices down for consumers as economies of scale are improved.

Commercialization and partnerships are tools that have genuine value well beyond DHS. In fact, these efforts can offer more and more opportunities to increase the speed-of-execution of government programs and increase the net realizable budget of the government -- all at the benefit of taxpayers the more the models are used both across and within government.

Acknowledgement

The authors thank and acknowledge Randy Zeller, Pete Ladowicz, Deborah Jermunson, Caroline Greenwood and Mark Protacio for their contributions to this resource. This document would not be possible without their tireless effort and dedication.



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Thomas A. Cellucci, Ph.D., MBA is the U.S. Department of Homeland Security's Director of Research & Development Partnerships Group (Acting) and the first Chief Commercialization Officer in the Department. He leads the private sector outreach initiatives for DHS S&T has written a series of reference guides to facilitate the development and articulation of operational requirements for DHS stakeholders.

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Appendix A

Department of Homeland Security Science and Technology Center of Innovation: Creating an “Innovation Ecosystem” Driven by Public-Private Partnerships for the Benefit of the Homeland Security Enterprise

Randel L. Zeller, Terry C. Pierce, and Thomas A. Cellucci of the U.S. Department of Homeland Security: Science and Technology Directorate, Washington, D.C.

The United States Air Force Academy (USAFA) Center of Innovation (CoI), which is managed by the Department of Homeland Security Science and Technology Directorate, is designed to create novel capabilities from emerging industry research technologies that eventually enable Commercial Off-The-Shelf (COTS) products. Located at the United States Air Force Academy (USAFA) and near U.S. Northern Command, the CoI leverages the academy’s state-of-the-art supercomputer and millennial generation cadets to create a truly interagency center.

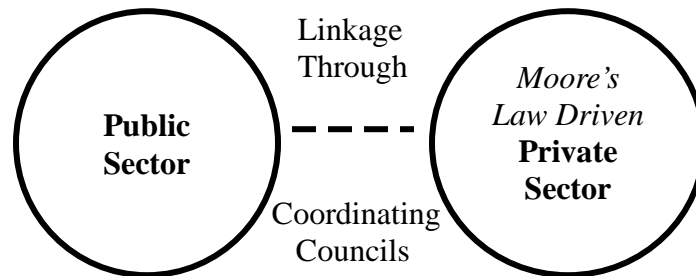
The CoI has had several major successes:

In July 2009, the CoI conducted the *USAFA Mission Fabric Collaboration Experiment*, co-sponsored by the Human Factors and Infrastructure Protection and Disaster Management Divisions for DHS S&T, as well as Department of Defense (Rapid Technology Fielding) to evaluate the impact of cutting-edge technology on distributed collaboration. The experiment participants included members from DHS’s Customs and Border Patrol Air/Marine Operations Center, multiple U.S. warfighting commands as well as academic institutions including USAFA cadets.

In December 2010, USAFA signed a unique cooperative agreement for research with Intel Corporation, on behalf of the CoI. This significant achievement established an innovative public-private partnerships model in the Federal government. The CoI is pursuing additional agreements with Cisco Systems and IBM. The combinations of these three market-shaping organizations represent over \$20 billion in corporate Research and Development (R&D) annually. The CoI is funding service academy cadets to perform research with Intel Corporation and the IBM Watson Research Center related to closing DHS capability gaps.

In March 2011, the CoI initiated several iterations in its Rare Event Scenario (RES) Framework. The first experiment is being played in a 2-D space, and will serve as a baseline for future iterations, which will be played in 3-D virtual environments. The RES Field testing will include several more games through December 2011. Future RESs will also field test private sector partner research technologies in creating a new, layered cyber security model called Flexible Distributed Security (FDS).

The Current Public/Private Cyber-Space Partnership Model:



*Figure 1
Typical Public-Private Cyberspace Partnership Model*

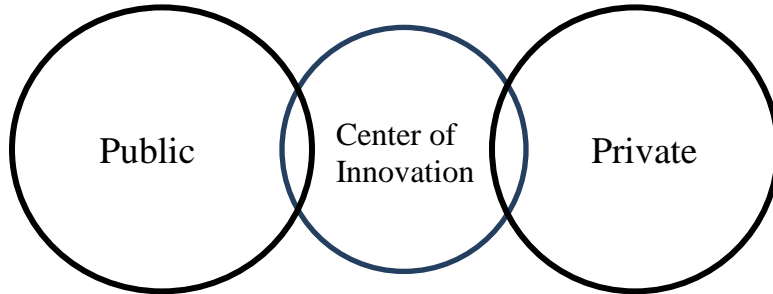
**A key aim is to integrate and field test research prototypes emerging from Moore's Law, which holds that information technology capabilities double every 18 months.*

To understand the uniqueness of the cooperative agreement the CoI has executed with the private sector, it is useful to examine how this kind of model compares to more conventional models. The typical or current public-private cyberspace partnership model is shown in Figure 1. While “partnerships” are a popular concept, it has been recognized that the reality of this kind of partnership does not yield optimal solutions.

A July 2010 Government Accounting Office (GAO) report found that Federal stakeholders felt that improvements could be made in the partnership if private sector stakeholders would share sensitive information. Figure 1 demonstrates the GAO finding that the private sector stakeholders are hesitant to share their research with the Federal government for a variety of reasons, including fear of public disclosure of proprietary or business sensitive information that could potentially result in the loss of shareholder returns. Therefore, Coordinating Councils alone do not always address the needs of both sides to enable collaborative research, especially in highly-charged, emerging trade space.

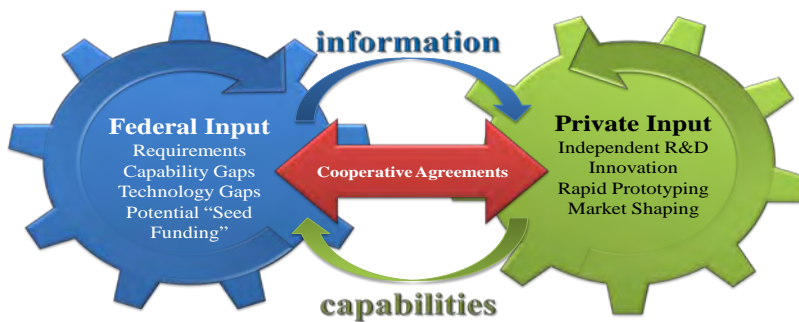
Continued implementation of partnerships that strive to meet commercial expectations is an effective means of building the desired ecosystem, which is required to prevent pervasive and sustained computer based attacks.

The CoI Public/Private Cyber-Space Partnership Model:



*Figure 2
CoI Public-Private Cyberspace Partnership Model*

As illustrated in Figure 2, the CoI is successfully exploring ways to build cooperative relationships with industry to further these goals. Using cooperative agreements for research, many of which are already underway with companies like Intel Corporation and the IBM Watson Research Center, the CoI is able to jointly conduct research with private sector companies (driven by Moore’s Law) in an established framework for federally-assisted research. The CoI holds that these types of research vehicles address some of the challenges highlighted in the GAO report that constrain private stakeholders from engaging in cooperative research with the Federal government because of the legitimate fear of losing sustainable competitive business advantage.



*Figure 3
CoI leverages cooperative agreements that facilitate open communication and cooperative research and development.*

Figure 3 demonstrates how the CoI accepts funding from several government sources to link private sector research technologies in novel ways to create game-changing innovations. Most importantly, these private research technologies have a greater probability of being COTS products within the next 1-3 years.

Cutting Edge Technologies and Game-Changing Process Innovations

Through this process, the CoI has created an engine of innovation driven by public-private partnerships and open cooperation. With DHS S&T and the CoI pioneering collaborative partnerships, these industry titans are opening their research departments to the Federal government to advance technology development toward a common goal. The CoI is in the process of integrating several private industry research technologies to discover the “Art of the Possible” for better communication and collaboration among Federal government organizations. Current CoI efforts are focused on providing start-up companies the same opportunities in this public-private innovation cauldron.

The CoI is managed by a newly formed organization at DHS S&T called the Research and Development Partnerships Group (RDP). RDP serves as the primary collaborative group for DHS S&T. The Interagency Office supports RDP and the Directorate by serving as S&T’s lead facilitator and systems integrator for helping our internal and external members of the Homeland Security Enterprise achieve their respective missions. RDP enables a collaborative and innovative “ecosystem” consisting of interagency partnerships, public-private partnerships, and state, local, territorial and tribal partnerships to identify, test, and eventually field innovative and game changing technologies.



Terry C. Pierce, D.P.A., M.A., is the Director of the Center of Innovation, Science and Technology Directorate, U.S. Department of Homeland Security. He focuses on creating public-private partnerships to enable game-changing innovations for the homeland security enterprise. He has written several articles and a book on championing disruptive innovations in the federal government and is a retired officer of the U.S. Navy.



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