Department of Defense Report to Congress on Technology Transition

July 2007

Foreword

The Department of Defense (DoD) is pleased to provide this assessment of the challenges associated with transitioning technology from science and technology into acquisition programs. Delivering capabilities rapidly to our warfighters is a responsibility we take seriously, and are therefore constantly seeking ways to improve and accelerate the transition of affordable and sustainable technology solutions.

The Department has purposefully attended to improving the planning process for fielding technology solutions so that our warfighters have the military capability advantage. We continue to learn from successes and failures of transition activities, and readily acknowledge that further progress will require the combined efforts of the DoD Enterprise, to include all communities that enable warfighter support.

In recognizing the need for advocacy at the Enterprise level, the Department recently assigned an Assistant Deputy Under Secretary of Defense for Innovation and Technology Transition (ADUSD (I&TT)), whose job is to "drive transition every day." The ADUSD (I&TT) will interact with the Military Departments and Defense Agencies to improve and strengthen the execution of technology transition to meet our warfighters' needs.

This report examines the principal barriers that impede technology transition and outlines a plan to address the root causes of those barriers. The Department is committed to increasing transition successes by restructuring programs, revising policies, and reinvigorating focused, consistent oversight of and advocacy for innovative solutions. Establishing a clearer vision and finding adaptable approaches to solving complex problems can only serve to improve our warfighting capabilities.

In this era of rapidly evolving global technology, and vast opportunity for garnering innovative solutions, we look forward to working with the Congress to implement improvements that will help our forces maintain a technical edge in our defense capabilities.

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Executive Summary

This report provides an initial response to Section 255 of the FY 2006 Defense Authorization Act, which directed the Department of Defense to assess organizational barriers, acquisition regulations, requirements validation, and the planning, programming, budgeting, and execution processes impacting the ability to transition technology from science and technology (S&T) into acquisition (Appendix A). We have taken an Enterprise level view in creating this response, basing it on personal interviews with Technology Transition Council (TTC) members (Appendix B), Technology Transition Working Group discussions, and written input from the Services and Defense Agencies. In addition, we have reviewed a number of previous reports and studies (Appendix C) to ensure that we have an historical perspective on technology transition, and have captured ideas, approaches, and best practices from across the Department and private industry. This report is not merely a compendium of these inputs, but rather serves as a basis for actionable outcomes that we intend to discuss with Congress through continual dialogue.

Transitioning technology into established Programs of Record (PoR) is a longstanding challenge for the Department. The underlying problem has come into sharp focus in recent years with the adoption of Technology Readiness Levels (TRLs) as a common vocabulary for discussing the maturity of a technology, uncovering a disconnect between our S&T and acquisition communities. Our acquisition policies require a minimum of TRL 7 (”system prototype demonstrated in an operational environment”) for a critical technology to be incorporated in a production program (an important best practice recommended by GAO to control technical risk, and strongly supported by DoD). On the other hand, expectations for the S&T community have traditionally been to advance new technologies only to the TRL 5 level of maturity (“component and/or breadboard validation in a relevant environment” (e.g. high fidelity laboratory)), with no particular capability deployment in mind, and then move on to the next technology. Admittedly there have been recent efforts by the Services/Agencies to stretch program developments to TRL 6, but that maturation effort comes at the expense of new ideas and innovation, especially as the S&T budget stagnates or declines.

This is evidence that a chasm exists between the DoD S&T (TRL 5) and acquisition (TRL 7) communities. That chasm, commonly referred to as the ‘valley of death,’ can be bridged only through cooperative efforts and investments by both communities.

Based on the recommendations of prior studies and inputs from DoD leaders in both the S&T and acquisition communities, we have identified four broad areas for improvement:

1. Responsibility, resources and programs for technology maturation beyond TRL 5 (technology “push”). Technology push refers to development that is directed, driven or ‘pushed’ by a developer in the S&T community. Early and frequent collaboration is required between the developer, acquirer and user. This early planning can then serve to mitigate the chasm between TRL 5 and TRL 7 by identifying technical issues, resource requirements/sources, avoiding unintended consequences, and ultimately gaining the most yield for the S&T investment.

2. Requirements, resources and acquisition strategies for timely technology transition beyond TRL 7 (acquisition "pull"). Technology pull refers to development that is directed, or 'pulled' by the acquisition and user communities' needs and requirements. Because our acquisition system is built around purchasing large and complex weapon systems whose developments are risky, a Program Manager (PM) is motivated to ensure the program meets planned cost, schedule and performance by accepting technology when the majority of risk has already been mitigated. If the PM were to conduct early and frequent communication with the developer about user requirements and companion acquisition plans, much of the development risk could be addressed earlier in the process.

3. Technical, cultural and business barriers to integrating new suppliers and new technologies into defense system architectures. The pace at which new technologies are discovered/innovated/developed/deployed in the private sector is staggering, and at odds with the linear, deliberate nature of some military acquisitions. . Finding ways to include these innovators in our process could serve both the military and America's economic competitiveness in the world market.

4. Focused oversight and governance at the Enterprise level. Each Service/Agency has devised methods to address both the S&T and acquisition communities. However, it is recognized that from a corporate viewpoint, there is a need for a federated approach to coordinate agile acquisition efforts, look for unrealized synergies among transition programs, and ensure adequate resourcing. The Technology Transition Council (TTC) was formed to deal with those issues, and reassessing its charter is warranted at this juncture to ensure that it is the most effective construct to sustainable, coordinated technology transition across the Department.

To set the needed improvements in motion over the next 18 months, the Director Defense Research and Engineering (DDR&E) will assign the new Assistant Deputy Under Secretary of Defense for Innovation and Technology Transition (ADUSD (I&TT)) to lead a Technology Transition Task Force (TTTF) that will develop and implement improvement plans in these four areas. The TTTF will propose improvements for issues such as:

- Visibility into technology insertion/refresh windows within the acquisition process
- Alignment/integration of technology transition initiatives
- Continuity of funding
- Seeking innovation from non-traditional sources
- Tracking successes and failures through a set of metrics, and making continuous process improvements as a result
- Renewed attention to appropriate, disciplined governance at every level

In this report you will find a compendium of representative challenges reported by the Military Departments and Defense Agencies through dialogue and written input as well as considerations for addressing those challenges. Insights and recommendations from various reports completed previously highlight barriers to transition. A summary of actions to be undertaken by the Technology Transition Task Force completes this report.

We look forward to taking the next steps in this process to further define and establish appropriate capabilities, processes, and mechanisms as we make 'Transition' a key component in transforming the Department to meet the demands of the future.

I. Challenges and Considerations to Address Technology Transition

The Military Departments, Defense Agencies and THE OFFICE OF THE SECRETARY OF DEFENSE (OSD) have taken steps to accelerate the flow of technology to the warfighter by reducing time and providing the flexibility to field new technology in order to maintain the technological superiority of our military systems. While making marked improvements in planning technology transition and initiating mechanisms for bridge funding, the DoD still faces many of the same challenges identified in various reports going back more than 10 years, as evidenced in Table 1, below.

Table 1: Excerpts of S&T Affordability Workshop, Transition Panel, June 10-11, 1997

What's Good?		What's Bad?
Frequent communication with warfighter & acquisition customer both before & during S&T		Artificial barriers between government & industry
Early definition of requirements		Inconsistent, undisciplined process of S&T management's prioritization of projects
Formal roadmaps		
Honest peer review of S&T/merit based		Ricebowls
S&T manager must be a marketeer		"Good Ol' Boy" System
Establish Transition Team from beginning		Requirements/capabilities not well-defined
Transition focus		
Multi-disciplinary team		Lacking measures/expectations related to affordability (lack of incentives)
Address all –ilities including logistics		
Include industry		Improper alignment with warfighter needs
Balance design with process capability		S&T personnel not motivated to achieve transition
Conduct affordability-cost trade-offs (begin production cost modeling)		Acquisition process changing – confusing
Establish S&T metrics on transition		Lack of overarching 10-20 year vision for DoD and the Military Departments
Mitigate/define risk		
Funding strategy for transition		Lack of communication with right people at right time
Establish IPT		
		Industry has short-term outlook
		Lack of focus on weapon sustainability
		Lack of understanding of S&T objectives by acquisition customer and user
		Lack of communication facilitator to provide linkages.

However, some examples of progress toward successful technology transition are:

- The Military Departments' and Defense Agencies' leadership has embraced the notion of early transition planning and has executed a number of successful pilot programs to demonstrate methods for transitioning technology.
- The Department is working toward re-engineering the Technology Transition Council (TTC), comprised of senior leadership from the S&T and Acquisition communities in OSD, Military Departments/Defense Agencies, and Combatant Commands, chartered to

execute a federated approach to coordinating transition efforts across the Department in support of agile acquisition.

- The Department's Chief Technology Officer (CTO) has assigned an Assistant Deputy Under Secretary of Defense for Innovation and Technology Transition (ADUSD (I&TT), empowered to advocate for and focus on effecting successful technology transition from an Enterprise perspective.

What follows is a synopsis of some of the specific challenges that have been reported by the Military Departments and Defense Agencies, along with those uncovered by our own experiences with Department-wide transition initiatives. Each challenge is followed by a set of considerations for the ADUSD (I&TT)'s attention during the ensuing months.

A. Organizational/Cultural Barriers

Organizational and cultural barriers to technology transition among the user, S&T, and acquisition communities have evolved over time. Each community brings a different mindset, driven by a variety of motivating factors. While each focuses on supporting the warfighter, activities at the varying stages of responsibility often drive disparate approaches to resolving issues. At the same time, the growing complexity and capabilities in new technology are driving a need for greater interaction among the communities.

Challenge:
The desire to rapidly field technology often runs counter to the risk-averse approach of fielding only mature technologies, which fosters a chasm between the S&T and acquisition communities. There is pressure to deliver a wide range of new technologies to the warfighter as quickly as possible. There also is an inherent mismatch between acquisition program managers' desire to field mature technologies on time and technologists' inclination to field new technologies with potentially greater capabilities. As indicated in a recent GAO Report dated September 2006, the result is that technologies are being transitioned before they are ready, creating operational issues, cost overruns, schedule delays, and a breakdown in communication between those responsible for providing and those responsible for fielding needed capabilities.

Program Managers are driven by the need to meet a set of cost, schedule, and performance parameters. They are inclined to determine that the risk associated with implementing an unplanned technology offered by the S&T community outweighs the additional capability to be gained by an improved technology. Therefore, PMs decline to fund, or delay, the final stages of development of a promising technology, preferring to invest in other aspects of the program that are viewed as more mature and vital to success and incorporating the newer technology in later program increments.

Considerations:
Through coordination with the Military Departments, OSD can identify ways to create an environment that rewards early and regular communication among all stakeholders. A collective, top-down approach by all affected communities is imperative. Mechanisms are needed that continually train and motivate the S&T and acquisition communities to work

together to reach a common outcome. All need a clear understanding of requirements, needs, S&T, acquisition, supportability, statutory/regulatory guidance, and resourcing methods.

- Transition Planning. The acquisition community should be required to identify, for each ACAT program, realistic technology insertion points in the program schedule, address maintainability and reliability issues, and develop technology roadmaps showing projected readiness for transition opportunities and the S&T programs (with schedules) which offer transition opportunities. The S&T community should be required to develop schedules showing when technology will be available for transition, aggressively manage to those schedules, and create more effective outreach mechanisms between the S&T and acquisition communities. Currently, program managers are responsible for planning incremental upgrades when technology transition might occur; the S&T community needs to be fully engaged to understand the deadlines associated with these plans and to ensure the technology has achieved the appropriate maturity level to make the transition.

- Technology Transition Agreements (TTA). Expectations can be managed better through increased emphasis on/institutionalization of TTAs. Through the inclusion of exit criteria which contain target performance objectives, transition milestones, and delivery dates of specific technologies, should be agreed to and updated as the project progresses to reflect more specific terms for accepting or rejecting a technology. All parties, including the technologists/developers, resource sponsor, program managers, logisticians, primes and subcontractors should make commitments through this agreement. Increased emphasis on TTAs would foster more and earlier interaction among the key stakeholders.

- Contracting Clauses. Program managers should take steps to ensure that technology transition events enable key system performance goals. One way to do this is to require Requests for Proposals (RFP) to include language requesting contractors demonstrate technology maturity and a plan for new technology insertion as part of the bid process. The feasibility of identifying and protecting technology transition funds from budget reprogramming should be considered to support this action.

- Relationship Managers. OSD will consider adopting industry's best practice of designating relationship managers to shepherd technology transition from the laboratory into an acquisition program for production and sustainment.

- SBIR CPP Coordinator. The DoD Office of Technology Transition (OTT) should consider establishing a formal communication plan with the DoD Small Business Programs Office to address opportunities to rapidly transition technologies developed through the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. Synergies among OTT programs and the SBIR Phase II Enhancement and Commercialization Pilot Programs (CPP) are particularly apparent and should be explored.

Challenge:

There is a general concern that technology development has become "stove-piped." Currently, technology development is conducted with little inter- and intra-collaboration. There is limited knowledge exchange among organizations' activities with respect to development and application of technology. There is a sense that each of the Military Departments/Defense Agencies carries out its functions in a relative vacuum, with no single organization or individual charged with taking a holistic, integrated view and doing what is best for the Department. In some cases this is fostered by an unwillingness to "show one's hand" until the promising efforts can be used as leverage in the battle for resources.

Today's complex systems and budget environment demand that there be a more collaborative approach among government and private organizations to discover multidisciplinary solutions that may be contrary to the strategy of developing centers of excellence for specific technologies.

Considerations:
DoD should establish a mechanism to facilitate the linkages among transition programs/initiatives, particularly for joint capabilities. It should address, from a transition perspective, the cross-cutting, pervasive, strategic issues (those that do not have a single Service owner), and make informed decisions about continuing or divesting of further investment.

To facilitate collaboration, the Department might establish Communities of Interest that relate to all Military Departments and span technology maturity levels for any given capability. A Joint Transition Initiative could be established, possibly as a pilot effort, to showcase technology development and transition to acquisition. Each Service would provide its own funding, but also compete for additional OSD dollars to advance and transition relevant technologies/capabilities.

Improved programmatic alignment of OSD with Military Departments/Defense Agencies could increase the probability of technology transition among several components simultaneously. Use of common databases with sufficient technical information might improve collaboration or at least facilitate awareness of other ongoing activities that could be leveraged to provide a needed capability.

B. Acquisition Regulations

The DoD 5000.1 and 5000.2 provide guidance concerning the incorporation of new technologies from S&T communities to programs of record. This guidance requires the creation of a Technology Development Strategy to reduce technology risk and to determine the appropriate set of technologies to be integrated into a full system. Another method could establish a portfolio management approach to emerging technologies that reports on their advancement and increasing maturity over time. Programs could reduce risk by choosing technologies from the portfolio when they are ready or by investing at key points in the evolution to accelerate their maturity. The execution of that strategy demands early and close coordination among the user, S&T, acquisition, and logistics communities.

Some feedback from the Military Departments/Defense Agencies indicates that many of the challenges to effective technology transition may be associated with acquisition regulations. However, lacking any citation of specific regulations, authorities, or mechanisms that impede

transition, we conclude this is perception only. The key is early, deliberate transition planning as a consideration in the acquisition strategy. That is not to say that there are not challenges, as noted below, but we find no reason to suggest changes to the acquisition regulations.

DoDI 5000.2 contains a requirement for a Concept Refinement phase in paragraph 3.5.3, "AoA shall assess the critical technologies associated with these concepts, including technology maturity, technical risk, and, if necessary, technology maturity and demonstration needs." This is an appropriate starting point to address transition of technologies into existing DoD systems.

Challenge:
In the Navy S&T community, there is a void (up to 12 months) between the completion of a 6.3 project and the development program due to regulations that dictate the types of solicitation techniques that must be used for certain types of basic and applied research. The Competition in Contracting Act (CICA) and the DoD statute on competition, 10 U.S.C. 2302, define competition to include the general solicitation technique used to obtain basic research proposals through the Federal Acquisition Regulation's (FAR) Broad Agency Announcement (BAA). In the area of basic scientific research where a requirement is typically incapable of specific definition, BAAs offer considerable advantage over traditional Requests for Proposals (RFP) as they allow offerors to propose specific tasks along with the corresponding technical approach of their choosing in response to a broadly defined area of Government interest. Each proposal is evaluated on its individual merits rather than on a comparative basis, and the Government has considerable latitude in determining which proposals submitted will be funded. However, the BAA solicitation technique is restricted to only basic and applied research and that portion of development not related to a specific system or hardware acquisition program.

Often, research from a basic science contract leads to advanced or applied levels of scientific research funded by budget categories 6.4 or 6.5. In this case, a new, separate contract for advanced research/development of the item must be drafted and a new competition must be initiated prior to award as the use of a BAA is restricted to the award of contracts for basic research only. The produces a gap or "break" in the development program that may last up to 12 months while the new acquisition is conducted.

Considerations:
An amendment for a "bridge" between the end of the basic research portion of a contract award under a BAA and the award of a contract under a new acquisition for advanced research or production could fill the void created by the existing contracting regulations. Contracts could be issued based on BAAs that take the most promising work through to integrated component evaluation, demonstration, and validation without having to re-start the acquisition process. The limits on the separate contract line item or option are designed to be the minimum allowable to continue work on the project through the "bridge period" necessary to conduct the follow-on acquisition; the overall goal being to speed the transition of S&T into fielded systems pursuant to DoD 5000.2.

The SBIR program presents a unique opportunity to bridge the development and transition gap. All legislated competition requirements are met as a result of SBIR Phase I and II contract awards thereby allowing sole source (SBIR Phase III) contracts to recipients of SBIR funding.

C. Technology Transition's Role in the Planning, Programming, Budgeting, and Execution System

Numerous challenges have been identified related to the planning, programming, budgeting, and execution system. Those that address barriers imposed by this process, rather than a general desire for more funding, will be addressed in this report. The average program RDT&E cost growth for immature technologies from its initial full estimate is almost 35% versus 4.8% for mature technologies.[1] A consequence of this cost growth is that the Military Departments typically deliver weapons systems late, have to reduce quantities to stay within cost estimates, shift funds away from other projects to make up for added costs, or some combination of the three. Additionally, life cycle costs often do not include costs/cost savings related to insertion opportunities.

Challenge:
Insufficient mechanisms exist to fund transitions of promising technologies unless they are fully mature or unless they meet a critical and immediate warfighter need. The DoD budgeting process requires technology investments to be targeted at least two years in advance of their activation. The S&T community has difficulty projecting and meeting dates that the technology will be matured and available for the acquisition community to insert into a PoR. Furthermore, acquisition programs lose transition funds and basic program funds when the S&T community fails to deliver required technology on schedule or at the promised technology readiness level. This makes it difficult for DoD to seize opportunities to introduce technological advances into acquisition programs.

Considerations:
Consider establishing a policy precluding unilateral recapturing of S&T and/or acquisition program funds when technology readiness is delayed. Establish a capital account under TTC oversight to influence and facilitate multi-year transition. The Department might want to establish a business process to provide gap funding to sustain technology effort until the next budget cycle in which obligation and disbursement rates would not be cause for reprogramming.

Challenge:
Program Executive Officers and Program Managers do not create program or portfolio plans that consciously identify needed technologies and/or their associated technology insertion points. The POM reflects a relatively short horizon, money-constrained program which does not adequately address technology insertion issues. There is no effective outreach mechanism between the user, S&T, acquisition, and logistics communities, hindering development of technology insertion plans.

Considerations:
Institutionalize a strategic plan that would provide a clear, overarching path to technology development that addresses capability gaps, affordability needs, and emerging opportunities.

[1] GAO Report 06-883

This would prioritize the organization's system engineering driven technology goals over a 20 year timeframe. Investments in the development of immature technologies demand a long range plan with long cycle times. Through collaboration with all relevant stakeholders, a detailed plan could be developed that not only includes schedules, but also takes into consideration funding constraints based upon budget guidance. The resulting strategic plan would support the POM and be updated annually.

Challenge:
The Army has identified an issue with the congressionally imposed requirements requiring certification of Technology Maturity prior to Milestone B (title 10, Section 2366a). This reduces the flexibility of the Department to accept risk by precluding the use of technologies that may greatly improve performance or reduce costs in a program if they have not been demonstrated at TRL 6 prior to Milestone B. For MDAPs, the threshold will be so high as to reduce acceptance of new technologies.

Consideration:
Consider allowing the Milestone Decision Authority to accept risk by approving the inclusion of technologies less than TRL 6 when there is significant justification for doing so based on the viability of a funded Technology Maturation Plan and the expected benefit from use of the technology.

D. Other Challenges

Challenge:
"Transition" is not defined the same way across communities of interest. Because the nature of the work of each of the Military Departments, Defense Agencies, and Combatant Commands is necessarily different, so are their approaches to technology transition. This has led to a variety of definitions for transition such as:

- Moving technology to budget activity 6.3
- An operational capability in which someone is interested
- A prototype is available for use
- No longer funded by S&T
- Moved into a program of record/acquisition program, adequately addressed all Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) requirements.

Consideration:
As the first step in measuring the Department's transition successes, we should consider the need for a common definition or set of definitions. Although in November 2005, the Technology Transition Council approved this definition, "*Transition occurs when there are no longer any S&T dollars required to further develop the technology; it is a part of a Program of Record or can be acquired through normal acquisition channels; all DOTMLPF issues have been satisfied*, Consideration should be given to reassessing this definition to ensure it still serves the Enterprise.

Challenge:
DoD needs a more effective way to communicate its needs to and attract innovation from non-traditional suppliers.

Consideration:
Technology insertion must take this into account and identify ways to better work with non-traditional sources, capitalizing on successful activities, such as Defense Acquisition Challenge, SBIR, and World's Best Technologies Showcase, and continue to explore new opportunities.

II. Examples of Technology Transition Programs/Initiatives within the Department of Defense

As mentioned previously, the Military Departments, Defense Agencies and OSD have not been idle in addressing the issues associated with technology transition. Each has established pilot initiatives that have been subject to continuous process improvement with the objective of accelerating the deployment of capabilities to the warfighter. What is missing is a way to link many of these initiatives together so as to share best practices, uncover synergies among programs, and surface any obstacles that inhibit transition success.

In an attempt to accelerate technology transition, OSD, Military Departments and Defense Agencies have stood up small programs to help shepherd technologies from S&T initiatives into acquisition programs. Although each has its own characteristics and success metrics, in many cases the differing program motives and funding levels detract from DoD's ability to achieve critical mass for adopting new/emerging technologies. While many of these approaches have experienced some level of transition success, the fact that they exist at all indicates a need for a Department-wide corporate approach to transition.

In the following table are representative examples of the various initiatives/approaches that have been undertaken by OSD, Military Departments, and Defense Agencies. They are presented in alphabetical order by program/initiative name, management responsibility, and general characteristics.

Table 2 - Examples of Technology Transition Programs/Initiatives within DoD

Program	**Management**	**Characteristics that Facilitate Transition**
Advanced Concept/ Joint Capabilities Technology Demonstration (AC/JCTD)	• Program direction and oversight by OSD • Projects managed and executed by Military Departments, Defense Agencies and SOCOM	• Focuses on Joint Warfighter Functional Capabilities which are often under-resourced and with no one organization tasked to meet these needs • Allows warfighters to evaluate a technology for its potential
Agile Integration and Development	• Army	• Funds acceleration for selected high-payoff emerging technologies • Improves technology readiness by accelerating the tech development schedule and/or performing detailed safety & validation tests in field/operational environment
Collaborative Technology Alliances	• Army	• Collaboration among Government-Industry-University researchers to achieve affordable transition of innovative technologies
Defense Acquisition Challenge Program (DAC)	• OSD oversight • Military Department/ Defense Agency management and execution	• Provides an "on-ramp" for industry and government to propose innovative new technology and equipment solutions for acquisition programs
Foreign Comparative Testing (FCT)	• OSD oversight • Military Department/ Defense Agency management and execution	• Helps find developed technologies in allied nations and funds their testing for potential procurement
Future Naval Capabilities (FNC)	• Navy	• Involves near-term S&T efforts that deliver maturing technologies for more timely incorporation
Rapid Deployment Capability (RDC)	• Navy	• Provides the ability to reach immediately to a newly discovered threat or to respond to significant and urgent safety situations
Rapid Technology Transition Program (RTT)	• Navy	• Has a charter to rapidly transition technology from any source, including those not traditionally associated with defense technology, into PORs
SBIR Commercialization Pilot Program (CPP)	• Army, Navy, Air Force • OSD Oversight, Direction, and Coordination	• Identifies projects with potential to meet high priority military needs • Provides assistance to affect rapid transition

Program	Management	Characteristics that Facilitate Transition
Technology Insertion for Savings Program (TIPS)	• Navy	• Concentrates on existing and/or COTS technology that can be formed quickly into the solution and has a high return on investment after insertion
Technology Transition Initiative (TTI)	• Program direction and oversight by OSD • Projects managed and executed by Military Departments, Defense Agencies and SOCOM	• Accelerate the introduction of new technologies into operational capabilities for the armed forces
Warfighter Rapid Acquisition Process	• Air Force	• Provides transition funding for development & fielding of successful experiments, demonstrations, & innovative approaches • Complete, approved acquisition plan.. • Budget Activity 7.

In addition to these programs, there are overarching pilot initiatives underway, such as the Concept Decision Process/Time Defined Acquisition, attempting to facilitate rapid/agile acquisition for the warfighter. Lessons learned from these initiatives can inform the transition process for DoD, and will be monitored for integration into OSD "best practices

III. Summation and Derived Actions

This section summarizes the inputs received from all sources, and outlines some of the associated actions for which the Department will take responsibility.

A. General Conclusion.
To achieve technology transition, it is imperative that the Department's S&T and acquisition communities work together, applying leadership commitment, resources, and relationship management to shepherd capabilities to our warfighters.

This necessarily demands that someone representing both communities take a leadership role in finding and implementing ways to modify/motivate thinking about risk-taking, planning, budgeting, and executing technology transition, and to apply an Enterprise-wide, centralized, intentional, focused technology transition decision process.

B. Approach to Solution.
To effect the need for advocacy and execution at an Enterprise level, the Director Defense Research and Engineering (DDR&E) will assign a Technology Transition Task Force (TTTF), headed by the ADUSD (Innovation and Technology Transition), to explore ways to improve the transition of technology solutions into affordable, deployable and sustainable capabilities for our warfighters.

Four broad categories for improvement can be derived from Military Department and Defense Agency inputs, as well as from previous reports on the subject of technology transition. Each category contains its own initiatives that have been /are being tried – some with success; some whose value is marginal. The TTTF will assess those initiatives/methods that bring the most value across the Enterprise and consider their expansion, modification, formal adoption, etc., along with any policy implications. Additionally, the Task Force will explore new, untried, bold ideas and methods which are clearly aligned with, or might cross-cut, these four categories.

1. Responsibility, resources and programs for technology maturation beyond TRL 5 (technology "push"). Technology push refers to development that is directed, driven or 'pushed' by a developer in the S&T community. Early and frequent collaboration is required between the developer, acquirer, and user. The developer must understand early on the needs of the acquirer and user (what capabilities are being addressed; integration issues, etc.) as well as constraints (budget, timing, etc.) so that the technology is developed in a way that will provide a timely, affordable solution. This early planning can then serve to mitigate the chasm between TRL 5 and TRL 7 by identifying technical issues, resource requirements/sources, avoiding unintended consequences, and ultimately gaining the most yield for the S&T investment.

2. Requirements, resources and acquisition strategies for timely technology transition beyond TRL 7 (acquisition "pull"). Technology pull refers to development that is directed, or 'pulled' by the acquisition and user communities' needs and requirements. Because our acquisition system is built around purchasing large and complex weapon systems whose developments are risky, a Program Manager (PM) is motivated to ensure the program meets planned cost, schedule and performance by accepting technology when the majority of risk has already been mitigated. If the PM were to conduct early and frequent communication with the developer about user requirements and companion acquisition plans, much of the development risk could be addressed earlier in the process.

3. Technical, cultural and business barriers to integrating new suppliers and new technologies into defense system architectures. The pace at which new technologies are discovered/innovated/developed/deployed in the private sector is staggering, and at odds with the linear, deliberate nature of some military acquisitions. But those technologies can be critical to solving warfighter needs rapidly and less costly. Our programming, budgeting and contracting practices often deter participation by these innovative companies. Finding ways to include these innovators in our process could serve both the military and America's economic competitiveness in the world market.

4. Focused oversight and governance at the Enterprise level. Each Service/Agency has devised methods for ensuring that transition is addressed in both the S&T and acquisition communities. However, it was recognized that from a corporate viewpoint, there was a need for a federated approach to coordinate agile acquisition efforts, look for unrealized synergies among transition programs, and ensure adequate resourcing. The Technology Transition Council (TTC) was formed to deal with those issues. Reassessing its charter is

warranted at this juncture to ensure that it is the most effective construct to sustainable, coordinated technology transition across the Department.

C. Actions for the Technology Transition Task Force

The following actions will be considered for inclusion in the Terms of Reference (in no particular order):

- Align/integrate existing technology transition initiatives (such as those listed in Table 2)
  - Seek opportunities to leverage approaches/funding (best output might come from a combination of transition initiatives)
  - Provide a capability to foster the relationship management necessary to shepherd the technologies through transition
  - Consider increased use of technology transfer programs (e.g., CRADAs, Patent Licensing Agreements)

- Obtain visibility into technology insertion/refresh windows within the acquisition process
  - No need for new documentation; just need to be smarter
  - Make transition planning a topic for milestone reviews
  - Explore ways to do risk mitigation earlier and more often
  - Make decisions about when to hold up acquisition programs for new technologies or recommend termination of R&D because it missed the window of opportunity for insertion/transition

- Continuity of Funding
  - Cooperative investment
    - Incentivize cost sharing
    - Make it painful to walk away from TTA obligations
  - Bridge funding
    - Capital account that is multi-year, joint, and addresses high priority technologies across the Enterprise

- Track successes and failures through an agreed-to set of metrics
  - Requires a common definition of "technology transition"
  - Apply best practices for continuous process improvement

- Seek innovation from non-traditional sources
  - Find the best solutions
  - Motivate their involvement
  - Contracting mechanisms

- Determine what constitutes effective outreach mechanisms to facilitate communication between S&T and acquisition communities
  - Technology Transition Agreements
  - Transition Plans

    - Viability of a reward system for early and frequent interaction among user, S&T and acquisition communities

- Identify skill sets associated with successful technology transition, and establish appropriate training material/venues
    - Technology scouting, technology assessments, technology roadmapping, due diligence, business case analysis, negotiation skills
    - Organic versus outsourced
    - Create case studies with continual updates to reflect actual examples and best practices

- Establish and/or continue appropriate, disciplined governance at every level of the Enterprise
    - Reassess the charter/objectives of the Technology Transition Council to determine if it is the best construct to provide Enterprise-wide (corporate) governance
    - Assess Service/Agency methods
    - Examine need for policy changes

In summary, this report sets the purpose and direction for formulation of a coordinated DoD strategy for technology transition. We are committed to completing actions that will make technology transition a way of doing business by institutionalizing pivotal changes across the Enterprise that will endure over time. We look forward to taking the next steps in this process to further define and establish appropriate capabilities, processes, and mechanisms as we make Transition a key component in transforming the Department to meet the demands of the future.

Appendix A - Tasking Legislation, FY 2006 Defense Authorization Act

Sec. 255 Technology Transition.

(a) CLARIFICATION of DUTIES of TECHNOLOGY TRANSITION COUNCIL. – Paragraph (2) of section 2359a(g) of title 10, United States Code, is amended to read as follows:

"(2) The duty of the Council shall be to support the Under Secretary of Defense for Acquisition, Technology, and Logistics in developing policies to facilitate the rapid transition of technologies from science and technology programs into acquisition programs of the Department of Defense.".

(b) REPORT ON TECHNOLOGY TRANSTION.-

(1) Report Required. – The Secretary of Defense shall submit to the Committee on Armed Services of the Senate and the Committee on Armed Services of the House of Representatives a report concerning the challenges associated with technology transition from the science and technology programs of the Department of Defense to the acquisition programs of the Department of Defense. The Secretary shall include in the report a strategy to address those challenges. The Secretary shall prepare the report working through the Technology Transition Council of the Department of Defense established under 2359a(g) of title 10, United States Code

(2) MATTERS TO BE INCLUDED. – The report shall include the following:

(A) A description of any internal organizational barriers within the the Department to technology transition between the technology development, acquisition, and operations components of the Department.

(B) An assessment of the effect of Department acquisition regulations on technology transition.

(C) An assessment of the effects of the requirements validation process and the planning, programming, budgeting, and execution processes of the Department on technology transition.

(D) A description of other challenges associated with technology Transition in the Department that are identified by the Secretary.

(E) A Department-wide strategy for pursuing technology transition.

(F) Such other recommendations as the Secretary considers appropriate to eliminate internal barriers within the Department to technology transition.

(3) SUBMITTAL DATE. – The report under paragraph (1) shall be submitted not later than nine months after the date of enactment of this Act.

Appendix B – Technology Transition Council Members

*VICE CHAIRMAN, JOINT CHIEFS OF STAFF	Admiral Edmund Giambastiani
ARMY ACQUISITION EXECUTIVE	Claude M. Bolton, Jr.
*NAVY ACQUISITION EXECUTIVE	Dr. Delores M. Etter
*AIR FORCE ACQUISITION EXECUTIVE	Sue C. Payton
*USSOCOM ACQUISITION EXECUTIVE	Dr. Dale G. Uhler
*ARMY SCIENCE AND TECHNOLOGY EXECUTIVE	Dr. Thomas A Killion
NAVY SCIENCE AND TECHNOLOGY EXECUTIVE	RADM William Landay
*AIR FORCE SCIENCE AND TECHNOLOGY EXECUTIVE	Mr. Terry Jaggers
*DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY	Dr. Anthony Tether
DIRECTOR, DEFENSE INFORMATION SYSTEMS AGENCY	Lt Gen Charles Croom, USAF
DIRECTOR, DEFENSE INTELLIGENCE AGENCY	LTG Michael D. Maples, USA
*DIRECTOR, DEFENSE LOGISTICS AGENCY	LTG Robert T. Dail, USA
*DIRECTOR, DEFENSE THREAT REDUCTION AGENCY	James Tegnelia
DIRECTOR, MISSILE DEFENSE AGENCY	Lt Gen Henry A. Obering, III, USAF
DIRECTOR, NATIONAL GEOSPATIAL INTELLIGENCE AGENCY	Vice Admiral Robert B. Murrett
DIRECTOR, NATIONAL SECURITY AGENCY	LTG Keith B. Alexander, USA

*TTC members who provided oral comments during interviews with the DUSD(AS&C)

Appendix C - References

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- "S&T Affordability Workshop" Transition Panel, June 10-11, 1997
- "Defense Acquisition Performance Assessment" January 2006
- Defense Science Board 2006 Summer Study, "21st Century Strategic Technology Vectors", February 2007
- Defense Acquisition Transformation Report to Congress, February 2007
- GAO Reports:
    - "Better Management of Technology Development Can Improve Weapon System Outcomes" GAO/NSIAD-99-162, July 1999
    - "Defense Technology Development – Management Process Can Be Strengthened for New Technology Transition Programs" , GAO-05-480, June 2005
    - "Best Practices – Stronger Practices Needed to Improve DOD Technology Transition Processes", GAO-06-883, September 2006

Appendix D – Acronym Dictionary

AoA	Analysis of Alternatives
ACAT	Acquisition Category
ADUSD (I&TT)	Assistant Deputy Under Secretary of Defense for Innovation and Technology Transition
BAA	Broad Agency Announcement
COTS	Commercial Off-The-Shelf
CRADA	Cooperative Research and Development Agreement
CTO	Chief Technology Officer
DAC	Defense Acquisition Challenge
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities
FAR	Federal Acquisition Regulation
FCT	Foreign Comparative Testing
FY	Fiscal Year
JCTD	Joint Capabilities Technology Demonstration
MDAP	Major Defense Acquisition Program
OSD	Office of the Secretary of Defense
OTT	Office of Technology Transition
PM	Program Manager
POM	Program Objective Memorandum
PoR	Program of Record
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
S&T	Science and Technology
SBIR	Small Business Innovation Research
SOCOM	Special Operations Command
STTR	Small Business Technology Transfer Program
TRL	Technology Readiness Level
TTA	Technology Transition Agreement
TTC	Technology Transition Council
TTI	Technology Transition Initiative