April 2008

A REPORT ON THE NAVY SBIR PROGRAM:
Best Practices, Roadblocks and Recommendations for Technology Transition

SBIR

The Navy Small Business Innovation Research Program Findings and Recommendations on Commercialization of SBIR Technologies within the U. S. Navy
A Navy SBIR Commercialization Pilot Program Project

Report Documentation Page	*Form Approved* *OMB No. 0704-0188*

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1. REPORT DATE **APR 2008**	2. REPORT TYPE	3. DATES COVERED **00-00-2008 to 00-00-2008**
4. TITLE AND SUBTITLE **A Report on the Navy SBIR Program: Best Practices, Roadblocks and Recommendations for Technology Transition**		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Office of Naval Research,Navy SBIR/STTR Programs,Arlington,VA**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)
12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release; distribution unlimited**		
13. SUPPLEMENTARY NOTES		
14. ABSTRACT		
15. SUBJECT TERMS		

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**132**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

DISCLAIMER
The findings and recommendations made in this report are those of the report authors only. These findings and recommendations do not constitute official Navy policy.

From the Director

Over the past few years the Armed Services Committees have shown an increased interest in the DoD doing as much as possible to transition SBIR developed technologies into products or services that support the warfighter. As part of the 2006 National Defense Authorization Act they formulated the Commercialization Pilot Program (CPP), which requests that the DoD SBIR program align itself more closely to Program Executive Offices (PEOs), platforms and warfighter needs, and improve the acceleration of SBIR technologies to the field. OSD AT&L responded to that language by requiring the Army, Air Force and Navy develop pilot programs aimed towards that goal.

One could argue that the Navy's SBIR program already meets the intent of the CPP legislation and we should continue business as usual. However, I see the CPP legislation as an opportunity for the Navy to take a good look at our entire SBIR program, from topic generation to Phase III award, and determine what works well, what challenges us and what we can do to make the SBIR program better tomorrow than it is today. I thought the best way to get started was to appoint an expert, independent "Tiger Team" to perform a comprehensive study of the Navy's best SBIR practices and worst roadblocks which impact technology transition. This report is the sum of their work, and will be a key document in providing guidance as the Navy maintains our continuous improvement philosophy for the best-in-class SBIR program.

The Tiger Team began its work with a thorough review of the military technology transition literature, directives, and instructions, studies from Government Accountability Office (GAO), RAND Corporation, National Research Council and SBIR Process Manuals from each of the Systems Commands (SYSCOMs).

From this literature review, the Tiger Team formulated a study strategy, which emphasized comprehensive interviews and surveys. The interviews focused on obtaining qualitative data from those that define military requirements and funding, manage the RDT&E of Naval acquisition platforms, award contracts, provide SBIR oversight management, and perform technical monitoring. The surveys focused on obtaining quantitative, statistical based data from SBIR firms, prime contractors and Navy technical monitors. From their findings the Tiger Team formulated a taxonomy which would become the basic structure for this report. This taxonomy is

"… a comprehensive study of the Navy's best SBIR transition practices and worst transition roadblocks."

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[1] The Small Business Administration, in its September 2002 *SBIR Policy Directive*, defined "commercialization" as the sequence of transition activities (such as testing, evaluation, demonstration and other maturation activities) up to and including the final step of insertion of an SBIR technology into a federal program.

described in Section 1.0 and includes Transition Impact Elements and Key Transition Criteria.
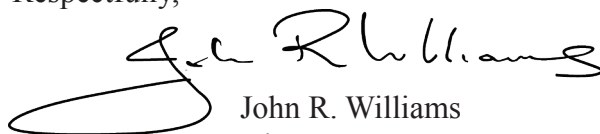
The report is divided into three sections:

- **Section One - Findings and Recommendations:** provides qualitative interview findings, quantitative survey data, and recommendations from the interviews and the Tiger Team.

- **Section Two - Recommended Initiatives:** suggests the establishment of four focused initiatives that address Policy, Process, Program Management and Contracting. These initiatives also propose changes to existing instructions, directives, procedures or management.

- **Section Three - Appendices:** is a compendium of all survey formats, data, terms and other documents that add value to this report.

"… findings, recommendations and initiatives that will create better awareness and allow us to make improvements …"

The report points out that the Navy's program is decentralized, which allows the PEOs and SYSCOMs to play a dominant role in determining SBIR topic and award allocation. PEO ownership of the Navy SBIR program is the key to our success: those with the technology needs and resources determine how to spend the SBIR investment. But, the study also found that there is substantial variation in practice and success; improvements could be gained from better sharing of best practices, standardization of repetitive tasks, and better training of SBIR firms, Navy Technical Monitors, PEOs, Fleet leaders (OPNAV) and our contracting officers. This report provides Navy management with well thought-out, defined and documented findings, recommendations and initiatives that will help guide us as we work to make the Navy SBIR program better.

As a whole, the Navy SBIR program has the highest transition success across the DoD and has that honor because of the dedication of the people that are involved. Nevertheless, we must continually study our processes and techniques in our desire to increase Phase III transitions and value to the Fleet. It is my hope that this report will help light the way in our efforts. I want to thank the Tiger Team for their efforts. It is now up to all of us to take these findings and recommendations and form them into tools and practices that will make the Navy's SBIR program stronger than ever.

Respectfully,

John R. Williams
Director
Navy SBIR/STTR Programs

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How Did We Proceed?   Executive Summary

The Tiger Team selected and chartered by the Navy SBIR/STTR Director in July of 2006 to study best Navy SBIR transition practices prepared itself through team review and discussion of key SBIR and technology transition-related information and reports from government and private sector sources. From this formative effort, the study team then drafted a project methodology, iterated it with the Navy, and finalized a three-pronged approach described below.

- *Literature Review and Defining Project Methodology*
  The study team's preparatory scrutiny included several Government Accountability Office (GAO) reports published between 2003-2007 by GAO's reputable Acquisition and Sourcing Management Group, as well as important studies presented to Congress and the Dept. of Defense by the National Research Council and RAND Corporation.[2] Additionally, the team found and reviewed reports developed by Navy and Marine Corps Systems Commands (SYSCOMs) and their constituent Program Executive Offices (PEOs), to better understand the normative process of current SBIR management in a large, decentralized military agency.

  From this baseline effort, the study team drafted a project methodology based on carefully chosen interviews of Navy personnel, thorough surveys of key segments of the broader SBIR community, and proposed to eventually develop transition initiatives based on cumulative interview/survey responses – all to be given back to the Navy SBIR/STTR Director and Navy SYSCOM SBIR managers in a published report. The key to the project methodology, the study team believed, was to iterate their draft project methodology with the Navy SBIR Director and Navy SYSCOM SBIR leads during mid-2006 until consensus was reached.

- *Interviews*
  Seventy-five interview candidates were nominated from three different Navy communities that participate in SBIR activity: managers and monitors of all SBIR work from the SYSCOM, PEO and laboratories; contracting officers; and the OPNAV or Warfare Sponsors (Fleet) community. The interview instrument [3] was designed to capture best practices as well as obstacles to timely and effective transition of SBIR technolo-

A three-pronged approach: literature review, interviews and surveys inform the project methodology.

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[2] A Report bibliography may be found in the attached Appendix.
[3] The interviewer's guide is also found in the Appendix.

gies. 25 interview sessions were held with a total of 34 persons from the 75-person candidate pool. The results were cataloged and organized according to taxonomy (see Section 1.0). When commingled with results of extensive surveys described below, a number of recommendations emerged from study team analysis. These recommendations are summarized below and cited in section Section One: Findings and Recommendations.

- *Surveys*
  A series of study surveys were designed and distributed to ensure in-depth input from quantitatively representative populations of three especially relevant SBIR populations:

  - small business concerns (SBCs), of whom 165 were surveyed of ~900 contacted
  - government SBIR project leads, Technical Points of Contact (TPOCs) of whom 149 were surveyed of ~500 contacted
  - defense industry prime contractors, of whom 33 were surveyed of ~275 contacted

While those surveyed were given the opportunity to make subjective or anecdotal comments on best practices, or impediments to same, the principal value of the surveys is to have generated a statistically significant body of data on SBIR program practices regarding transition . Results of the surveys were incorporated into both the report findings and its recommendations.

What Did We Find?

The study team, after cataloging and assessing results of its interviews and surveys, identified six "Transition Impact Elements" that address Congressional objectives in baseline SBIR legislation. These elements are:

- Law (Congressional level)
- Policy (DoD and Navy levels)
- Management Authority and Responsibility (OPNAV, SYSCOM, PEO)
- Decision Making (OPNAV, SYSCOM, PEO, or Program-level)
- Capability Development (OPNAV, SBIR project, Acquisition Program)
- Transition Management

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[4] The Primes survey responses were judged to be marginally adequate given the size of the sample contacted; therefore, results of this survey did not play the same role in overall study analysis as did the SBC and TPOC surveys. Detailed survey outcomes may be found in the Appendix.

Drilling more deeply into its raw data, element by element, the study team then identified nine overarching "Key Transition Criteria" required to effectively transition SBIR technologies. These criteria are:

- Right Topic
  Choosing the right topic is essential to transition success. SBIR topics must be timely and relevant to the needs of the customer, the acquisition program and the warfighter who will use the technology.

- Sufficient Resources
  Sufficient resources and tools must be provided at all levels of program execution.

- Effective Management and Processes
  Effective management and processes must be in place to support/endorse and execute technology transition.

- Prime Contractor Acceptance
  Prime contractor and Acquisition Program teams must accept the SBIR project as a viable solution to their problems and needs.

- Reliable SBIR Supplier
  SBIR companies must be reliable suppliers, capable of establishing and sustaining production of their product.

- Mature and Relevant Technology
  Technology must be mature and useable in the context of its proposed application.

- Effective Policy
  DoD and Navy policy must effectively facilitate technology transition.

- Contracting
  Contracting process must be straightforward and timely.

- Outreach and Education
  Value stream participants must be empowered and knowledgeable of SBIR program objectives, policies, process execution, and transition requirements within the context of the acquisition process.

Interviews and surveys suggested six Transition Impact Elements and nine Key Transition Criteria.

Further scrutiny suggested "driving forces vs. restraining forces" tables for each Key Transition Criteria.

Further extracting information from the interview and survey raw data, the study team then developed succinct "driving forces vs. restraining forces" diagrams for each criteria, using the following "Right Topic" criteria diagram as an example:

Right Topic

Choosing the right topic is essential to transition success. SBIR topics must be timely and relevant to the needs of the customer, the acquisition program and the warfighter who will use the technology.

BEST PRACTICES INITIATIVES	ROADBLOCKS
DRIVING FORCES	RESTRAINING FORCES
Acquisition Personnel are involved in topic generation	DDR&E emphasis on innovation vice cquisition Program requirements
SYSCOM Utilization of PEO Boards	PMO topics not tied to current and relevant requirements
Some SYSCOM require ID of a Transition Plan/Strategy before a topic is approved	Hobby topics
Open system Architecture requirements will present more SBIR technology insertion opportunities	Lack of consistent Prime Contractor participation in Topic generation process
	Inconsistent Transition Planning in the topic generation process at the SYSCOM level

What Do We Therefore Recommend?

With months of raw data aggregation and analysis behind it, the study team turned from an organized expression of its findings to the final task of making recommendations. Section 1.2 cites detailed recommendations for each of the nine "Key Transition Criteria" and Section 2.0 recommends four strategic initiatives, each of which link to at least one "Transition Impact Element" and "Key Transition Criteria."

Key Transition Criteria Recommendations

The following are the recommendations pulled from Section 1.2 for each of the "Key Transition Criteria." Section 1.2 also includes the findings, survey and interview results:

- Right Topic
    - The study team recommends that topic authors and TPOCs be required to convey specific program requirements during the Kick-Off meeting with SBCs and that they immediately notify the small business of any changes in requirements that may impact the SBIR development.

    - Requirements should be clearly articulated at the onset of the project to prevent any confusion as to who the final customer is, what their needs are, and how the SBIR will be addressing those needs.

- Sufficient Resources
    - The study team recommends that the Navy SBIR Director provide guidance to the utilization of SBIR funds for T&E activities. This guidance should include a maximum percentage of SBIR funding that can be used for T&E but allow flexibility in how each SYSCOM/PEO leverages the funding.

    - If additional SBIR funding is provided in support of testing, we recommend that the program office commit to a formal Technology Transition Agreement (TTA).

    - A longer term team-recommended solution is a requirement that all new Acquisition Strategies include a section on technology management that incorporates technology insertion as in integral part of the strategy.

    - To ensure long-term success from a management resource perspective, an overarching Navy-wide information technology strategy to execute the program is recommended to free limited resources for less administrative and more strategic activities. This should include a common database for the SBIR Program Director and the SBIR community.

- Effective Management and Processes
    - The study team recommends that the Navy SBIR PM evaluate the value added of multiple levels of topic reviews. Eliminating or streamlining these reviews could potentially shorten the cycle significantly.

Recommendations address all nine Key Transition Criteria.

- The study team recommends review of the JIEDDO process and assessment of a prototype process for solicitation of a small percentage of topics with a compressed topic generation cycle (30-60 days). Topic selection should match with urgent program needs that can be readily addressed by SBIR. This experimental process should be monitored.

- The study team recommends that all SYSCOMS and PEOs adopt use of a single or consolidated Phase I contract office, a single evaluator and use of purchase orders to speed contract action.

- Technology Acceptance
  Several "best practices" initiatives and recommendations provided during interviews may improve prime contractor SBIR support:

  - Janet Jaensch of NAVSEA recommended prime contract incentive clauses for SBIR use as positive reinforcement for utilizing SBIR.
  - To incentivize better performance, Dick McNamara of NAVSEA PEO Sub has touted SBIR projects as competition to prime contractors, initially targeting areas where the prime contractor is not performing well.
  - Ralph Skiano of PEO Sub PMW 180 recommended increasing SBIR exposure to prime contractors to increase their awareness of the benefits of the program and improve communication between the SBCs and large primes.
  - Many of those interviewed specifically recommended prime contractor attendance at TAP SBIR kickoff.
  - Many of those interviewed also recommended that all SBIR projects be briefed to prospective prime contractors for new Programs of Record, and request that they consider including them as subcontractors or as suppliers of the needed technology.
  - Jim Alpers of NAVAIR PEO JSF suggested that prime contractors be involved during topic generation and the proposal down-selection process.
  - Dale Moore of NAVAIR LSS recommended that major acquisition contracts include a Contract Data Requirements List (CDRL) that calls on Primes annually to submit relevant SBIR.
  - The study team recommends the inclusion of contract language that specifically encourages the inclusion of SBIR technologies as part of the overall system design strategy, and inclusion of award fees and other incentive clauses in the contract to reward the prime contractor for participation in the SBIR program.

- The study team recommends earlier prime contractor involvement in the SBIR process.

- Reliable SBIR Supplier
    - The study team recommends TAP and other awardee assistance expand to address:

        - Business planning for growth required to transition from Phase II to Phase III
        - Manufacturing
        - Risk management in a DoD Weapons System or Program
        - Government contract compliance issues.

- Mature and Relevant Technology
    - The study team recommends that current content be expanded to better meet transition objectives for technology insertion. Elements of this Transition Plan should include:

        - Project and Topic information
        - Sponsoring Command
        - Company name and relevant contact information
        - TPOC names and relevant contact information
        - SBIR program manager and relevant contact information
        - Technology need addressed, Timing, and Involved Parties
        - SBIR Project and Expected Outcomes
        - Hurdles and Contingencies
        - Technology Maturation Milestones
        - Potential Funding sources and Transition Strategies

    - A more formalized and specific plan is recommended in the form of a Technology Transition Agreement or TTA, developed during the Phase II effort as a prerequisite for SBIR Phase III. The TTA establishes exit criteria for program acceptance and technology insertion. Key TTA elements include:

        - Responsibilities of SBIR company, the Acquisition Program and Resource or Requirements Sponsor
        - Specifics on test facilities, availability, and required funding
        - Documentation requirements, such as interface documents
        - An integration strategy and activities required to implement the technology

- Effective Policy
    - The study team recommends that Navy policy be changed to support the inclusion of technology management, properly outlining appropriate resource requirements and technology risk management, in each program Acquisition Strategy.

    - The study team recommends that any formal policy change to acquisition guidance must be supported with changes to the Planning, Programming, Budget and Execution (PPBE) system. Acceptance in the PPBE process to apply funding for technology refresh including SBIR and STTR technology insertion during the SD&D phase will make it possible to effectively plan and resource technology changes.

    - We recommend that Navy contracting language should facilitate and in the case of Open Architecture, incentivize changes that support technology insertion for incremental performance gain and life cycle cost reductions.

    - We recommend the inclusion of specific technology sources, to make this guidebook more complete and useable for contracting and acquisition program personnel. (A new Open Architecture guidebook for contracting[5] discusses technology transition, but does not specifically include SBIR, STTR or other technology development programs as sources of technology improvement.)

- Contracting
    - The study team recommends that consideration be given to consolidation of SBIR contracting in the Navy. Benefits appear especially possible in consolidation of Phase II and Phase III contracting action.

    - A related but independent contracting manpower assessment is recommended.

    - We recommend that adequacy of human resources be considered in more depth, as many interviewees noted a need for more contracting personnel, more TPOC personnel, and/or a Transition Manager to work closely with the acquisition organizations on transition process and issues and help focus attention on SBIR contract actions that are the responsibility of the program office.

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[5] Naval Open Architecture Contract Guidebook, PEO IWS 7, Version 1.0, (Washington, D.C., 07 July 2007)

- Education and Outreach
  - The study team recommends that all outreach activities should optimize inclusion of all transition stream and SBIR value stream participants.

  - We recommend that the Navy SBIR Program Director ensure a sufficient degree of standardization across the program.

  - The study team recommends the following improvements to SBIR education planning:

    - Institutionalize early transition planning:
    - Early and effective SBIR Company intervention
    - Early and increased prime involvement in the SBIR process
    - Consistent and effective training of SBIR value stream participants across the Navy SBIR community

Recommended Initiatives

Given the complexity of the Navy SBIR program, decentralized program management at the SYSCOM level, and the mutual dependences noted in our findings and associated recommendations, the study team also presents the following four strategic initiatives, fully described in the Report's Section Two: Recommended Initiatives. The initiative section includes specific proposed amendments to current DoD instructions, procedures and processes. This section has extensive detail including candidate language for amendment of existing DOD documents, prepared memos, and detailed descriptions of new procedures. Implementing these initiatives will take substantial effort and support—but these initiatives have the greatest potential for value to the Navy SBIR program.

Review of study findings and recommendations supports four major improvement initiatives.

The initiatives are summarized briefly here:

- Policy Change Initiative
  - A series of additions and edits to SECNAVINST 5000.2C
  - Planning and Programming—Outreach to OPNAV Resource Sponsors
  - Acquisition Plan Guidance—Additions to the Defense Acquisition Guide with reference to contracting.
  - Project (Gated) Process Initiative—(see chart on following page)

Gated Process Improvement Initiative

Gated Process Improvement Initiative

1–2 Years | 3 Years

Pre-Solicitation

Solicitation & Evaluation

Phase I ($70k) | **Phase I Option ($30k)** — Deliverable: Feasibility Study or Report

Phase II ($600k) | **Phase II Option ($150k)** — Deliverable: Prototype

Phase III Full Scale Devel.

SBIR Process Value Stream

| Seed Topics matching ACAT tech needs | Submit & Promote Topics/Assess New Techs | Begin Project Interface with PEO/PM and Prime | Detail Design Requirements/Define Risk & Opportunities | Obtain Funding from Program Sponsors, Prepare for Transition |

Phase 0 — Gate — Phase 1 — Gate — Phase 2 — Gate — Phase 2B — Gate — Phase 3

| •SBIR Topics with documented ACAT Sponsor Transition Strategy

•DDR&E Compliant Topic

•Phase I proposal contains a Commercialization and Transition Strategy | •Updated Commercialization and Transition Strategy

• Prime contractor involvement identified

•Reaffirm requirement and update ACAT transition strategy

•Feasibility Study or Report | •Approved Commercialization Transition Plan

•Project Technical Readiness Review

•TAP Attendance | •Risk Assessment and Mitigation Plan

•TTA (if required)

• Prototype

• TRL 6 |

Process Improvements

| Event and Performance Driven Process | Early SBIR Company Intervention | Early Transition Planning | Focus on Transition and Commercialization | Standard Processes and Metrics | SBIR Funded Risk Reduction and Technology Maturity |

- Program Management Initiative
  - Navy-wide SBIR integrated, web-based management system
  - Management metrics capture
  - Uniform education and training deployment

- Contracting Initiative
  - Lean Six Sigma study

- Consolidation of SBIR contracting shops
- Workforce and resource requirements
- Standardized contract shells and templates
- Wider use of Indefinite Quantity/Indefinite Delivery (ID/IQ) contract vehicle
- Prime contractor contract incentive clauses

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Section One: Findings and Recommendations

1.0. Study Framework

Transition Impact Elements and Key Transition Criteria

To categorize information received during the interviews and surveys, the study team constructed taxonomy for defining six "Transition Impact Elements" that address Congressional objectives in baseline SBIR legislation of accelerating innovative technology transition and increasing commercialization, as defined by SBA.[6] The two basic assumptions made in the definition of the taxonomy were (1) transition responsibility crosses many organizations, and (2) transition is dependent upon both organizational and functional behavior. The Transition Impact Elements are:

- Law (Congressional level)
- Policy (DoD and Navy levels)
- Management Authority and Responsibility (OPNAV, SYSCOM, PEO)
- Decision Making (OPNAV, SYSCOM, PEO, or Program-level)
- Capability Development (OPNAV, SBIR project, Acquisition Program)
- Transition Management

With these elements in mind, the study team then reassessed interview and survey information to distill nine "Key Transition Criteria" required to effectively transition SBIR technologies. The Key Transition Criteria are:

- Right SBIR Topic
- Sufficient Resources
- Effective Management and Processes
- Technology Acceptance
- Reliable SBIR Supplier
- Mature and Relevant Technology
- Effective Policy
- Efficient Contracting
- Education and Outreach

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[6] See **Foreword**, Footnote #1.

Figure 1 | Transition Impact Elements

Key Transition Criteria	Tansition Impact Elements					
	Law	Policy	Management Authority	Decision Making	Capability Development	Transition Management
Right Topic		√		√	√	√
Sufficient Resources		√	√	√	√	√
Effective Mgmt and Proccesses		√	√	√	√	√
Technology Acceptance				√		√
Reliable SBIR Supplier	√	√				√
Mature & Relevant Technology				√	√	√
Effective Policy	√	√		√		√
Contracting	√	√	√	√	√	√
Outreach and Education				√	√	√

Recommendations that address the Transition Impact Elements are mainly addressed under Section 2.0 Recommended Initiatives. This section provides specific policy, procedural or instructional change recommendations. Recommendations addressing the Key Transition Criteria are listed within each criteria section, starting with Section 1.2.1. Right Topic.

A matrix of Transition Impact Elements and Key Transition Criteria highlight areas needing most improvement.

1.1. Transition Impact Element Descriptions

1.1.1. Law

Comments in this category relate to the law establishing or constraining organizations and programs involved with SBIR technology development, transition, and implementation. Legislation includes the requirement for reports to Congress pertaining to the SBIR Program or use of SBIR technology. Since authority and responsibility for change of law resides with the Congress, there is a potential that changes in the SBIR program to implement best practices or mitigate or eliminate roadblocks may require the concurrence of the Congress and in some cases, new legislation or modification of current law.

1.1.2. Policy

This element primarily involves organizations in the Office of the Secretary of Defense (OSD) and Navy responsible for developing policy to execute the legislative direction for SBIR. This includes any oversight or reporting requirements necessary to monitor compliance to policy as well as the establishment of OSD or Navy objectives. Policy also includes identifica-

tion and assignment of organizational roles, authority, and responsibility to execute the acquisition programs and the SBIR Program.

Policy change recommendations/road blocks could be some of the most important because of their systemic impact upon the SBIR Program and the transition environment. Within the Navy, the Office of the Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RD&A)) is anticipated to be the key participant in policy change initiative recommendation because it is the first organizational point where the Navy SBIR Program Office converges with the PEO and SYSCOM.

1.1.3. Management Authority and Responsibility

This element of the taxonomy pertains to the organizations charged with managing and executing programs. Comments associated with this area deal with how management authority and responsibility have been distributed; the relationship between roles, responsibilities and results; and the impact of locally-generated procedures on SBIR transition. This includes any oversight or reporting requirements necessary to determine execution progress and execution compliance with policy. Typically, but not uniformly within the Navy, two organizational levels work together within this element, one monitoring progress and establishing local procedures (e.g., a SYSCOM) and the other executing program (e.g., a PEO).

1.1.4. Decision Making

This portion of the taxonomy encompasses the whole of the decision making process associated with technology investment, development, and transition from:

- How are the decisions made (the process);
- Who makes the decisions;
- When are decisions made;
- What criteria are most important;
- What information is used and where does it come from; and
- What quality control is in place on the decision making process and the results?

In this area, we are seeking to understand the relationship between the decision process and the results achieved. Typically, the organizations involved are those charged with the responsibility and authority to make decisions (or recommend decisions to higher authority) as well as the higher authority organization that provides quality control to the decision process.

Key decisions within SBIR project management include: topic formulation, proposal selection, contract execution, development and demonstration plan approval, and transition assessment. Typically, the decision process extends to the SBIR execution organization at the PEO or SYSCOM level with participation by the project end-user and support from various subject matter experts. The end-users are usually representatives from the acquisition program, prime contractor or relevant operational organization.

Within acquisition programs, decision-making associated with technology transition is tailored to the specific requirements, cost and schedule constraints, and acquisition strategy of the program and approved by higher authority.

1.1.5. Capability Development

From the perspective of the SBIR process, Capability Development is the core of the process. This Transition Impact Element deals with the management and execution of the SBIR technology development. It includes various strategies, approaches, procedures, and actions that are commonly part of the development of technical capability prior to a technology transition. Interview recommendations /road blocks cited in this category focus on how the capability is developed and include the contracting process, contract management, and technical and programmatic assessment of the development. Capability Development represents the steps to execute SBIR decisions. Within the current SBIR process, this element is the most expensive in terms of man-hours, elapsed-time, and administrative budget. All four of the "Initiatives" deal with Capability Development.

1.1.6. Transition Management

This final impact element in the taxonomy focuses on the process of deciding what information and capability is important in order to achieve a transition decision, the generation of that guidance, how that guidance is conveyed to those developing the technology, and establishing the process and criteria to be used in the transition process.

This element is often complex in that it involves at least a developing organization or project and an end-user organization or program. Often multiple organizations must participate if testing in a relevant operational environment, such as a Sea Trial event, is involved. Even if the funding required in this phase is small, the amount of effort to coordinate successful transition can be overwhelming to small businesses and difficult for acquisition program offices. This element is addressed in the Project Process and Program Management Initiative.

1.2. Key Transition Criteria Descriptions

Section 1.2. is organized by Key Transition Criteria and provides a summary of the criteria, related interview and survey data and recommendations from those interviewed and the Tiger Team. All recommendations are in red and italicized.

1.2.1. Right Topic

Aligning SBIR topics to valid military requirements is a significant issue facing SBIR topic development in aligning SBIR topics to current and relevant military requirements. Linkages to relevant requirements are needed to ensure the financial and developmental alignment of SBIR technologies to other ongoing or planned core program and capability development efforts. Under the current solicitation timeline, topics are selected four or more years before the technology will be incorporated into an acquisition program of record. The assumptions on how critical the need is, how durable the need will be, and the presence or absence of reasonable alternatives, are all very fluid. These factors make it difficult to align a topic with emergent needs.

Descriptions of nine Key Transition Criteria include "driving forces vs. restraining forces" tables and derivative recommendations.

Figure 2 | Right Topic

Right Topic

Choosing the right topic is essential to transition success. SBIR topics must be timely and relevant to the needs of the customer, the acquisition program and the warfighter who will use the technology.

BEST PRACTICES INITIATIVES	ROADBLOCKS
DRIVING FORCES	RESTRAINING FORCES
Acquisition Personnel are involved in topic generation	DDR&E emphasis on innovation vice cquisition Program requirements
SYSCOM Utilization of PEO Boards	PMO topics not tied to current and relevant requirements
Some SYSCOM require ID of a Transition Plan/Strategy before a topic is approved	Hobby topics
Open system Architecture requirements will present more SBIR technology insertion opportunities	Lack of consistent Prime Contractor participation in Topic generation process
	Inconsistent Transition Planning in the topic generation process at the SYSCOM level

SBIR participants indicated that they are well aware of the need to closely align SBIR projects to warfighter need, considering program and sponsor priorities. Subsequently, most SYSCOMs and PEOs attempt to work with their respective Acquisition Program Managers to identify relevant topics and establish a foundation for later transition. Disconnects do occur however, because many of the Acquisition Program Managers delegate topic generation to individuals who may not have a complete understanding of or access to current and specific requirements. In the construct of DoD's top down capability development, the Navy is implementing an Enterprise structure based upon mission areas to better define and align requirements. Examples include the Surface Warfare Enterprise and the Naval Research Enterprise.

The objective of the Naval Enterprise construct is to flow military requirements and needs from a national level down into the acquisition community in an integrated, coordinated fashion to give broader visibility and accessibility to relevant requirement/needs. While the Navy Enterprise structure is developing, there have been interim initiatives at the SYSCOM and PEO level to obtain relevant military needs and requirements to serve as the basis for SBIR projects. For example, Janet McGovern reported that her NAVAIR SYSCOM actively participates in AIRTEC Fleet Technology development meetings to capture relevant warfighter needs. Other SYSCOM and PEO SBIR managers capture similar information from comparable boards such as the NAVSEA Submarine Technology Group (STG) and Technology Investment Board.

Another complicating factor in aligning topics to relevant needs is the conflict between internal DoD philosophies of using SBIR topics to achieve break-through warfighting improvements compared to those who seek to achieve incremental improvements to existing systems. The SBIR program includes multiple topic critique cycles during the topic approval process that tend to glean topics that could meet emergent warfighter needs. This happens because the organizations developing topics (SYSCOMS, PEOs) and those evaluating topics (Office of Director, Defense Research & Engineering (DDR&E)) evaluate the topics' overall merit from conflicting viewpoints. As noted in a recent Rand study and reinforced in Tiger Team interviews, the portion of the topic review/approval process conducted by DDR&E tends to favor technical innovation as a key selection criterion in determining whether or not a topic should be published. DDR&E's definition of innovative, based on the topics they approve compared to those they reject, requires that the topic focus on problems that would solicit disruptive

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[7] RAND National Defense Research Institute, *Evaluations and Recommendations for Improvement of the Department of Defense Small Business Innovative Research Program*, 2006

and high risk solutions. In most cases, technologies of this nature represent long-term development and greater risk to the program offices that must ultimately incorporate the technology. As noted in several interviews, particularly innovative technologies may need to progress on a separate path, with a longer development timeline and accommodation for their higher risk.

In addressing the issue of topic innovation within the DDR&E topic approval process, Hank Hinkle and Ed Anderson of NAVAIR PEO W recommended a balance of technology innovation and acquisition program needs (market needs). Dick McNamara of NAVSEA PEO SUB and others further recommended extending the interpretation of innovation beyond technical considerations to include cost savings, reduced maintenance and other efficiencies. Mr. McNamara also promoted SBIR projects as competitive alternatives in areas where prime contractors have not done well. The SBIR program would then serve as an acquisition tool for Program Managers throughout the lifecycle of the program.

DDR&E topic approvals have an embedded issue of how to balance innovation with Acquisition Program needs.

DDR&E's policy is counter to the need for SBIR topics to align with the more immediate needs of program offices and the warfighter. The study team recommends consideration of the Navy's balanced approach to technology development as a model for OSD's determination on topic innovation. In this model, portions of the budget are focused on near (or incremental) solutions as well as future game-changing capabilities; both of which can be considered innovative solutions. By allowing a broader definition of innovation, SBIR topics are better able to align with both near and far term warfighter needs.

A final disconnect noted by the study team is the lack of conveyance of the requirements to small businesses participating in the SBIR program. Companies that routinely work with DoD may know how to capture this information but those that do not are significantly hampered in delivering a relevant solution. This statement is particularly true if the topic author and TPOC do not know current program needs and/or requirement changes. Small Business Concern (SBC) survey results, shown in Figure 3 and Figure 4, indicate that a key cause of slow transition or failure is the late or inadequate identification of key transition stream elements including an understanding Navy's requirements and poor identification of the ultimate customer. Figure 5 shows the lack of visibility and understanding of system requirements by SBCs. Respondents cited that the #1 piece of information needed, which is either not available or difficult to obtain, is the identification and alignment of requirements.

Figure 3 | Processes that Slow Transition

What processes slow transition, or cause transition efforts to fail?
(First, Second, Third Nominations)

Legend:
- First Nomination
- Second Nomination
- Third Nomination

Y-axis: Percentage of Respondents (0 to 60)

X-axis categories:
- Late or inadequate identification of key transition stream Elements and POCs
- Difficulty in understanding needs of and working with Prime, Integrators
- Gap or delays in the SBIR contract process
- Lack of funding to sufficiently mature SBIR technlogy (includes Phae III $)
- Insufficient SBIR project participation by TPOC

Figure 4 | Processes that Accelerate Transition

What processes accelerate the speed of
transition of SBIR technology to acquisition programs?

Legend:
- First Nomination
- Second Nomination
- Third Nomination

Y-axis: Percentage of Respondents (0 to 80)

X-axis categories:
- Early (Phase I) identification, alignment of key transition stream elements and POCs
- Funding sufficient to mature SBIR technology (includes Phase III $)
- Enhanced, expanded SBIR project participation by TPOC
- Enhancement of Transition Assistance Program retransition planning
- Reducing gap or delays in the SBIR contract process
- Teaming with other small businesses to respond to "bigger" SBIR Topics

Figure 5 | Difficult to Obtain Info for SBIR Productivity

What information do you need that is either not available or is difficult to obtain that would make your SBIR work more productive?
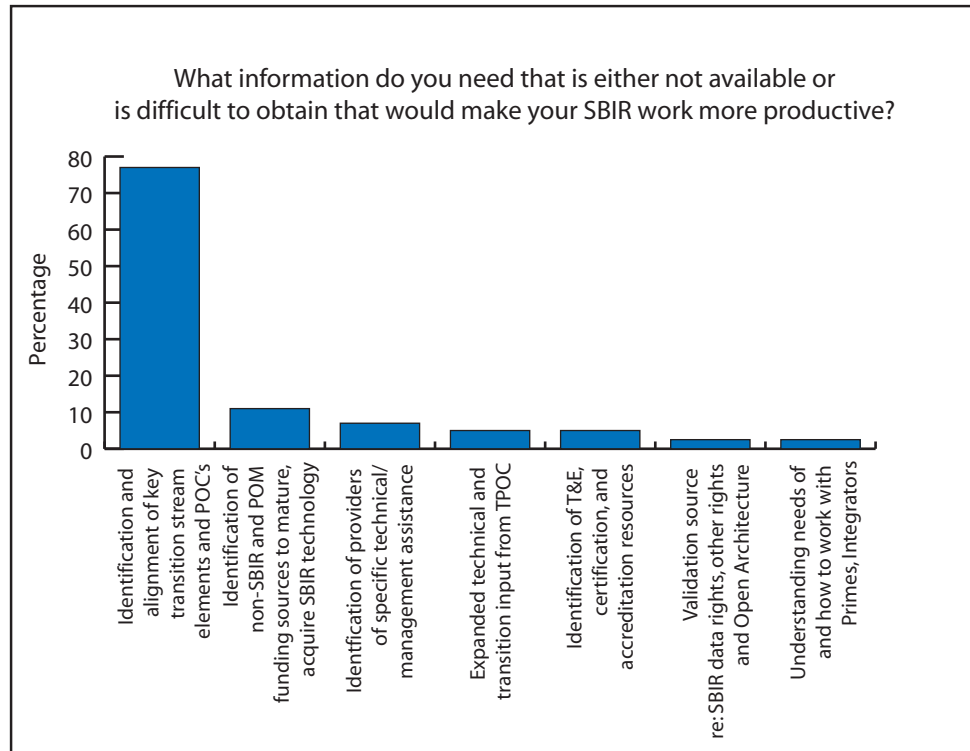
Recommendation

Right Topic recommendations focus on earlier articulation of applications and customer data.

To overcome this gap, the study team recommends that topic authors and TPOCs be required to convey specific program requirements during the Kick-Off meeting with SBCs and that they immediately notify the small business of any changes in requirements that may impact the SBIR development. Requirements should be clearly articulated at the onset of the project to prevent any confusion as to who the final customer is, what their needs are, and how the SBIR will be addressing those needs.

1.2.2. Sufficient Resources and Tools

A recurring theme throughout the interviews was the need for sufficient resources (both financial and personnel) and tools to effectively develop and manage SBIR efforts. Three major areas where the SBIR community indicated lack of resources or tools preclude the rapid transition of SBIR technologies are:

- Test and Evaluation (T&E) funding and other government resources to enable testing and product improvement to gain and demonstrate technical maturity in the context of its intended use;

- Programmed funding for integration and collaborative engineering within the acquisition program to enable effective product transition from the SBIR company to the major system development team; and
- Sufficient human resources and management tools on the government team to facilitate administration, provide guidance, transition assistance, and rapid response to questions and issues that occur.

Figure 6 | Sufficient Resources and Tools
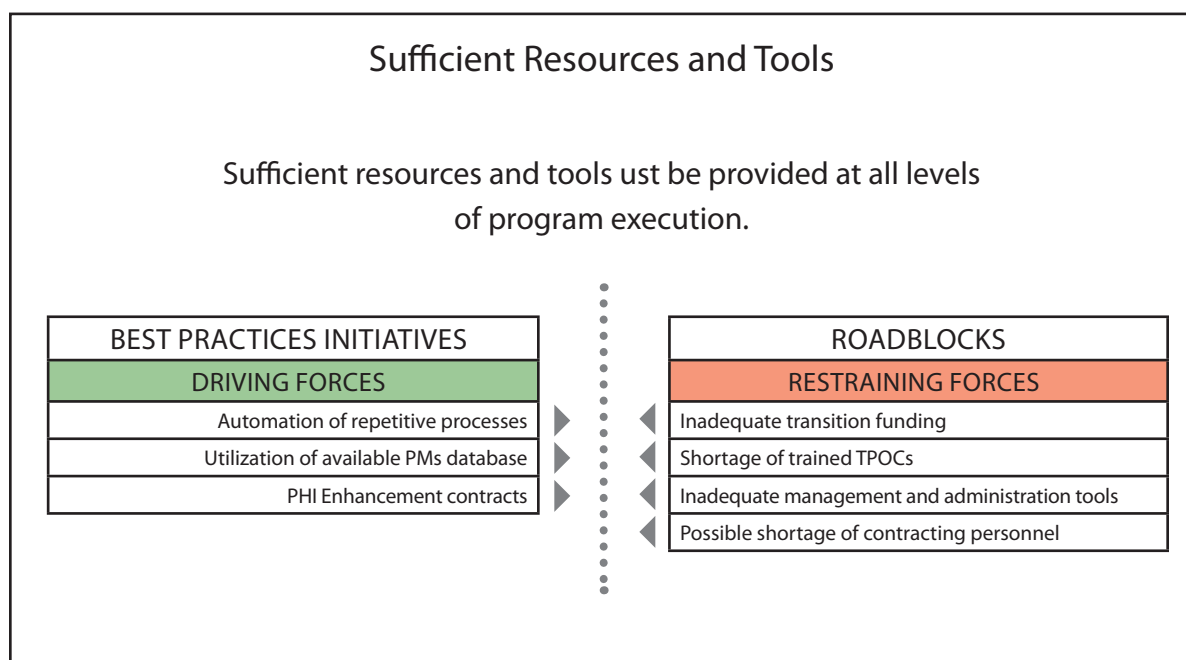
Additional funding and in some cases, other government support is needed for test and evaluation in support of transition. Guidance from DDR&E requires all candidate technologies for system development be at Technology Readiness Level (TRL) 6 before Milestone B.[8] This means that the technology (a model or prototype) must be tested in a relevant environment. Examples include testing the prototype in a high-fidelity laboratory environment or in a simulated operational environment. As this policy has become standard, lessons learned show that Small Business cannot accomplish testing and maturity objectives without the guidance and support of an acquisition program office. This includes the dedication of funding for technology integration and insertion within Programs of Record.

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[8] AKSS Knowledge Center Question 12284 concerning Technology Readiness Levels

There were few recommendations or ongoing initiatives directly focused on improving the levels of SBIR T&E funding. While Congressional language now permits the use of SBIR funding for T&E as part of the CPP initiative, there is no centralized Navy policy for applying this essential resource. One concept to leverage funding for T&E investment is cost sharing between SBIR and program office funding. Dick McNamara of NAVSEA PEO SUB stated that acquisition program managers in his organization must contribute half of the Phase II SBIR second-year costs. This level of investment ensures close program office attention to SBIR progress and frees SBIR funding which could potentially be applied to T&E activities.

Recommendation

The study team recommends that the Navy SBIR Director provide guidance to the utilization of SBIR funds for T&E activities. This guidance should include a maximum percentage of SBIR funding that can be used for T&E but allow flexibility in how each SYSCOM/PEO leverages the funding. If additional SBIR funding is provided in support of testing, we recommend that the program office commit to a formal Technology Transition Agreement (TTA).[9]

Sufficient Resources recommendations focus on the need for an array of new technology transition/ insertion tools and funding.

In addition to lacking T&E funding, several interviewees noted instances where technology was tested and fully ready for insertion, but funding was not available to fully implement the technology into the primary system. This was also highlighted in the TPOC survey where inadequate transition funding was marked as a primary concern. Programming of funding in anticipation of technology readiness was either neglected or difficult to defend within the budgeting process. Hank Hinkle of NAVAIR PEO W suggested that "Programmed funding for integration and collaborative engineering can be addressed by requiring (Program Managers) to have a cost estimate and production readiness review completed when considering the insertion of SBIR technologies into a Program of Record to ensure that the insertion is fully funded and properly managed."

Small Business surveys further confirmed the lack of available funding as a predominant concern for continued support through technology transition, as depicted in Figure 7.

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[9] For an example, see **Appendix: Technology Transition Agreement.**

Figure 7 | Fundamental Reason for Disinterest in Project

If there was not continued interest in funding this technology, what would you consider the main reason?
(1 to 10 with 1 being most important)
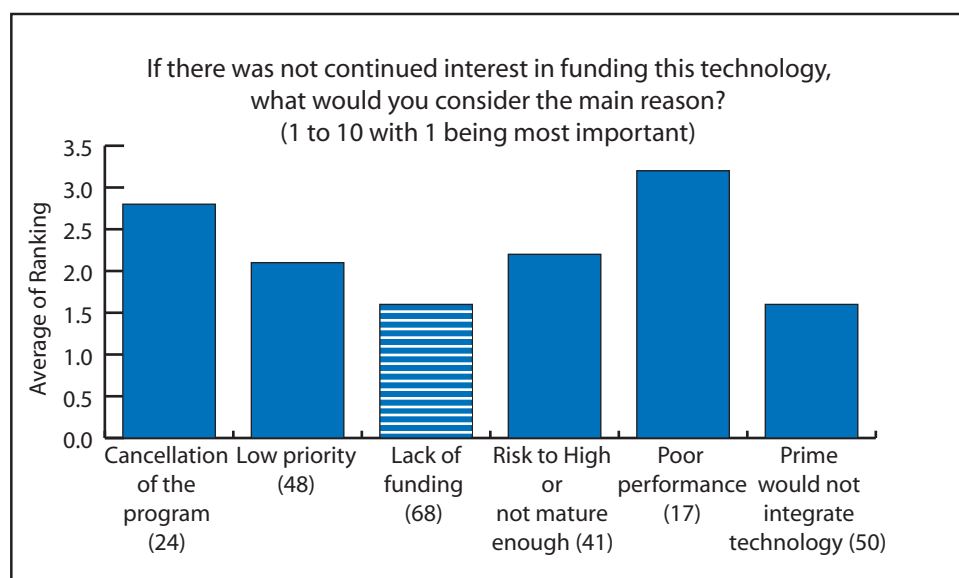
Recommendation

A longer term, team-recommended solution, which gains more formal acceptance of SBIR technology within the acquisition program of record, is a requirement that all new Acquisition Strategies include a section on technology management that incorporates technology insertion as in integral part of the strategy. Formalizing technology management in the Acquisition Strategy would allow for the inclusion of Commercial Off-the-Shelf (COTS) and technology refresh throughout all program acquisition phases, providing an integrated mechanism for technology insertion in general, and providing greater justification for full funding, including T&E and insertion dollars.

Inadequate human resources were also cited in almost all of the organizations interviewed. Training and improved incentives may help. However, interviewees cited a significant mismatch between available personnel and SBIR related workload. The problem is especially acute for viable TPOCs, system engineers and other acquisition program office personnel responsible for system integration activities, and contracting personnel, responsible for writing and approving SBIR contracts.

PEO staff said that TPOCs often have SBIR tasking as a collateral duty and can't be adequately responsive to SBIR awardees, particularly those with little experience with DoD. Furthermore, an overloaded TPOC is not able to rapidly address all the administrative work associated with contracts. This

lack of focus or time promotes error and rework which ultimately delays contract award. In the TPOC survey, many of those who responded indicated that improvements could be made with more funding for increased effort, improved training and better transition processes.

In the acquisition program offices, reduction of government personnel billets has increased assignment of multiple duties to each employee. SBIR projects are rarely in the critical path for system development; they rate little management attention, as transition planning and management takes precious time and energy.

Other resource-related issues included complaints of inadequate management tools available for SBIR program management. SBIR management tools vary across SYSCOMs and are essentially data repositories that do not support the automation of program management and decision-making processes. Consequently, data is captured and managed in multiple locations making it difficult to collect relevant information for general program reporting and decision-making activities. As an interim solution, Janet Jaensch and Douglas Marker of NAVSEA advocated short-term assistance from drilling reservists ("free" manpower) who would contact small firms to capture Phase III transition related information needed for Congressional reporting. This method would potentially prevent additional reporting responsibilities being invoked on TPOCs, and also identify commercial investment supporting other government use that may not otherwise show up on reporting mechanisms such as DD-350 contract reports.

Recommendation

To ensure long-term success from a management resource perspective, an overarching Navy-wide information technology strategy to execute the program is recommended to free limited resources for less administrative and more strategic activities. This should include a common database for the SBIR Program Director and the SBIR community. Automated management tools and web-based training should also be considered.

1.2.3. Effective Management and Processes
Two significant areas have been identified for Navy Leadership to create a more positive transition environment: Open Architecture and overall SBIR logistics issues.

Figure 8 | Effective Management & Processes

Sufficient Resources and Tools

Effective leadership and management must be in place to support/endorse and execute technology transition.

BEST PRACTICES INITIATIVES
DRIVING FORCES
Diversified Navy SBIR Program execution at the SYSCOM level promotes close ties with Acquisition programs
Dedicate Transition Managers assigned in some PEO organization

ROADBLOCKS
RESTRAINING FORCES
Best practices not uniformly deployed to all SBIR SYSCOM Programs
Lack of uniform SBIR Program policy documentation at the Director level
Lack of Transition Managersat some PEO/PMO organization
Lack of effective management metrics

1.2.3.1. Open Systems Architecture

First, adopting a more proactive and incentivized approach to Open Systems Architecture will create greater opportunities for small businesses to participate in major weapons system development. Second, SBIR selection processes should be reviewed for efficiencies that are available with a simpler approach.

Navy senior leadership is committed to an Open Systems Architecture methodology for system and subsystem development for all future Naval platforms. This approach to improving and sustaining capability is intended to permit modular changes and system improvements at relatively low risk and low cost. It also allows the widespread use of COTS components within DoD. This philosophy carries over from industry where there is acceptance that complex systems can be broken into components that can be rapidly and easily integrated into multiple and/or larger systems. This concept of modularity is the thrust of the Modular Open Systems Task Force within the Office of the Secretary of Defense and is also very important in the Navy for sea frame modularity of systems on the Littoral Combatant Ship.

Navy Open Systems Architecture may represent a major new SBIR access opportunity.

By employing the management principles of Open Architecture, a continuous improvement process can be achieved in complex weapons systems to affordably keep the systems current and effective against emerging threats. From this perspective the Navy SBIR program could be an integral and significant source of innovative products ready for application and integration into a complex system. Successful insertion of SBIR technologies is strongly dependent on proactive management practices and planning activities such as the inclusion of SBIR in the technology development strategy and early transition management activities. The duties of the Transition Manager, discussed elsewhere in this report, are specifically targeted for these transition management activities.

In addition to planning, acquisition management authority must create opportunities for small business participation in the development of systems and capabilities to the Navy. Traditional weapon system acquisition programs tend to include complete design, integration and test responsibilities in the prime contract. Within this business model, prime contractors typically select the most mature and typically low risk solutions to ensure that they can deliver a reliable and functional product. Given this tendency, the use of potentially higher risk SBIR technologies is highly unlikely even if there is a substantial performance or cost benefit associated with the SBIR solution. Although there are subcontracting and small business clauses in most prime contracts, the contract holds the prime contractor accountable for product and rarely has effective measures to encourage SBIR participation.

As the Navy shifts to Open Systems Architecture, however, there is an opportunity to expand competition to many suppliers including small businesses for separate components of the system. This open system approach requires an infrastructure that is accessible to many companies who can experiment and test their ideas and engineering designs in an environment that reasonably replicates the environment expected for the open system design. In this manner, SBCs can demonstrate capability at low risk.

The infrastructure investment needed by the Navy includes well-defined physical and electronic interface models and hardware mock-ups with available reference scenarios, data collection and analysis to be able to measure performance in a simulated environment. Making this infrastructure available at low cost to independent developers is equivalent to making a developer's tool kit available to software developers. Once the infrastructure is in place, small businesses can independently address Navy needs at the modular prod-

uct level and the Government can select and contract for products that have been tested on a common test basis with other competing products.
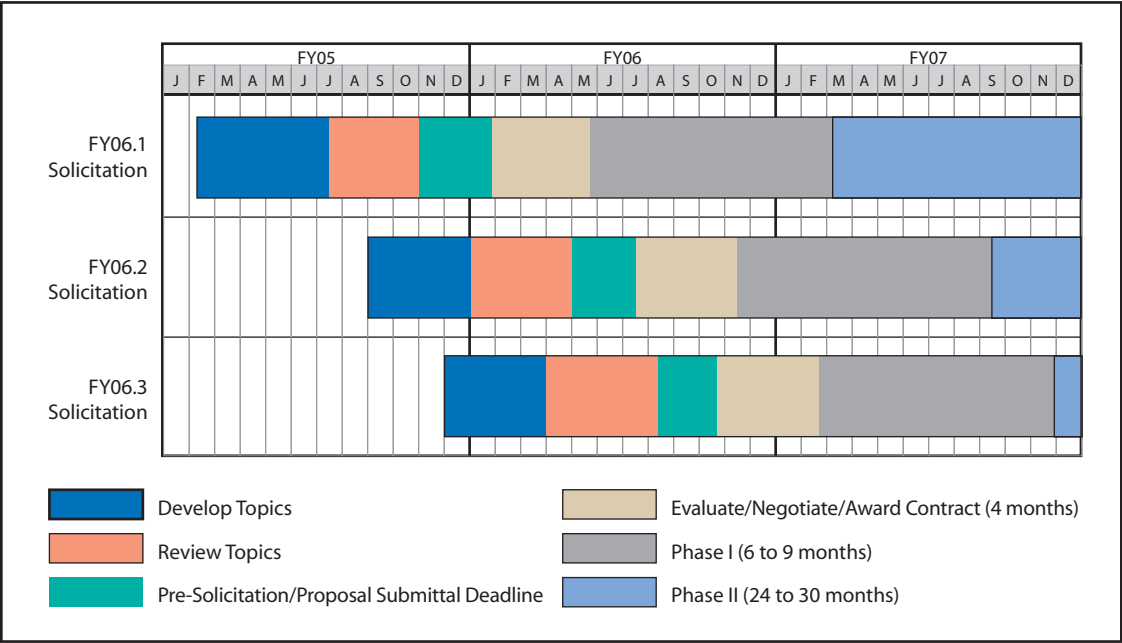
Programs like LCS have taken the first practical steps to integrating SBIR products into the systems designed by their prime contractors by utilizing DFARS language (Clauses 252.227-7025 and 252.227.7018) in SBIR contracts which gives the small business government purpose rights to access and use prime contractor designs. This allows SBCs to have a better visibility into the actual design features being developed and align their products with the solution being delivered by the Prime contractor. This practice also reduces the risk associated with the SBIR effort because the small business is given more exposure to the contracted design efforts and goals as well as more interaction with Primes who must be comfortable with SBIR incorporation.

1.2.3.2. Simplification of SBIR Processes

Second, there is excessive time and complexity associated with the overall SBIR process. In NAVSEA, the time from when PEO SBIR planning activities begin to completion of Phase II efforts often spans more than four years. While interviewees commented that much of the time was spent in contracting efforts, the study team also noted that the topic generation process and the Phase I and II selection processes comprised a significant amount of time and management effort as well.

The study team found that SBIR topic generation and selection process tends to be excessive. Figure 9 from the NAVSEA SBIR Process Manual depicts the initial stages of the SBIR process, which are candidates for streamlining. The elapsed time from the start of topic development within the PEOs to the point at which topics enter the DDR&E review cycle is approximately six months. DDR&E then reviews the topics for an additional three months bringing the total topic generation process to nine months. This is an extremely long time period given that a topic write-up is typically less than two pages in length and the subsequent solicitation is typically one-half page.

Figure 9 | NAVSEA SBIR Process Overview

Develop Topics
Review Topics
Pre-Solicitation/Proposal Submittal Deadline
Evaluate/Negotiate/Award Contract (4 months)
Phase I (6 to 9 months)
Phase II (24 to 30 months)

Recommendation

Effective Management recommendations focus on systematic identification and reduction of procedural gaps in SBIR management, especially those that mean "time without money" for SBIR contractors.

The study team recommends that the Navy SBIR PM evaluate the value added of multiple levels of topic reviews. Eliminating or streamlining these reviews could potentially shorten the cycle significantly.

A rapid technology selection process such as that used by the Joint Improvised Explosive Device Defeat Organization (JIEDDO) could be used as an example. An important method used by JIEDDO to reduce processing time is a disciplined review process known as a "battle rhythm." In the JIEDDO "Battle Rhythm" process, review events are scheduled routinely and frequently. Each review authority must act during these reviews or the topic will automatically be passed to the next step.

Recommendation

The study team recommends review of the JIEDDO process and assessment of a prototype process for solicitation of a small percentage of topics with a compressed topic generation cycle (30-60 days). Topic selection should match with urgent program needs that can be readily addressed by SBIR. This experimental process could be monitored to determine:

- *The impact of shortening this part of the program on transition potential and rates.*

- *Any quality indicators or other factors that would support further continuation or modification of the lengthy development and review process currently employed for SBIR topics.*

Another specific process area which could be streamlined to shorten the SBIR process timeline is the Phase I contract award process. Currently this portion of the SBIR process involves the evaluation of proposals, selection/approval of awardees, contract negotiation, and contract award activities. Both DoD and Navy require a maximum of four months between the close of the solicitation and the Phase I contract award. However, there is no specific guidance on the level of due diligence that must occur to justify a Phase I award. Subsequently, each SYSCOM within the Navy has taken different approaches to the number of evaluators required, the fidelity of evaluations, and the contract vehicles for Phase I awards.

Navy SBIR Phase I awards typically do not exceed $100K. Many of those interviewed believe that the amount of due diligence and contract types currently utilized are mismatched compared to the level of funding and the type of work being performed. In an effort to realign this mismatch, organizations such as ONR and NAVSEA have streamlined the contracting award process by moving to purchase orders or centralized Phase I contracting offices. ONR also opts for single evaluators, in many cases, to further streamline the evaluation process. PEO Ships SBIR Coordinator Elizabeth Madden commented that more evaluators often lengthens the Phase I award process as balancing schedules and availability of numerous evaluators is much more challenging than that of a single evaluator.

Recommendation

The study team recommends that all SYSCOMS and PEOs adopt use of a single or consolidated Phase I contract office, a single evaluator and use of purchase orders to speed contract action.

Another factor that reduces SBIR process efficiency is the decision-making aspect of determining Phase II awards. This is a significant contributor to the length of the SBIR process time line and often leads to a funding gap for many SBIR firms. According to the NAVSEA SBIR Process Manual, TPOCs are to determine the eligibility of the Phase I contractor to submit a Phase II proposal and submit a recommendation to the Phase I Sponsor, the NAVSEA SBIR Program Manager, and the PCO between 90 and 180 days after Phase I contract execution. Figure 10 depicts the entire Phase II selection cycle:

Figure 10 | Phase II Invitation, Evaluation and Selection (During Phase I)

TPOCS determine eligibility for Phase II and send recommendations to sponsor	Between 90 and 180 days after contract execution
PCO Invites Phase II Proposals	Prior to Phase I completion or no later than 30 days after
Contractor submits Phase II Proposal	Within 60 days of Phase I contract completion
Phase II Proposals Evaluated	Within 60 days of proposal submittal
Award Phase II Contracts	Within 6 months of proposal submittal

The disconnect that occurs in this process is the fact that most TPOCs are not comfortable recommending or requesting a Phase II proposal from any Phase I awardees until all Phase I efforts are completed and the TPOC has reviewed all final reports. Since final reports are typically submitted 30 days after the completion of the effort, small businesses often find themselves in a minimum 1-2 month funding gap while the decision to request a Phase II proposal is being made. Moreover, timing depicted in Figure 10 does not account for the internal PEO decision processes associated with determining Phase II invitees.

According to interviewees and SBIR companies surveyed, this internal decision process adds months just to the invitation aspect of the process creating an even larger gap between Phase I and Phase II activities. Once the decision to request a Phase II proposal is made, Phase I options are typically exercised, but again, this is typically months after the small business has completed its Phase I efforts. Furthermore, even if a Phase I options is executed, the funding value ($30K-$50K) is insufficient to keep principal SBC personnel fully funded during the Phase II proposal evaluation and contract award process which spans eight months or longer.

1.2.4. Technology Acceptance by Prime Contractor
Prime contractors are system developers that are responsible for complete system design. Outside technologies, supplied computer code or equipment, whether provided as a part of a SBIR project or as a government furnished products, are outside the span of control of the system developer and are

viewed to have considerable risk. Program Managers are geared to hold the prime contractor accountable and will be reluctant to force a strategy that increases contractor's risk. Furthermore, there is a very poor internal business case for a prime to support the inclusion of a technology not developed by its own personnel because support of such a technology takes workshare/man-hours for development (and subsequent funding) away from the Prime. Incentives and new approaches for utilizing SBIR technologies must be developed to facilitate acceptance.

Figure 11 | Prime Contractor Acceptance

Prime Contractor Acceptance

Prime contractor and Acquisition Program teams must accept the SBIR project as a viable soluion to their problems and needs

BEST PRACTICES INITIATIVES	ROADBLOCKS
DRIVING FORCES	RESTRAINING FORCES
PEO requires Prime involvement before approving PH III Transition investment	Primes not adequately involved in topic generation processes
Prime Initiative underway	Few incentives in-place to facilitate Prime Involvement

Recommendation

Several "best practices" initiatives and recommendations provided during interviews may improve prime contractor SBIR support. Janet Jaensch of NAVSEA recommended prime contract incentive clauses for SBIR use as positive reinforcement for utilizing SBIR. To incentivize better performance, Dick McNamara has touted SBIR projects as competition to prime contractors, initially targeting areas where the prime contractor is not performing well. Ralph Skiano of PMW 180 recommended increasing SBIR exposure to prime contractors to increase their awareness of the benefits of the program and improve communication between the SBCs and large primes. Many of

those interviewed specifically recommended prime contractor attendance at TAP SBIR kickoff. Interviewees believe this venue is a mechanism for both prime and small businesses to increase exposure to each other's products in a time efficient manner.

Another facilitation method recommended is to brief all SBIR projects to prospective prime contractors for new Programs of Record, and request that they consider including them as subcontractors or as suppliers of the needed technology. Jim Alpers of NAVAIR PEO JSF suggested that prime contractors be involved during topic generation and the proposal down-selection process. Dale Moore of NAVAIR LSS recommended that major acquisition contracts include a Contract Data Requirements List (CDRL) that calls on Primes annually to submit relevant SBIR.
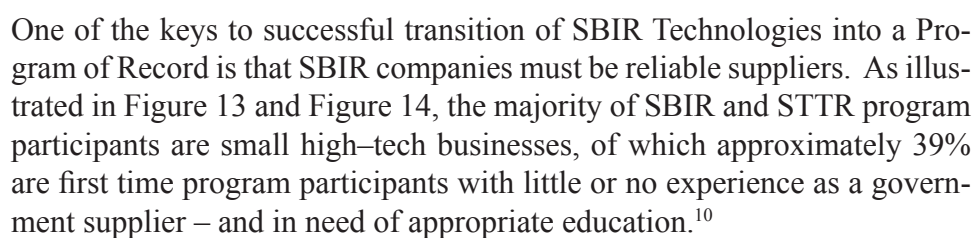
Prime Contractor Acceptance recommendations focus on early Prime involvement in SBIR processes, with appropriate incentives and mandates for SBIR inclusion.

Overall, study team recommendations are:

- *Include contract language that specifically encourages the inclusion of SBIR technologies as part of the overall system design strategy.*
- *Include award fees and other incentive clauses in the contract to reward the prime contractor for participation in the SBIR program.*
- *Encourage early prime contractor involvement in the SBIR process*

1.2.5. Reliable SBIR Supplier

In the past, small businesses participating in SBIR projects have had difficulty getting a project out of the laboratory and into production. The due diligence process for SBIR selection now screens companies carefully to ensure that the companies have or will have the requisite capability to transition a project into production, but problems persist.

Many SBIR awardees are inexperienced with government contracts. They are typically not familiar with FAR clauses and the need for an approved accounting system prior to Phase II acceptance. Several were not familiar with how DoD acquisition programs work, how they are funded, what the transition process is and what transition prerequisites will make transition easier. Lack of experience or knowledge in these areas as well as a lack of appreciation for the resources required for the SBIR company to meet the system development requirements for DoD weapon systems contribute to the delay of the SBIR technology development and prevent timely transition to a Program of Record.

Figure 12 | Reliable SBIR Supplier

Reliable SBIR Supplier

SBIR companies must be reliable supliers, capable of establishing and sustaining production of their product.

BEST PRACTICES INITIATIVES
DRIVING FORCES
Navy Transition Assistance Program (TAP)
PEO requires systematic review of PH II progress

ROADBLOCKS
RESTRAINING FORCES
SBIR companies do not understand government contracting requirements
Inadequate business planning by SBIR companies
Underestimation of manufacturing requirements associated with PH III transition and delivery
Lack of in-sight into transition stream participants
Underestimation of requirements associated with working with prime contractors
Lack of risk management and program management expertise required for participation in the system development process associated with a major DoD weapons system development

One of the keys to successful transition of SBIR Technologies into a Program of Record is that SBIR companies must be reliable suppliers. As illustrated in Figure 13 and Figure 14, the majority of SBIR and STTR program participants are small high–tech businesses, of which approximately 39% are first time program participants with little or no experience as a government supplier – and in need of appropriate education.[10]

Reliable SBIR Supplier recommendations focus on better preparation of SBIR contractors for all phases of technology transition.

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[10] The Navy SBIR Program. Presentation by John R. Williams at the NDIA 2006 Naval S&T Partnership Conference (Washington, D.C., July 2006)

Figure 13 | Firms Participating in SBIR/STTR

Who Participates in SBIR/STTR?

Firm Size Distribution*

Number of Employees

- Small hi-tech firms from across the country
- Firms are typically small and are new to the program

* FY04 Phase I Award Winners
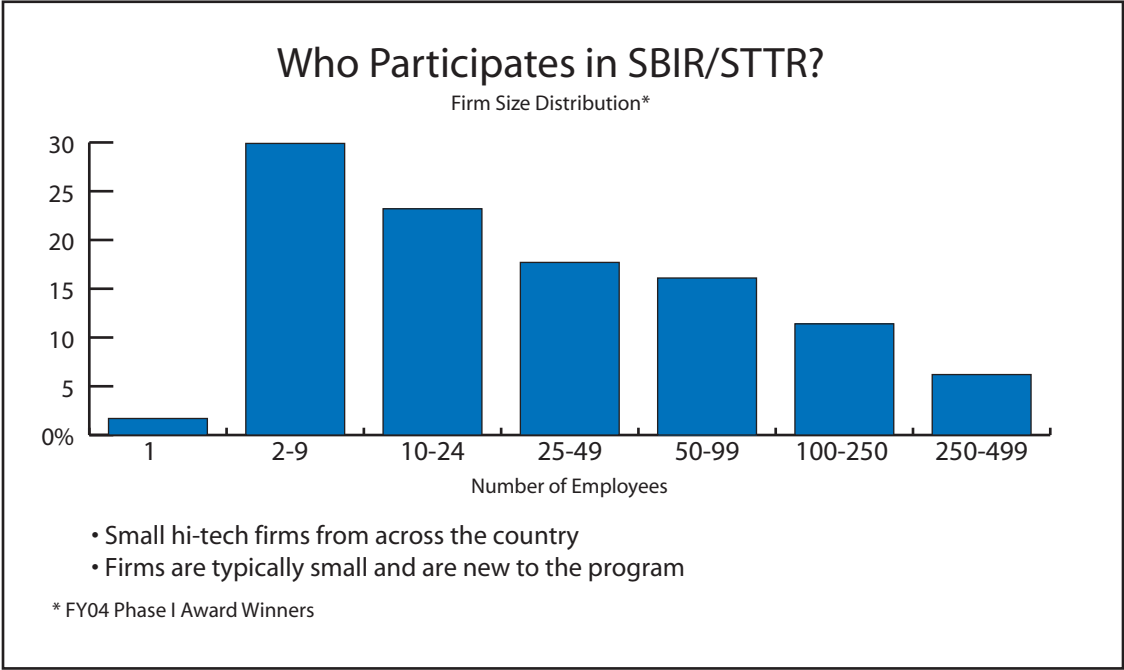
Figure 14 | First Time SBIR Awardees

First Time Award Winners

- 39% of Phase I Awardees are First-Time DoD Winners
- Even non-"First Timers" are relatively new to the program, with only a few prior Phase II Awards

>50
1%

11–50
9%

6–10
11%

1–5
79%
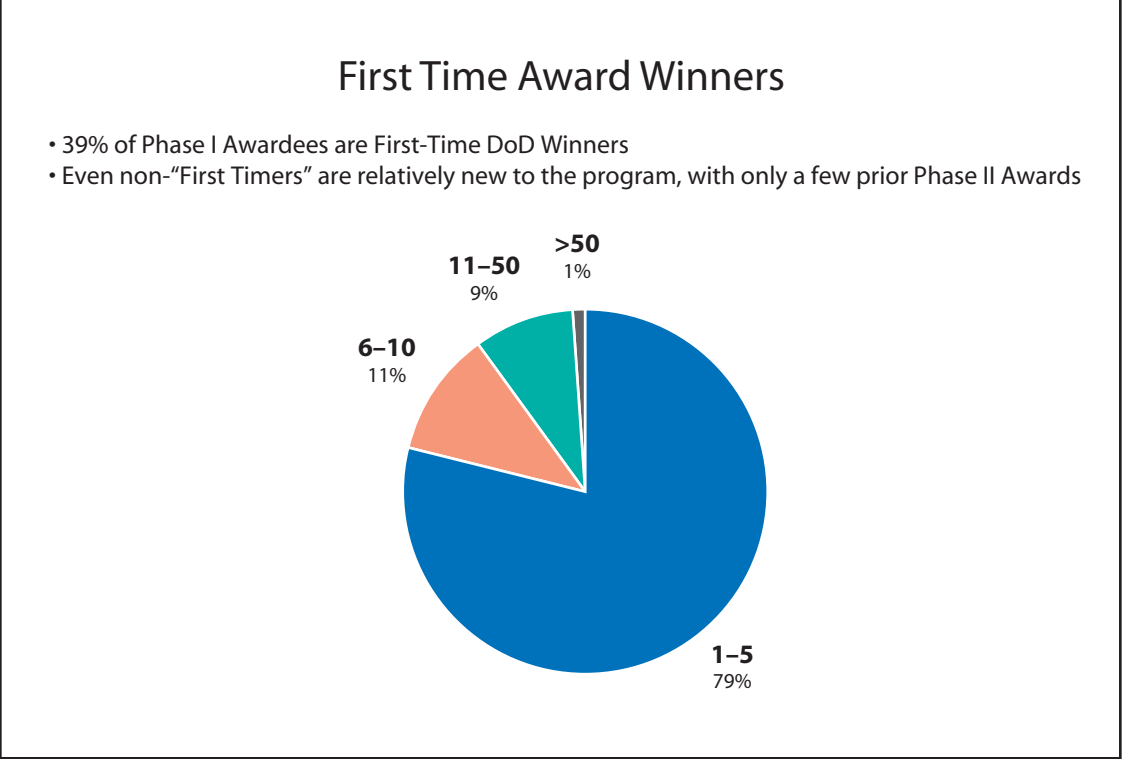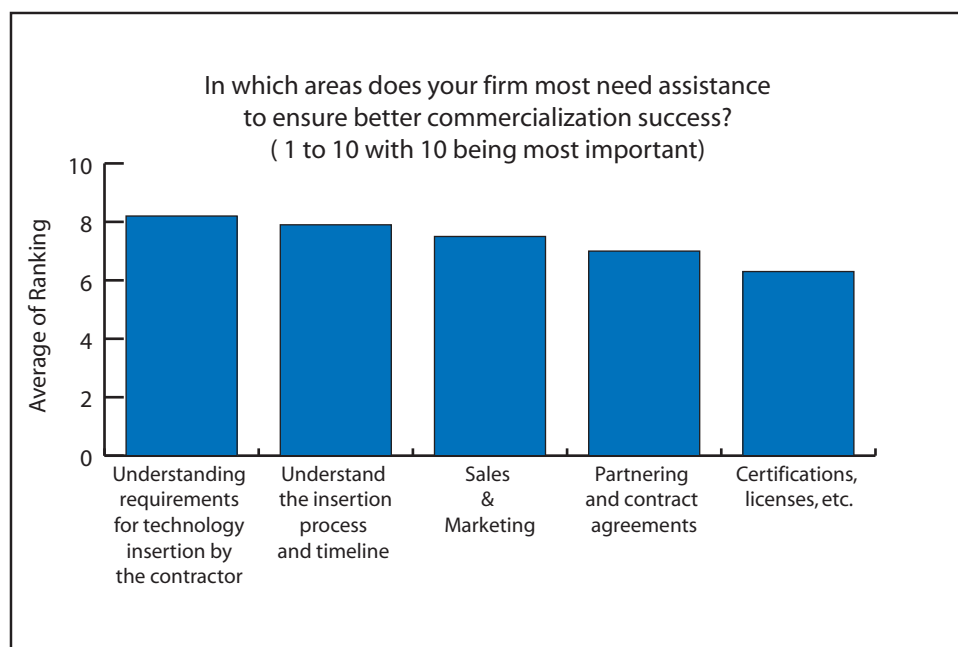
Small Business Survey results in Figure 15 confirm these findings. A large majority indicated lack of knowledge in areas critical to a government supplier's success.

Figure 15 | SBIR Firm Knowledge Gaps

In which areas does your firm most need assistance
to ensure better commercialization success?
(1 to 10 with 10 being most important)

[Bar chart: "Average of Ranking" on y-axis from 0 to 10. Bars: "Understanding requirements for technology insertion by the contractor" ≈8.2; "Understand the insertion process and timeline" ≈7.9; "Sales & Marketing" ≈7.5; "Partnering and contract agreements" ≈7.0; "Certifications, licenses, etc." ≈6.3]

The Navy currently addresses this need by offering transition assistance to its SBIR/STTR participants. The Navy Transition Assistance Program is offered to all Phase II SBIR companies to help the SBIR firm delivery a technology product to DoD and the Navy. The program is ten months long and provides extensive education and support. Even with all of the current support from TAP, gaps still exist as the survey shows.

Additionally, NAVAIR Transition and Supplier Risk Assessment of nineteen FY06 CPP projects found that the high risk areas (excluding funding) associated with the SBIR CPP companies were manufacturing risks and supplier understanding and execution of contract requirements related to system development: Configuration Management (CM), Quality Assurance (QA), and Government Contract compliance.

Recommendation

In order to assist small businesses in becoming more reliable suppliers, the study team recommends TAP and other supplier development activities expand to address:
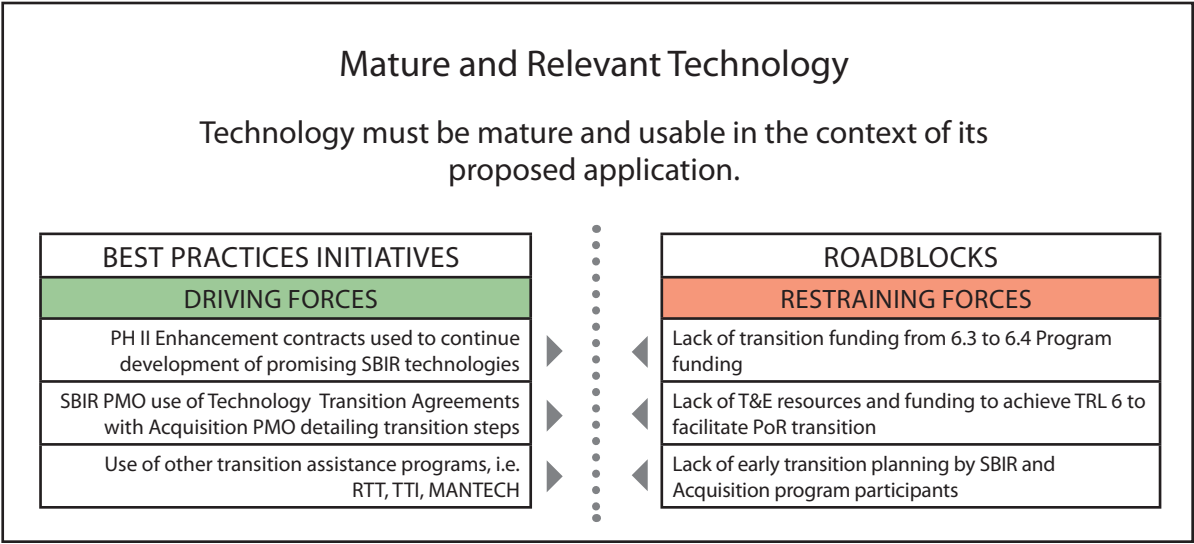- *Business planning for growth required to transition from Phase II to Phase III*
- *Manufacturing*
- *Risk management in a DoD Weapons System or Program*
- *Government contract compliance issues.*

Mature and Relevant Technology recommendations focus on the need for far more inclusive, exacting attention to transition stream processes and related training needs.

1.2.6. Mature and Relevant Technology

One shortcoming in transitioning SBIR technologies is underestimation of the degree of planning, documentation and testing required to achieve sufficient technical maturity and programmatic acceptance for transition. SBIR firms and the acquisition program customer must plan early to ensure that appropriate testing can be accomplished and other program expectations can be met. If planning is too late in the SBIR development cycle, T&E planning is often inadequate; incorrect assumptions are made about needed government test facilities and support, and necessary funding.

Figure 16 | Mature and Relevant Technology

Mature and Relevant Technology

Technology must be mature and usable in the context of its proposed application.

BEST PRACTICES INITIATIVES	ROADBLOCKS
DRIVING FORCES	RESTRAINING FORCES
PH II Enhancement contracts used to continue development of promising SBIR technologies	Lack of transition funding from 6.3 to 6.4 Program funding
SBIR PMO use of Technology Transition Agreements with Acquisition PMO detailing transition steps	Lack of T&E resources and funding to achieve TRL 6 to facilitate PoR transition
Use of other transition assistance programs, i.e. RTT, TTI, MANTECH	Lack of early transition planning by SBIR and Acquisition program participants

As noted by Eric Pitt of NAVSEA PEO Carriers, prohibitions in the use of government facilities for T&E causes a gap because testing to validate and support approval of systems cannot occur at a government facility using SBIR funding.[11] Additionally, programs like SEA TRIAL permit demon-

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[11] Note that Section 252 of the 2006 National Defense Authorization Act now permits use of SBIR funding for testing. Policy for use of SBIR funds for testing activities has not been promulgated and is the subject of a separate recommendation in this report.

strations in relevant environment but are difficult to arrange and coordinate. Acquisition program assistance is essential to obtaining the correct resources in the appropriate sequence to retire technology transition risk.

The study team found that Department of Defense SBIR transition guidance is inadequate for DoD application. SBIR companies are required to submit "Commercialization Strategies" as part of their Phase I and Phase II proposals. The DoD Commercialization Strategies require the companies to:

"Describe in approximately one page your company's strategy for commercializing this technology in DoD, other Federal Agencies, and/or private sector markets. Provide specific information on the market need the technology will address and the size of the market. Also include a schedule showing the quantitative commercialization results from this SBIR project that your company expects to achieve and when (e.g., amount of additional investment, sales revenue, etc.)"

DoD and Navy guidance and examples for transition planning (also referred to as commercialization plans) focus on non-government commercialization and have insufficient military program relevance. Attributes include defining the market for the technology but don't clearly address military utility or integration into military applications. For example, the following excerpt is from NAVSEA SYSCOM SBIR Phase II Proposal Guidance:

"COMMERCIALIZATION STRATEGY
Provide a brief (2 page), unclassified, non-proprietary summary, addressing the following questions:

(1) What is the first product that this technology will go into?
(2) Who will be your customers, and what is your estimate of the market size?
(3) How much money will you need to bring the technology to market, and how will you raise that money?
(4) Does your company contain marketing expertise and, if not, how do you intend to bring that expertise into the company?
(5) Who are your competitors, and what is your price and/or quality advantage over your competitors?

The commercialization strategy must also include a schedule showing the quantitative commercialization results from the Phase II project that your company expects to report in its Company Commercialization Report Updates one year after the start of Phase II, at the completion of Phase II, and after the completion of Phase II (i.e., amount of additional investment, sales revenue, etc…)"

Effective Policy recommendations focus on the need for more policies, and more emphatic policies, with respect to technology transition and management thereof.

Although the outline above will serve well to prepare the SBC for commercial markets and provide commercialization information to the Small Business Administration, it does little to prepare the SBC for the steps needed to implement the SBIR technology into a DoD acquisition program. A modified version should include questions such as:

- What military capability or stated requirement does this technology support?
- Has an acquisition program sponsor been identified?
- Has this project been presented and accepted for SBIR development by other services?
- What tests will be required to demonstrate the technology in a relevant military environment?
- Is there potential for testing in a more robust operational environment (Navy SEA TRIAL, for example)?

The Navy SBIR/STTR program is centrally directed from the Office of Naval Research (ONR) but executed at each Major Systems Command (SYSCOM) to accommodate the diversity and complexity of fielding Navy systems. As a result, due to the complexity of the phase II program, each SYSCOM has its own unique set of rules and instructions for the small business to follow. The following table summarizes the Phase II proposal Commercialization Strategy requirements.

Figure 17 | SYSCOM Commercialization Strategy Requirements

Summary of Navy SBIR SYSCOM Commercialization Strategy Requirements		
SYSCOM	Detailed Transition Plan	Updates
NAVAIR	**Yes.** Specific template provided. Required as part of Commercialization Strategy	None Stated. Assume DoD requirement of 1Yr after Phase II award.
NAVSEA	**Yes.** Required as part of Commercialization Strategy. Provides broad outline guidance for Transition Plan.	Annual updates required for the Commercialization Strategy.
SPAWAR	**No.** Requires a Transition/Marketing Plan but does not provide format or content requirements.	None given. Assume DoD requirement of 1Yr after Phase II award.
MARCOR	**No.** Requires Program review every six months with Quad charts.	Every six months.
ONR	**Yes.** Provides detailed instructions and outline.	Continuous as Phase II progresses.
NAVFAC	**No**	
NAVSUP	**No**	

In addition, to the various Transition Plan requirements detailed above, the Navy SBIR program provides all Navy SBIR Phase II companies an opportunity to participate in the TAP. TAP training to SBIR companies includes transition planning for military applications; however, the program does not start until the second year of a Phase II effort. Furthermore, TAP portfolio managers are not exposed to acquisition program schedules and requirements and are not positioned to aid in the identification of acquisition program testing needs and required resources.

Survey results shown in Figure 18 indicate that while most of the survey participants received transition planning assistance during TAP training and were required to develop a transition plan, the assistance was still insufficient to provide many details needed for successful transition planning. There is a greater need for understanding the technology insertion process and timeline, as well as a clearer identification of customers/end-users and funding sources. Interviews and TAP feedback information also indicated that the level of assistance to develop these plans varied greatly across SYSCOMs.

Figure 18 | Value of TAP Transition Planning

Value of TAP in SBIR Technology Transition
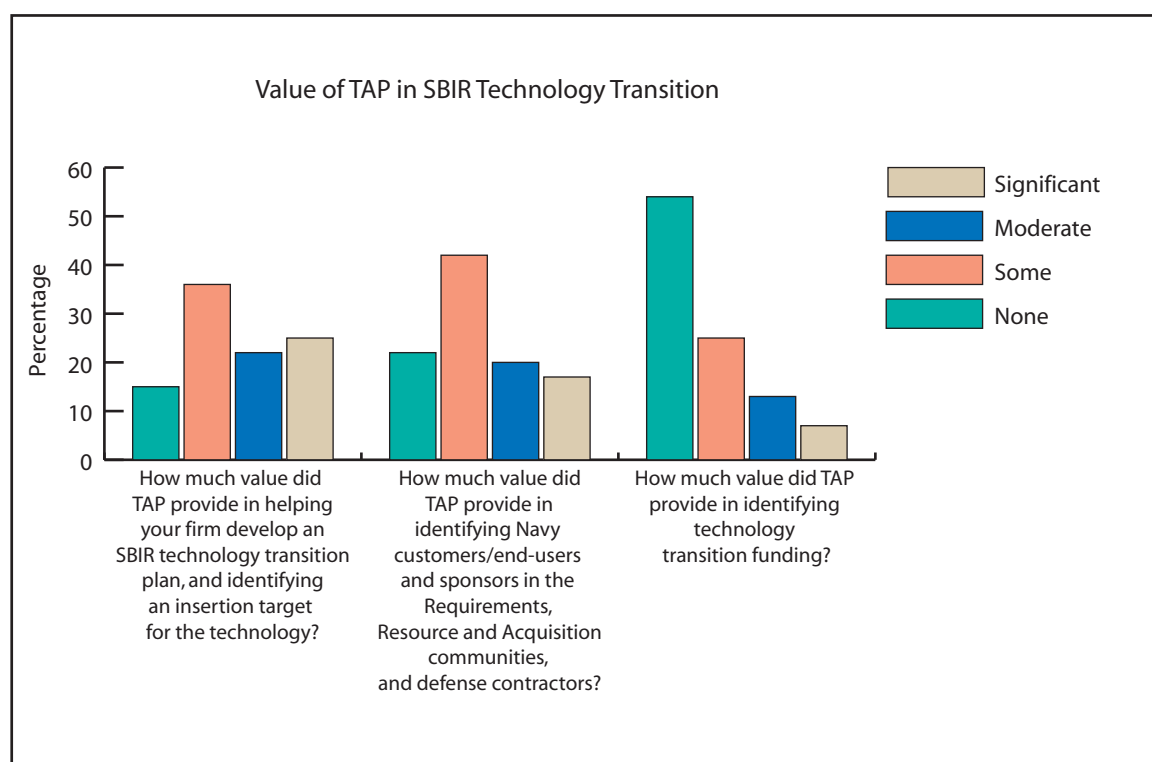
Recommendation

While most Navy SYSCOM guidance includes a specific transition plan at completion of SBIR Phase I in preparation for Phase II, the study team recommends that current content be expanded to better meet transition objectives for technology insertion. Elements of this Transition Plan should include:

- *Project and Topic information*
- *Sponsoring Command*
- *Company name and relevant contact information:*
- *TPOC names and relevant contact information*
- *SBIR program manager and relevant contact information*
- *Technology need addressed, Timing, and Involved Parties*
- *SBIR Project and Expected Outcomes*

  - *Milestones*
  - *TRL*
  - *Risk*

  - *Test*
  - *Measure of Success*
  - *TRL date*

- *Hurdles and Contingencies*
- *Technology Maturation Levels*
  - *Test and Demonstrations*
  - *Milestone dates*
  - *Estimated funding requirements*
  - *Organizations and test resources/facilities needed*

- *Potential Funding sources and Transition Strategies*

A more formalized and specific plan in the form of a Technology Transition Agreement or TTA (see Appendix to this report) should be developed during the Phase II effort as a prerequisite for SBIR Phase III. The TTA establishes exit criteria for program acceptance and technology insertion. Key TTA elements include:

- *Responsibilities of SBIR company, the Acquisition Program and Resource or Requirements Sponsor*
- *Specifics on test facilities, availability, and required funding*
- *Documentation requirements, such as interface documents*
- *An integration strategy and activities required to implement the technology*

In order to capture many of the needed process changes listed in the previous paragraphs, the study team recommends a Navy-wide process change

to improve the overall transition process. (See the Gated Process Improvement Initiative in Section Two: Recommendations of This Study, with recommendations for transition training, planning, phasing and overall improvements in transition management focus.

Figure 19 | Effective Policy

Effective Policy

DoD and Navy policy must effectivel facilitate technology transition.

BEST PRACTICES INITIATIVES	ROADBLOCKS
DRIVING FORCES	RESTRAINING FORCES
De-Centralized Navy SBIR Program Management fosters Acquisition Community involvement	DDR&E focus on innovation hinders topics which focus on Acquisition program requirements
	Current Acquisition guidance does not require formal planning for technology insertion in the PoR Acquisition Strategy

1.2.7. Effective Policy

Research and interviews suggest that there is little policy or guidance from the Navy to facilitate SBIR technology transition in acquisition programs. There were several process and policy "best practices" recommendations discussed during the interview process, which related to acquisition policy. Ralph Skiano, Ed Mozley and others from PMW-180 stressed inclusion of a Technology Development Strategy throughout the program lifecycle. Dick McNamara said that PEO SUBS includes SBIR development and transition under the Acquisition Strategy of "umbrella" programs.

DoD and Navy acquisition policy as represented in DoD Instruction 5000.2 and SECNAV Instruction 5000.2C do not require formal planning for technology insertion during the acquisition program System Development and Demonstration (SDD) phase. Except as part of the Technology Development Phase, acquisition program planning rarely includes specific tech-

nology transition as a part of program development. A consequence is that technology transition is not formally included in funding plans, is not programmed into the Navy Budget, and the transition effort between technology development and technology integration languishes in the "Valley of Death." Recent policy from ASN(RDA) precludes expenditures for changes in existing programs unless the change is safety related or for other specified reasons. This policy makes it more difficult to incorporate changes in an acquisition program to incorporate new technologies; however, the policy permits programmed changes if those changes are included in the program baseline. That makes it essential to plan early and include technology transition as an active component of program acquisition strategy and the program baseline.

For the future, the Navy is pursuing Open Architecture with modular, open systems specifically to expand the business model to increase flexibility and lower cost in system development. Policy and process changes are needed to take advantage technology opportunities during system development and the even more continuous technology insertion planned for open systems development.

Recommendation

In order to open the acquisition development process to improve the application of SBIR and other new technologies, the study team recommends that Navy policy be changed to support the inclusion of technology management, properly outlining appropriate resource requirements and technology risk management, in each program Acquisition Strategy.

In parallel, any formal policy change to acquisition guidance must be supported with changes to the Planning, Programming, Budget and Execution (PPBE) system. Acceptance in the PPBE process to apply funding for technology refresh including SBIR and STTR technology insertion during the SD&D phase will make it possible to effectively plan and resource technology changes.

As an additional step to improve SBIR technology insertion during the SD&D phase, Navy contracting language should facilitate and in the case of Open Architecture, incentivize changes that support technology insertion for incremental performance gain and life cycle cost reductions.

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[12] DAU Press, Manager's Guide to Technology Transition in an Evolutionary Acquisition Environment, (Fort Belvoir, VA: June 2005)

[13] ASN(RDA) Memorandum, Acquisition Program Cost Growth; Management Of Engineering Change Proposals, (Washington, D.C., 04 December 2006)

[14] Department of the Navy Acquisition Plan Guide Book, ASN(RDA) (Washington, D.C., March 2007)

Existing Navy-wide guidance for the development of program Acquisition Plans is silent on technology transition during the SD&D phase. It does not include any language on SBIR, STTR or other rapid technology transition programs. Although it includes information on Modular, Open System Architecture, it does not specifically address Navy Open Architecture. Navy Open Architecture is inherently open to the integration of new technologies. Greater implementation of Navy Open Architecture within the Navy would foster technology transition of SBIR, STTR and other technology developments.

A new Open Architecture guidebook for contracting[15] discusses technology transition, but does not specifically include SBIR, STTR or other technology development programs as sources of technology improvement. We recommend the inclusion of specific technology sources, to make this guidebook more complete and useable for contracting and acquisition program personnel.

1.2.8. Efficient Contracting in Support of the SBIR Program

The largest single category of problems cited in interviews related to SBIR process delays is the need to streamline or improve SBIR contracting practices.

There were several reports of "contract actions take too long." Tom Hill and Tammy Ryman stated that there is little or no consistency or consensus on appropriate contract clauses to be included in the SBIR contracts. Douglas Marker noted that one contract action in NAVSEA took over twelve months

Figure 20 | Effective Policy

Contracting

Contracting process must be straightforward and timely.

BEST PRACTICES INITIATIVES		ROADBLOCKS
DRIVING FORCES		RESTRAINING FORCES
Use of IDIQ contracts to facilitate PHIII tasking		28 different Navy DODACs issuing SBIR Contracts
Contract shells for repetitive PH I contracts		Possible lack of sufficient contract personnel assigned to SBIR contract shops
Consolidated SBIR Contract Shop		Time to contract is excessive across the SBIR Program
		SBIR companies unfamiliar with DCAA audit and government accounting requirements

[15] Naval Open Architecture Contract Guidebook, PEO IWS 7, Version 1.0, (Washington, D.C., 07 July 2007)

to award. Tom Hill recommended consolidation of SBIR contracting in the Navy after he noted that there are 28 separate DoD Activity Address Code (DODAC) associated with SBIR contracting in the Navy. Carol VanWyk suggested hiring of pre-negotiators (retired contracts person) to accelerate contracts work. Dick McNamara recommended hiring more contracts personnel to help speed contract actions.

Interviews also indicated systemic issues with the SBIR contracting process. SBIR contracts are typically small and have lower priority than large defense contracts. An already low priority compounded with a lack of available, well trained personnel leads to significant delays in contract actions. Several examples of contract delays were discussed during study team interviews. These were not indicated as individual instances of poor performance by contracting personnel; rather, all indications point to a systemic lack of SBIR-dedicated personnel resources.

Contracting recommendations focus on the need for SBIR process improvements and rationalizations, for consolidated efforts, and for improved training for both government and small business participants.

To improve contracting efficiency, Linda Whittington, Janet McGovern, Carol VanWyk, and Janet Jaensch, recommended using standardized contracting shells as a means to streamline process and reduce administrative burden. Tom Hill recommended consolidating SBIR contracts to a single contracting office for each SBIR phase level.

The study team found this issue difficult to assess absent a specific manning study to evaluate the claim of inadequate numbers of contracting personnel. Although there were symptoms that contract delays were in part due to a lack of sufficient personnel, there were also indications of other contributing factors that may be alleviated through other means. Further information is needed to resolve the source of the contract related delays.

Investigation revealed several related causes:

- SBIR contracts are relatively small compared to other military contracting actions raising an issue of priority. Small contracts are usually lower in priority than large contracts.
- There is a lack of consistency associated with contracting action in the Navy. A contributing factor is that are 28 separate DoD Activity Address Codes (DODACs) associated with SBIR contracting in the Navy.
- The funding process may be dependent upon serial decisions that accumulate processing time.
- TPOCs are not well trained and do not provide adequate guidance and support to Small Businesses preparing for government contracts

- Proposal Request packages and Statements of Work are of poor quality and must be rewritten.
- Lag time in coordination between the contracts individual and the TPOC and in some cases the Program Manager leads to long contract action delays. Program office personnel are difficult to access or respond slowly to questions.
- Multitasking and heavy workloads for contract personnel and TPOCs lead to reduction in dedicated time for SBIR contract actions.
- Small businesses do not fully understand all of the administrative requirements of the SBIR program.
- There have been instances of funding not being transferred and fully in place when the contract is signed, which causes a delay in starting the work.

Recommendation

The study team recommends that consideration be given to consolidation of SBIR contracting in the Navy. Benefits appear especially possible in consolidation of Phase II and Phase III contracting action. Since the SYS-COMS already provide contracting to Program Offices as part of a matrix of services, the SYSCOMS may be best positioned to closely support the programs.

Although there may be room for some efficiencies and better training, the issue of adequate human resources should be considered in more depth. Significant discussion during interviews pointed to a need for more contracting personnel. Discussion also highlighted a need for either more TPOC personnel or as noted elsewhere in this report, a need for a Transition Manager to work closely with the acquisition organizations on transition process and issues. We recommend the addition of a Transition Manager to work with the TPOC and directly with the program office would help focus attention on SBIR contract actions that are the responsibility of the program office.

1.2.9. Education and Outreach

Navy SBIR is a complex program involving the Marine Corps, Office of Naval Research (ONR), Navy Systems Commands, Acquisition Program Offices and PEOs.

A recent Six Sigma Study within the NAVAIR AIRSpeed Project on the NAVAIR SBIR Program illustrates the SBIR Program value stream interactions and complexities.[16] The study found that during the course of any Fiscal Year, the SBIR Program is executing eight major solicitations. Although

Figure 21 | Education and Outreach
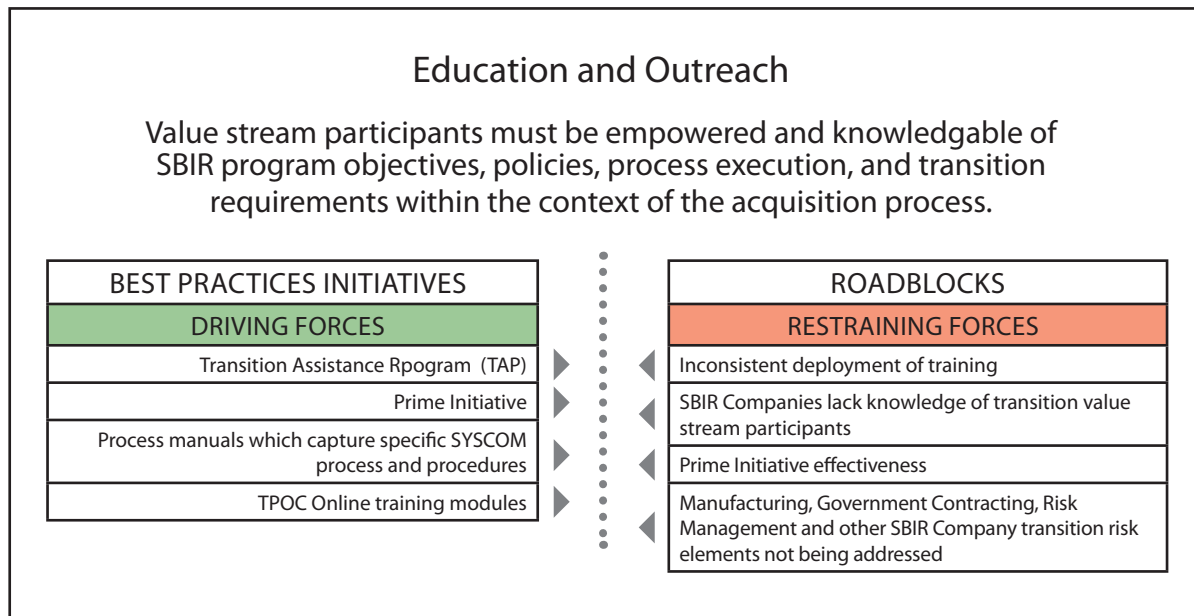
the study is specific to NAVAIR's execution of the Navy SBIR Program, the processes and the complexities are applicable across the entire Navy SBIR Enterprise. As a result of the complexity and inherent process interdependencies, the success of the Navy program is heavily dependent upon value stream participants that are empowered and knowledgeable of SBIR program objectives, policies, process execution, and transition requirements within the context of the acquisition process. To enhance transition success and consistency across the program value stream, a multi-faceted, robust education and outreach strategy is required.

1.2.9.1. Education Activities

Education and training was discussed in many interviews, and cited extensively in the surveys. Results indicated that Navy SBIR education efforts are divided into two areas: training for personnel involved in program execution, and educating the SBIR companies to improve their capabilities as suppliers.

Personnel education activities are those program activities, processes and formal training provided to increase participants' awareness, knowledge and expertise in information, processes, policy, and transition requirements nec-

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[16] Naval Aviation Enterprise AIRSpeed, Project Case Study: SBIR, Presented by Dale Moore, (San Diego, CA., 28 June 2006)

essary to successfully develop and transition SBIR technology to the Fleet. Education activities are intended for value stream participants involved in program execution and typically include SBIR Program personnel, TPOCs, and select Acquisition Community personnel (including the proposed Transition Manager).

A major finding is the impression of constant turnover of key value stream personnel. When experienced TPOCs, Program Office personnel, contracting personnel and other key SBIR program participants leave and are replaced by newer and less experienced individuals, a "knowledge drain" is created. The majority of interviewee comments concerning personnel education were directed toward the TPOCs. This is not surprising given the important role TPOCs play in the success of the SBIR Program. TPOCs participate in almost every meaningful process within the SBIR value stream and interact extensively with all of the key SBIR participants. Mr. Douglas Marker, SBIR Director, PEO Integrated Weapon Systems (IWS) noted during his interview, "[Well trained] TPOCs, who understand the job well, tend to improve SBIR transitions rates and speed." To mitigate the impact of personnel volatility on program execution, various training and educational tools have been deployed across the program. Examples of "Best Practice" initiatives and tools currently deployed on the program include:

- Topic generation seminars for TPOCs and Program Office personnel
- Process manuals which capture specific SYSCOM process and procedures
- On-line training modules (relatively limited use at present)

From comments in the interviews, these tools appear to be locally deployed (i.e. SYSCOM specific) and do not appear to be consistent in content or delivery. Ongoing training is fragmented at the SYSCOM level.

Education and Outreach recommendations focus on better training for all government SBIR program participants in various specified areas, and better education of SBIR contractors regarding improvement of their supplier capabilities.

Recommendation

Although the current practices accommodate tailoring to SYSCOM specific practices and circumstances, we recommend that the Navy SBIR Program Director ensure some degree of standardization across the program.

Ensuring that SBIR companies become reliable suppliers is one of the keys to successful transition of SBIR technologies into an Acquisition Program of Record. (See Section 1.2.5, above.) The majority of SBIR and STTR companies are small high technology businesses, of which approximately 39% are first time program participants with little or no experience as a government supplier.[17] Subsequently, many of the SBIR companies have

little or no experience with government contracting. A significant number of these companies struggle to meet the SBIR program management requirements and find it difficult to support SBIR technology transition. The critical role of the SBIR companies in the value stream and the inherent risks associated with innovative research and the transition of new technologies makes it essential to educate and assist the companies on techniques for becoming a reliable government supplier.

The Navy offers a unique transition assistance program (TAP) to SBIR companies. The Navy TAP is offered to all Phase II SBIR companies and is an example of an Education and Outreach "Best Practice" initiatives within DoD. Navy TAP has two primary objectives:

- To facilitate DoD use of Navy-funded SBIR technology
- To assist SBIR-funded firms to accelerate the rate of technology transition through development of relationships with prime contractors and various activities aimed at preparing the SBIR firm to deliver product. TAP is a 10-month program offered exclusively to SBIR and STTR Phase II award recipients.

The program is designed to help Phase II recipients conduct preliminary strategic planning and assist them to:

- Confirm the Navy customers' needs
- Enhance the strategies for transitioning to Phase III
- Develop a technical briefing for inclusion in the Virtual Acquisition Showcase®
- Develop a business plan or other appropriate tool(s)
- Present their opportunities at the Navy Opportunity Forum® [18]

Dr. Jenny Servo, President of Dawnbreaker, Inc., identified in her interview the following additional benefits and information available to TAP participants:

- SBIR Data Rights information
- DoD requirements validation, budget information
- Business, manufacturing and strategic planning consultation
- Markets, government and commercial, applicable to their technology
- Formal TPOC communications
- Tailored transition steps to transition to Program of Records

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[17] The Navy SBIR Program, presentation by John R. Williams, at the NDIA 2006 Naval S&T Partnership Conference, (Washington, D.C., July 2006)

[18] Navy Transition Assistance Program website, http://www.dawnbreaker.com/navytap

- Formal exposure to Primes, Government Acquisition Personnel and Venture Capitalists

According to Dr. Servo, Navy TAP is "designed to teach the companies how to be successful in transitioning their technologies." Despite the participation in TAP by a majority of Navy SBIR companies, interview and survey comments indicate that improvements in SBIR companies' supplier maturity were still required. For example, Mr. Tom Hill, Director of Contracting, Naval Air Warfare Center, Weapons Development, (NAWC-WD) Lakehurst, noted " Small businesses do not understand accounting process required… or] what it takes to pass a [Defense Contract Audit Agency] DCAA audit." In addition, even when a SBIR company successfully develops a technology which could be transitioned into a weapon system, they are often ill-prepared for the programmatic and systems engineering rigor and/or manufacturing expertise required for advancing into the System Design and Development (SDD) phase and on to Full Rate Production (FRP).

The results of a transition risk analysis of the nineteen companies in the FY06 NAVAIR Commercialization Pilot Program (CPP) concluded that if funding is not considered, the most significant transition risks and issues identified for a majority of the companies were:

- Programmatic rigor: Meeting and understanding contract requirements (20%)
- Program management, budget planning, Export/ITAR, Security (30%)
- Systems engineering rigor: Quality Control and Configuration Management (30%)
- Full Rate Production: Manufacturing, Lifecycle support, and Logistic support (45%)

These results indicate further company education and assistance may be needed to address these risk areas.

1.2.9.2. Outreach Activities

These include efforts and/or initiatives directed at value stream participants that include PMOs, PEOs and prime, 1st and 2nd tier contractors. These value stream participants' overarching priorities rest with ensuring the SBIR technologies developed in the program meet or supports Warfighter requirements. Within the context of transition, this group constitutes the customers of the SBIR Program. Typical outreach activities include but are not limited to the following categories:

- Soliciting Topics
- Marketing Technologies and assisting with transition
- Responding to requests
- Providing information

Outreach activities occurring at the beginning of the SBIR process are centered on topic generation and involve soliciting inputs for topics from the PEOs PMOs, and TPOCs and involving this group in the prioritization and down-select of topics submitted to DDR&E for final approval. The overall objective of these outreach activities is to align topics with acquisition requirements and Science and Technology (S&T) objectives.

According to a recent study released by the National Research Council, "[Navy] Acquisition offices currently sponsor or endorse more than half of all DoD topics indicates that this objective has been accomplished to some extent. At Navy, the acquisition-driven model of topic development [has] been expanded further…84 percent of Navy topics came from the acquisition community and…Program Executive Officers in the Navy's Systems Commands participated in selecting proposals,…managing them through Phase I and Phase II...,always with a view toward the Phase III transition. By this method of asking systems commands for topics, a "pull" had been created from the programs in a position to fund Phase III. As a routine, the Navy participated in every DoD SBIR topic solicitation— three per year for SBIR and one per year for STTR. Some of the topics included in those solicitations came from the S&T community, but over 80 percent come from the acquisition community, systems commands, and program executive officers." [19]

Outreach activities occurring at the end of the SBIR process involve engaging the PMOs and PEOs to transition technologies from Phase II to Phase III. One of the outreach strategies employed is the Phase II Enhancement to incentivize Acquisition Program Offices or private sector industry to utilize SBIR technology by providing SBIR matching funds for further R&D.[20]

As an extension to Phase II Enhancement, NAVAIRSYSCOM pioneered the use of an SBIR Indefinite Delivery/Indefinite Quantity (ID/IQ) contract initiated in conjunction with award of a Phase II Enhancement. The ID/IQ contract allows separate Delivery Orders (DO) to be initiated for work or purchase of an SBIR technology as funds become available and the technol-

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[19]National Research Council, Committee on Capitalizing on Science, Technology, and Innovation: An Assessment of the Small Business Innovation Research Program , SBIR and the Phase III Challenge of Commercialization: Report of a Symposium, Charles W. Wessner, Editor, 2007, pp. 60-62.
[20]Go to http://www.acq.osd.mil/osbp/sbir/fasttrack/index.htm for more information on DoD SBIR Program Fast Track and Phase II Enhancements

ogy matures. The ID/IQ allows the program to further mature the technology through the Phase II Enhancement and then have a contracting vehicle available to execute follow on orders. From the SBIR Company's perspective, the ID/IQ provides a readily available contracting vehicle for other government agencies to purchase their SBIR technology and services. PEO SUBS has successfully used similar contract vehicles to permit greater flexibility in SBIR related, follow-on work.

One of the most significant marketing outreach activities is the Navy *Opportunity Forum*®. This forum is sponsored by the Navy SBIR Program Office as the culminating event of each TAP. The Forum provides a technology showcase for TAP participants and is an effective way for acquisition officers, R&D managers, prime contractors, 1st and 2nd tier suppliers, and defense personnel to preview Navy-funded technologies. The forum is a unique outreach event that has been well received and attended by Prime contractors, acquisition personnel and venture capital investors.

As noted above, gaining acceptance of SBIR technologies by the 1st and 2nd tier prime contractors is one of the keys of improving SBIR transition. As the defense industrial base consolidated, large defense prime contractors assumed the role as Systems Integrators; although Navy reversed this trend in 2007, primes still yield a considerable amount of influence on technology insertion into current and future weapon systems.

Outreach activities to primes include involvement in the Navy *Opportunity Forum*® and a Prime Outreach initiative sponsored by the Navy SBIR Program Director. The Prime Outreach initiative is aimed at engaging the major prime contractors and increasing their participation in and awareness of the Navy SBIR program.

Recommendation

Study team recommendations to improve Education and Outreach are summarized in the following categories:

- *Institutionalize early transition planning*
- *Early and effective SBIR Company intervention*
- *Early and increased prime involvement in the SBIR process*
- *Consistent and effective training of SBIR value stream participants across the Navy SBIR Enterprise*

Section Two: Recommended Initiatives

2.0. Recommended Initiatives Framework

Four strategic initiatives, complete with White Papers, could significantly improve Navy SBIR transitions.

Over the course of the study team's assessment of information obtained from our interviews and surveys, ordered into the nine "Key Transition Criteria" discussed in **Section One: Findings of This Study**, we first called out recommendations particular to each criteria, and then developed four strategic initiatives wherein change could bring significant improvement in quality and timeliness of Navy SBIR transitions. Each recommended initiative links several issues, generic to one of more of the nine Key Transition Criteria. Each initiative is presented inclusive of "issue white papers" to serve as a starting point for action.

2.1. Policy Change Strategic Initiative

As noted in several GAO reports and the National Research Council report "Accelerating Technology Transition", there is a systemic problem with funding the successful transition of technology from project development in SBIR Phase II into an acquisition program of record for Phase III or direct application. This problem description was repeatedly reinforced by survey data and interviews.

The Policy Change initiative addresses planning and programming of funds for SBIR transitions into acquisition programs.

An updated policy represented through changes in DoD Instruction 5000.2 and SECNAV Instruction 5000.2C will provide a foundation for planning and programming of funds specifically for technology transition in acquisition programs of record.

The Policy Change Strategic Initiative addresses changes to DoD Instruction 5000.2, the Defense Acquisition Guide, and SECNAV Instruction 5000.2C; a parallel outreach to the members of the Navy Resources and Requirements Review Board; and proposed guidance to Navy contracting activities. The intent is to establish a collaborative and coordinated Navy-wide policy change implementation with respect to the following:

    a. Change to Documents
- to DoDINST 5000.2
- Change to Defense Acquisition Guide
- Change to SECNAVINST 5000.2C

    b. Planning and Programming—Outreach to OPNAV Resource Sponsors
    c. Acquisition Plan Guidance—Guidance change for Navy Contracting

2.1.1. Navy Policy Change to Improve Technology Transition in Acquisition Programs (Changes to DoDINST 5000.2, Defense Acquisition Guide and SECNAVINST 5000.2C)

2.1.1.1. Issue
DoD and Navy acquisition policy represented in DoD Instruction 5000.2, Defense Acquisition Guide and SECNAV Instruction 5000.2C do not require formal planning for technology transition or technology insertion during the acquisition program System Development and Demonstration phase.

2.1.1.2. Background
Insertion of new technology into a program of record requires early planning to ensure that it can be accommodated into the design at manageable risk and cost. If technology insertion is not specifically included in the system development planning then there will be no early identification of need for the change and no linkage to the existing budget. If technology change is not programmed, it will not be funded and the technology represented in the change must typically await incorporation during the next spiral development phase (if it can be accommodated within that spiral's budget) or it must await the formal budget process that can take many months. Below is an example of the delay that can accumulate awaiting a POM cycle funding timeline for a Small Business Innovative Research project. Note that transition and integration of the technologies represented by the SBIR are just starting after a 34 month delay.

- Data call for 2005.3 SBIR solicitation began January 2005.
- Phase II development ends January 2009. Decision to transition can only be made after the project has been successfully demonstrated at the end of Phase II. Request for transition funding is submitted as part of POM12 Issues in October 2009.
- POM funding begins October 2011 and technology transition follows.
- Resulting funding Gap = 34 months (January 2009 – October 2011).

Today, funding for refresh of technology and COTS as well as SBIR project integration and rapid capability improvement is rarely incorporated as part of program budget planning for programs in development. In the past, new technology integration during the SD&D phase was a task to avoid due to expense and risk. New policy within the Navy makes it even more imperative that proper planning include programming for technology insertion as a part of the overall program strategy. With open architecture and balanced

Principal DoD and Navy acquisition policy guides don't require formal technology transition planning in the vital System Development and Demonstration phase.

A Technology Development Strategy, prior to Milestone B, is required to guide assessment and incorporation of SBIR products, and precedes Total Life Cycle Systems Management (TLCSM) planning.

risk management, capability improvements could enhance or complement problem correction, sustainability improvements and life cycle cost improvements during System Development and Demonstration as long as they are thoroughly considered during planning phases. In the Navy, PEO Submarines has demonstrated the benefits of continuous, risk managed technology insertion through the Acoustic Rapid COTS Improvement Program.

2.1.1.3. Discussion

… but the Defense Acquisition Guide doesn't reference technology integration in the followon Acquisition Strategy required at Milestone B, impeding application of Open Systems design that permits new technology insertion, which could provide SBIR access.

Incorporation of new technologies is an important component of design development during the Technology Development Phase prior to Milestone B. A formal Technology Development Strategy is required to guide assessment of new technologies and to plan for incorporation into the system. Total Life Cycle Systems Management (TLCSM), which will continue through the life of the program, is also initiated during this phase and is intended to consider planning of long-term sustainment, obsolescence management and continuous lifecycle cost improvements

After Milestone C and during the Production and Deployment Phase, the continuance of TLCSM and the application of Performance Based Logistics (PBL) are emphasized for improving product sustainment and reducing lifecycle costs.

As noted in both the DoDINST 5000.2 and the Defense Acquisition Guide, the Technology Development Strategy is merged into and replaced by the Acquisition Strategy required at Milestone B. Table 2.3.1 from the Defense Acquisition Guide lists the principal considerations to include in the Acquisition Strategy. The integration of new technology is not included; however, application of Open Systems design now permits an incremental and continuous change process that will allow technology insertion at any stage of the system development. This is important because it allows insertion of new technology when the technology is appropriately tested and mature, without the delay of waiting for the next spiral design window of opportunity. Open Systems design allows use of TLCSM in the System Development and Demonstration Phase with the additional consideration of improving performance. The Draft Acquisition Strategy Guide from DAU Press, dated June 2003, includes Open System discussions and technology transition planning as important considerations for the Acquisition Strategy. These considerations are not reflected in DoD or Navy formal guidance.

2.1.1.4. Recommendation

Submit recommended changes (see Recommended Document Changes below) to DoDI 5000.2, the Defense Acquisition Guide and/or SECNAV Instruction 5000.2C to specifically add Technology Management as a principal consideration for inclusion in the Acquisition Strategy for DoD and Navy and Marine Corps Acquisition Programs. Technology Management in the Acquisition Strategy should carry forward the technology insertion strategy developed in the Technology Development Strategy. Technology Management planning should include COTS and technology refresh considerations as well as technology transition planning for SBIR, STTR, Joint Concept Technology Demonstration (JCTD) products and other available new technologies. It must also include the opportunities in Open Systems to accommodate rapid improvements, consider technology based, reliability or other sustainability improvements and life cycle cost improvements as indicated in TLCSM. The Technology Management section should highlight incorporation of the Rapid Capabilities Improvement Process (RCIP), if applicable.

Technology Management should be included in the Acquisition Strategy, to carry forward insertion planning from the Technology Development Strategy – and Technology Management should incorporate "tech refresh", Open Systems and TLCSM opportunities.

The objective of this policy change is to provide focus on technology transition, continuous product improvement and life cycle cost savings available in Open Systems development and to a limited degree within other programs. The Technology Management section should complement the competition strategy within the Acquisition Strategy and be consistent with the program Risk Management Plan, the System Engineering Plan and the Test and Evaluation Management Plan. An appropriate level of resources must be reflected in the program budget and carried into the Acquisition Program Baseline. Separate identification and accounting of the specific funding planned for Technology Management is recommended in order to allow visibility and oversight of the Technology Management effort. The identified funding is not intended as a program management reserve, but as a formalized means to take full advantage of active risk management, life-cycle cost reductions and Open System benefits to provide long term cost savings and rapid capability improvement.

2.1.1.5. Information Sources and References
- Interview with CAPT Eric Sweigard, OPNAV N866, 3 October 2006
- Interview with RADM C. H. Hamilton, III, PEO Ships, 16 January 2007
- Interview with Linda Whittington, PEO C4I, Director S&T, 29 September 2006
- Interview with Jenny Servo, Dawnbreaker Inc. 11 January 2007
- Interview and group discussion with Mr. Ralph Skiano, PMW-180, Deputy PM

- Interview with Mr. Richard McNamara, Deputy PEO, PEO Submarines, 30 November 2006

- DoD Instruction 5000.2, "Operation of the Defense Acquisition System," Defense Acquisition Guide Sections, 12 May 2003

- SECNAVINST 5000.2C, "Implementation and Operation of the Defense Acquisition and the Joint Capabilities Integration and Development System," Sections 2.5.4.4, 19 November 2004

- Draft Acquisition Strategy Guide, Fifth Edition, Defense Acquisition University Press, June 2003: Section 2.2.6 discussion on Technology Transition; Section 2.2.7 discussion on Affordability Improvements; Section 2.2.6 Business Strategy including discussion on Small Business Innovative Research; Table 3-3 Section 6 including section 6.1 Technology Transition, Section 6.2 Open Systems and Section 7.2 Affordability Improvements; and example WIN-Tactical Acquisition Strategy, Section 1.2.3 Technology Insertion

- Manager's Guide to Technology Transition in an Evolutionary Acquisition Environment, Version 2.0, Defense Acquisition University Press, June 2005

- "Designing and Assessing Supportability in DoD Weapon Systems: A Guide to Increased Reliability and Reduced Logistics Footprint" Office of the Under Secretary of Defense, Acquisition, Technology and Logistics, Section 2.2, October 24, 2003

2.1.2. Recommended Document Changes

2.1.2.1. DoD Instruction 5000.2, "Operation of the Defense Acquisition System," 12 May 2003 (Extract of Section 3.7.2.2)

2.1.2.1.1. Current Text
3.7. System Development and Demonstration

Recommended content revision for three key DoD documents includes the current text, proposed text, and rationale for revision.

3.7.2.2. - "The management and mitigation of technology risk, which allows less costly and less time-consuming systems development, is a crucial part of overall program management and is especially relevant to meeting cost and schedule goals. Objective assessment of technology maturity and risk shall be a routine aspect of DoD acquisition. Technology developed in S&T

or procured from industry or other sources shall have been demonstrated in a relevant environment or, preferably, in an operational environment to be considered mature enough to use for product development in systems integration. Technology readiness assessments, and where necessary, independent assessments, shall be conducted. If technology is not mature, the DoD Component shall use alternative technology that is mature and that can meet the user's needs."

2.1.2.1.2. Recommended Change
Add two new sentences at the end of the paragraph to read:

"Technology Management to include technology risk management, life cycle cost trades and an integrated Technology Insertion Plan for COTS and technology refresh and incorporation of mature SBIR, STTR and JCTD technologies shall be considered as part of technology planning evolved from the Technology Development Strategy into the Acquisition Strategy for the System Development and Demonstration Phase. Additionally, Open Systems programs should specifically include multiple technology entry points or transition gates throughout the SD&D phase to permit replacement of existing components or modules when the new technology is fully mature and risk is well contained."

2.1.2.1.3. Rationale
Addition of the first sentence provides guidance for technology planning to validate appropriate risk management and technology transition processes available to permit valid systems engineering cost and performance trades during the SD&D phase. The existing guidance appears to preclude technology insertion during SD&D, regardless of benefit. Addition of the second sentence highlights and reinforces the benefits of Open Systems to gain continuous product and performance improvement and life-cycle cost savings throughout product development.

2.1.2.2. Defense Acquisition Guide
2.1.2.2.1. Current Text
Section 2.3 Systems Acquisition: Acquisition Strategy

In Table 2.3.1, No mention is made of Technology Management, Technology Transition or continuation of the Technology Development Strategy as principal considerations associated with development of the acquisition strategy.

2.1.2.2.2. Recommended Change

Add a new Acquisition Strategy Consideration for Technology Management "hot-linked" to a new paragraph on Technology Management, as follows:

> "The Acquisition Strategy will include a section on Technology Management to include the Technology Development Strategy for future spirals as well as plans for technology risk management, COTS refresh, technology refresh, and technology insertion or transition of Small Business Innovative Research (SBIR), Small Business Technology Transition (STTR), Joint Concept Technology Demonstrations (JCTD) and other technology initiatives. It should also include considerations for technology based, reliability and other sustainability improvements and life cycle cost improvements. In modular open systems, technology refresh may include new mature technologies developed as applications that can be integrated during the SD&D phase."

2.1.2.2.3. Rationale

The addition of this section provides emphasis on carrying forward technology planning from the Technology Development Strategy approved for the Technology Development phase into the Acquisition Strategy governing the SD&D phase and introduces consideration for transition of mature technologies as a component of the overall program development. Including technology transition as an approved component of the Acquisition Strategy provides a basis for resource planning and justification. The objective is to plan and resource properly for technology transition to avoid a "valley of death" lag in time from when technology is mature until funding is applied to make the transition. This proposed guidance is similar to Technology Insertion Planning initial utilized in the Navy's DD(X) program and also parallels the technology transition discussion noted in Section 2.6.6 in the draft Acquisition Strategy Guide, DAU Press, June 2003.

2.1.2.3. SECNAVINST 5000.2C, "Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System," Nov 19, 2004 (Extract of Section 2.5.4.4)

2.1.2.3.1. Current Text

2.5.4.4 Technology Development "Technology development is normally part of the pre-systems acquisition effort conducted prior to program initiation. Shipbuilding programs may be initiated at Milestone A in order to start Ship Design concurrent with sub-system/component technology development."

2.1.2.3.2. Recommended Text

Add paragraph at Section 2.5.4.4, as follows:

"In spiral development, Technology Development Strategies will be incorporated into the Acquisition Strategy in accordance with section 3.7.2.3 of reference b. For Navy and Marine Corps programs, the incorporation of technology development strategies shall be represented in a section on Technology Management within the Acquisition Strategy. The Technology Management section will include the Technology Development Strategy for future spirals as well as plans for technology risk management, COTS refresh, technology refresh, and technology insertion or transition of Small Business Innovative Research (SBIR), Small Business Technology Transfer (STTR), Joint Concept Technology Demonstrations (JCTDs) and other technology initiatives. In modular open systems, technology refresh may include new mature technologies developed as applications that can be integrated during the SD&D phase."

2.1.2.3.3. Rationale

The addition of this paragraph provides emphasis on carrying forward technology planning from the Technology Development Strategy approved for the Technology Development phase into the Acquisition Strategy governing the SD&D phase and introduces consideration for transition of mature technologies as a component of the overall program development. Including technology transition as an approved component of the Acquisition Strategy provides a basis for resource planning and justification. The objective is to plan and resource properly for technology transition to avoid a "valley of death" lag in time from when technology is mature until funding is applied to make the transition.

2.1.2.4. Extract of SECNAVINST 5000.2C, Section 3.4.6:
2.1.2.4.1. Current Text

3.4.6 Design Considerations Affecting the Acquisition Strategy

3.4.6.1 Open Systems Approach
"Open systems approach shall be applied as an integrated technical approach and is intended to be used for all systems, including support systems." quintessential

2.1.2.4.2. Recommended Text

Add paragraph at Section 3.4.6, as follows:

"To reduce overall system risk, the introduction of new technologies into open systems should not be considered until system interfaces are well developed, tested and approved. Thereafter, there is opportunity for considerable flexibility for technology transition and a means to capture Navy technology investments from SBIR, STTR and other S&T sources. An initial and conservative modular baseline design approach can include multiple entry points throughout the System Development and Demonstration phase to permit replacement of existing components or modules when the new technology is fully mature and risk is well contained. This open and more continuous change approach allows new modular components and applications to mature at their own rate and enter into the system only when fully tested and ready. Essentially, technology transition opportunities should be considered as part of existing "make or buy" decisions during system development but expanded to maintain options to incorporate alternative technologies as they become available. Permitting technology transition throughout the System Development and Demonstration phase will permit more rapid integration of new technologies without having to delay for the next development spiral. Change management through the Navy's Rapid Capabilities Integration Process (RCIP) should be considered, if applicable. Plans to include technology transition in open systems development should be indicated in the Acquisition Strategy and fully described in the System Engineering Plan."

2.1.2.4.3. Rationale

The addition of this paragraph provides greater emphasis on the benefits of Open Systems and highlights the associated opportunities to control risk while increasing competition, gaining opportunity for technology transition, maintaining currency, and lowering life-cycle costs. At the enterprise level, the Navy will make better use of investment dollars by being able to incorporate technologies more rapidly in each system and horizontally across multiple systems.

2.1.3. Navy Policy Change to Improve Technology Transition in Acquisition Programs– Planning and Programming

2.1.3.1. Issue

There is inadequate program funding to cover the technology "valley of death" or the hiatus in funding when funding shifts from RDT&E 6.3 S&T sponsored funding to RDT&E 6.4 acquisition funding. The impact of this issue is particularly severe for technologies developed by SBIR and similar programs that are not within the pre-acquisition development stream for Navy acquisition programs.

2.1.3.2. Background

An acknowledged problem in the acquisition community, supported by feedback from several interviews is that there is inadequate funding programmed to transition a SBIR project from S&T technology development into an acquisition program of record. Note: This issue is linked to a policy issue paper advocating a change to policy to require transition planning as an integral part of the Acquisition Strategy.

2.1.3.3. Discussion

Recent policy direction from ASN(RDA) reflects a need to control cost growth in each program and specifically cautions against "incremental capability increases through P3I or other good ideas (that) can result in significant cost increases." The memorandum on "ACQUISITION PROGRAM COST GROWTH; MANAGEMENT OF ENGINEERING CHANGE PROPOSALS" also acknowledges that some changes to reduce life cycle costs are needed and can be submitted for consideration to the Resource Sponsor. The important aspect of this memorandum is that budgets developed for each program must fully fund the program to reasonably reflect the projected cost of incorporating necessary changes. In order to take advantage of SBIR, STTR, JCTD, Navy FNC and other technology opportunities, programs must project and budget for a reasonable amount of technology transition. For example, since 2.5% of the acquisition RDT&E budget is allocated to SBIR technology development, a reasonable amount of transition funding should be allocated within each program's budget to take advantage of SBIR products. This is especially important for new open systems development and concepts such as the LCS Sea Frame, where the system design allows new technology solutions at the subsystem of even component level, independent of major system baselines (or in LCS case, the next Mission Package spiral). Change is needed to implement an open architecture business model in the Navy.

Inadequate program funding to sufficiently mature technology for transition is an acknowledged DoD problem.

To meet DoD cost growth management, Systems Engineering and Open Systems goals, better technology transition funding is necessary.

The Navy Requirements and Resource Review process is where this problem should be raised, with a parallel effort to include Technology Management as a required Acquisition Strategy element.

2.1.3.4. Recommendation

Develop briefing for presentation by OPNAV N091 at a future Requirements and Resource Review (R3B) meeting to highlight the need to program funding for technology refresh and technology transition as part of the overall budget in each program. Coordinate with parallel effort to modify Navy acquisition policy guidance to include technology management as a required element of the Acquisition Strategy for each acquisition program.

2.1.3.5. Information Sources and References

- Interview with CAPT Eric Sweigard, OPNAV N866, 3 October 2006
- Interview with RADM C. H. Hamilton, III, PEO Ships, 16 January 2007
- Interview and group discussion with Mr. Ralph Skiano, PMW-180, Deputy PM, and other PMW-180 personnel
- Interview with Mr. Richard McNamara, Deputy PEO, PEO Submarines, 30 November 2006
- Interview with Bill Johnson, Deputy PM, PEO IWS Future Combat System Open Architecture, 6 February 2007
- Interview with Mr. Hank Hinkle, Deputy PEO(T), 12 January 20
- ASN(RDA) Memorandum: ACQUISITION PROGRAM COST GROWTH; MANAGEMENT OF ENGINEERING CHANGE PROPOSALS, 04 December 2006

2.1.3.6. Related Discussions

- Interview with Linda Whittington, PEO C4I, Director S&T, 29 September 2006 (Lack of T&E funding for SBIR development and transition; strengthen business case for alignment with acquisition programs)
- Interview with Jenny Servo, Dawnbreaker Inc. 11 January 2007 (Lack of T&E funding for SBIR development and transition)
- Interview with Ed Anderson, Deputy PEO(W) Advanced Technology Directorate, 11 January 2007 (Involvement of OPNAV Requirements Officer to support SBIR use)
- Interview with Rob McHenry, PMS 501 (Involvement of OPNAV Sponsor to support SBIR use) 21 February 2007
- Interview with William McGregor, N880 Science and Technical Advisor, 16 November 2006 (Align SBIR initiatives with OPNAV sponsored programs and roadmaps)

2.1.4. Navy Policy Change to Improve Technology Transition in Acquisition Programs – Acquisition Plan Guide

2.1.4.1. Issue

Navy acquisition planning guidance to contracting officials included in the Department of the Navy Acquisition Plan Guide does not incorporate the important material provided in the Naval Open Architecture (NOA) Contract Guidebook that supports implementation of Naval Open Architecture. Neither document provides emphasis on the opportunities gained with Open Architecture to facilitate Technology Insertion, promote Technology Refresh and the application of SBIR and STTR technologies.

2.1.4.2. Background

Open Architecture can provide a significant foundation to foster Technology Refresh from SBIR, STTR, JCTD, ONR FNC and other technology sources. Incorporation of SBIR technologies from Small Business Concerns provides innovation and an alternate source of mission solutions. Information and examples given in interviews strongly support Open Architecture as a means to expand open competition, improve product performance and reduce cost. The requirement for Open Architecture implementation was provided in OPNAV Requirements Letter of 23 December 2005. A combination of Open Architecture and SBIR projects demonstrated considerable flexibility and a more competitive means to reach acquisition program objectives within PEO SUBS and that success is now part of the Navy's business case for moving to Open Architecture.

2.1.4.3. Recommendations

Submit change proposal (see Recommended Document Changes, below) for the DoN Acquisition Plan Guide to incorporate an expanded application of Open Architecture and a greater emphasis on the use of SBIR, STTR and other technologies as applications within the architecture.

Submit feedback to PEO IWS 7 (see Recommended Document Changes, below) to recommend specific inclusion of SBIR, STTR and other small business technologies as potential sources of warfighting applications in the Naval Open Architecture Contract Guidebook.

Coordinate this change with a parallel effort to modify Navy acquisition policy guidance to include technology management as a required element in each Acquisition Strategy along with supporting changes in budget planning and programming.

The Navy Open Architecture initiative could offer excellent SBIR access into acquisition programs, but information from the NOA Contract Guide isn't included in the Navy Acquisition Plan Guide. PEO Sub success with NOA through SBIR should be a model to follow. Key document modifications are needed.

2.1.4.4. Information Sources and References
- Interview with CAPT Eric Sweigard, OPNAV N866, 3 October 2006
- Interview with RADM C. H. Hamilton, III, PEO Ships, 16 January 2007
- Interview and group discussion with Mr. Ralph Skiano, PMW-180, Deputy PM
- Interview with Mr. Richard McNamara, Deputy PEO, PEO Submarines, 30 November 2006
- Interview with Bill Johnson, Deputy PM, PEO IWS Future Combat System Open Architecture, 6 February 2007
- Interview with Mr. Hank Hinkle, Deputy PEO(T), 12 January 20
- Office of the Chief of Naval Operations Letter 9010, Ser N6N7/5U916276 of 23 December 2005, Subj: REQUIREMENT FOR OPEN ARCHI-TECTURE (OA) IMPLEMENTATION
- Department of the Navy Acquisition Plan Guide of March 2007, Section 6.4.7
- Naval Open Architecture Contract Guidebook, Version 1.0 of 7 July 2006, Chapter B, Subfactor 1c.

2.1.4.5. Recommended Document Changes:
2.1.4.5.1. Department of the Navy Acquisition Plan Guide, March 2007

2.1.4.5.1.1. Recommended Text
Revise paragraph 6.4.8 Modular Open Systems Approach (MOSA) to read:

"Modular Open Systems Approach (MOSA) and Naval Open Architecture Address use of MOSA and Naval Open Architecture.

Paragraphs 2.3.15, "Modular Open Systems Approach", 4.4.1, "Open Systems Design" and 5.4.1.1.2, "Life-Cycle Logistics (LCL) Considerations During Concept Refinement" of the Defense Acquisition Guidebook provide general advice and guidance. The Naval Open Architecture Contract Guidebook contains recommended language for Section C and associated CDRLs of contracts and Sections L and M of solicitations issued by the Navy and Marine Corps for National Security Systems or larger systems of systems."

2.1.4.5.1.2. Rationale
Update to include latest information specific to Naval Open Architecture

2.1.4.5.1.3. Recommended Text
Add a new paragraph 6.4.9 Other Technology Sources

"Discuss plans for insertion and transition of Small Business Innovative Research (SBIR), Small Business Technology Transition (STTR), Future Naval Capabilities (FNC), Joint Concept Technology Demonstrations (JCTD) and other outside sources of technology."

2.1.4.5.1.4. Rationale

Highlight additional opportunities to achieve the innovation, life cycle cost savings, and competitive objectives of open architecture and MOSA

2.1.4.5.1.5. Recommended Text

Renumber paragraph on Quality and Information Assurance to:

6.4.10 Quality and Information Assurance

2.1.4.5.2. Naval Open Architecture Contract Guidebook, PEO-IWS-7, 14 July 2006

2.1.4.5.2.1. Recommended Text

Page 1, in Background paragraph, modify the second sentence to read (changes underlined):

"Elements of the OA strategy include increasing opportunities for competition and innovation; transition of technologies from Small Business Innovative Research, Small Business Technology Transition, Future Naval Capabilities, Joint Capabilities Technology Demonstrations and other technology sources; enabling rapidly fielded and upgradeable systems; and optimizing software asset reuse."

2.1.4.5.2.2. Rationale

Introduce alternative sources of technology compatible with OA strategy and DoD guidance.

2.1.4.5.2.3. Recommended Text

Page 2, lines 2 & 3; Modify sentence to read (changes underlined):

"More importantly, OA will contribute to greater competition among system developers and component suppliers through the use of open standards and standard, published interfaces."

2.1.4.5.2.4. Rationale

Open systems with well-defined interfaces provide opportunities to compete at the component and modular level.

2.1.4.5.2.5. Recommended Text

Page 10, paragraph 1.m; Modify first sentence to read (changes underlined):

"Open Business Practices – The Contractor shall demonstrate that the modularity of the system design promotes the identification of multiple sources of supply and/or repair, and supports flexible business strategies that enhance subcontractor competition <u>or incorporation of alternative sources such as SBIR and STTR</u>."

2.1.4.5.2.6. Rationale

Inserted to expand the pool of alternatives considered. SBIR and STTR technologies may have been developed specifically to address the required application or a similar application and are usually available at low cost to the program.

2.1.4.5.2.7. Recommended Text

Page 13, Subfactor 1.c, Technology Insertion and Refresh; Insert a new sentence after the first sentence to read:

"The Offeror will specifically address how SBIR, STTR, Future Naval Capabilities, JCTDs and other government technology programs will be considered."

2.1.4.5.2.8. Rationale

Government technology programs can be overlooked by contractors in favor of in-house solutions or subcontractor efforts as a more attractive business case for the contractor. The best value solution for the government may be to make use of existing government investments in technology programs.

2.1.4.5.3. Draft Memo for Acquisition Plan Guide Changes

2.1.4.5.3.1. Recommended Text

MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (RESEARCH, DEVELOPMENT AND ACQUISITION), ATTN: DASN(ACQ)

Various memoranda from top Navy offices are needed to launch policy revisions.

From: Director, Naval SBIR & STTR Program, Office Of Naval Research, Code 03TSB

Subj: Department of the Navy Acquisition Plan Guide of March 2007; Recommendation for changes

Ref: (a) Department of the Navy Acquisition Plan Guide, March 2007

      (b) Naval Commercialization Pilot Program (CPP) Implementation Study Final Report, XX July 2007

1. We are submitting the recommended changes indicated below to reference (a) to improve consideration and the potential for <u>transition of technologies from Small Business Innovative Research, Small Business Technology Transition, Future Naval Capabilities, and Joint Capabilities Technology Demonstrations</u>, as valid technology sources in Modular Open Systems Architecture. These recommendations were based upon research, interviews and surveys conducted as part of a study related to implementing an SBIR Commercialization Pilot Program authorized by Congress. The study, reference (b), found that the Acquisition Plan Guide did not include the most current information from the Naval Open Architecture (NOA) Contract Guidebook and did not provide emphasis on the opportunities gained with Modular Open Systems Architecture to facilitate Technology Insertion, promote Technology Refresh and the application of SBIR, STTR, Future Naval Capabilities, JCTD or other technologies that originate outside each individual program.

2.1.4.5.3.2. Recommended changes to Department of the Navy "Acquisition Plan Guide," March 2007

2.1.4.5.3.2.1. Recommended Text

Revise paragraph 6.4.8 Modular Open Systems Approach (MOSA) to read:

> **"Modular Open Systems Approach (MOSA) and Naval Open Architecture. Address use of MOSA and Naval Open Architecture.** Paragraphs 2.3.15, "Modular Open Systems Approach", 4.4.1, "Open Systems Design" and 5.4.1.1.2, "Life-Cycle Logistics (LCL) Considerations During Concept Refinement" of the Defense Acquisition Guidebook provide general advice and guidance. The Naval Open Architecture Contract Guidebook contains recommended language for Section C and associated CDRLs of contracts and Sections L and M of solicitations issued by the Navy and Marine Corps for National Security Systems or larger systems of systems."

2.1.4.5.3.2.2. Rationale

Update to include latest information specific to Naval Open Architecture

Add a new paragraph:

6.4.9 Other Technology Sources
"Discuss plans for insertion and transition of Small Business Innovative Research (SBIR), Small Business Technology Transition (STTR), Future Naval Capabilities (FNC), Joint Concept Technology Demonstrations (JCTD) and other outside sources of technology."

2.1.4.5.3.2.3. Rationale

Highlight additional opportunities to achieve the innovation, life cycle cost savings, and competitive objectives of open architecture and MOSA.

2.1.4.5.3.2.4. Recommended Text

Renumber paragraph on Quality and Information Assurance to:

6.4.10 Quality and Information Assurance

2. Please contact Mr. John Williams, Director, Naval SBIR & STTR Programs, Office Of Naval Research, Code 03TSB, williajr@onr.navy.mil, (703) 696-0342 if you have questions or for further discussion.

Respectfully,

John Williams

Memorandum to be submitted by mail to:

DASN(ACQ)
1000 NAVY PENTAGON, BF992
WASHINGTON DC 20350-1000

2.1.4.5.4. Draft Memo for Open Architecture Contract Guide Changes

2.1.4.5.4.1. Recommended Text:

MEMORANDUM FOR PROGRAM MANAGER, FUTURE COMBAT SYSTEMS OPEN ARCHITECTURE (PEO-IWS 7); ATTN: PEO-IWS 7B1

From: Director, Naval Small Business Innovative Research (SBIR) Program

Subj: NAVAL OPEN ARCHITECTURE CONTRACT GUIDEBOOK; RECOMMENDATION FOR CHANGES

Ref: (a) "Naval Open Architecture Contract Guidebook," PEO-IWS-7, 14 July 2006

(b) Naval Commercialization Pilot Program (CPP) Implementation Study Final Report, XX July 2007

1. We are submitting the recommended changes indicated below to reference (a) to improve consideration and the potential for transition of several technologies originating within DoD and the Navy. These recommendations were based upon research, interviews and surveys conducted as part of a study related to implementing an SBIR Commercialization Pilot Program authorized by Congress. The study, reference (b), found that the Naval Open Architecture Contract Guidebook did not explicitly include technology sources that have been successfully implemented in several programs. Specifically, Navy contracting guidance provided in the Naval Open Architecture (NOA) Contract Guidebook does not provide emphasis on the opportunities gained with Open Architecture to facilitate Technology Insertion, promote Technology Refresh and the application of SBIR, STTR, Future Naval Capabilities, JCTD or other technologies that originate outside each individual program.

2.1.4.5.5. Recommended changes to "Naval Open Architecture Contract Guidebook," PEO-IWS-7, 14 July 2006

2.1.4.5.5.1. Recommended Text

Page 1, in Background paragraph, modify the second sentence to read (changes underlined):

"Elements of the OA strategy include increasing opportunities for competition and innovation; transition of technologies from Small Business Innovative Research, Small Business Technology Transition, Future Naval Capabilities, Joint Capabilities Technology Demonstrations and other technology sources; enabling rapidly fielded and upgradeable systems; and optimizing software asset reuse."

2.1.4.5.5.2. Rationale

Introduce alternative sources of technology compatible with OA strategy and DoD guidance.

2.1.4.5.5.3. Recommended Text

Page 2, lines 2 & 3; Modify sentence to read (changes underlined):

"More importantly, OA will contribute to greater competition among system developers and component suppliers through the use of open standards and standard, published interfaces."

2.1.4.5.5.4. Rationale

Open systems with well-defined interfaces provide opportunities to compete at the component and modular level.

2.1.4.5.5.5. Recommended Text

Page 10, paragraph 1.m; Modify first sentence to read (changes underlined):

"Open Business Practices – The Contractor shall demonstrate that the modularity of the system design promotes the identification of multiple sources of supply and/or repair, and supports flexible business strategies that enhance subcontractor competition or incorporation of alternative sources such as SBIR and STTR."

2.1.4.5.5.6. Rationale

Inserted to expand the pool of alternatives considered. SBIR and STTR technologies may have been developed specifically to address the required application or a similar application and are usually available at low cost to the program.

2.1.4.5.5.7. Recommended Text

Page 13, Subfactor 1.c, Technology Insertion and Refresh; Insert a new sentence after the first sentence to read:

"The Offeror will specifically address how SBIR, STTR, Future Naval Capabilities, JCTDs and other government technology programs will be considered."

2.1.4.5.5.8. Rationale

Government technology programs can be overlooked by contractors in favor of in-house solutions or subcontractor efforts as a more attractive business case for the contractor. The best value solution for the government may be to make use of existing government investments in technology programs.

2. Please contact Mr. John Williams, Director, Naval SBIR & STTR Pro-

grams, Office of Naval Research, Code 03TSB, williajr@onr.navy.mil, (703) 696-0342, if you have questions or desire further discussion.

Respectfully,

John Williams

Memorandum to be submitted by mail to: Program Manager, Future Combat Systems Open Architecture (PEO-IWS 7.0)1333 Isaac Hull Avenue SE Washington Navy Yard, Washington, DC 20376-2301

2.2. Project (Gated) Process Initiative

2.2.1. Issue

The Navy SBIR program is currently executed via a process, illustrated in the figure below, that divides the SBIR process into distinct phases defined primarily by contractual options executed within the SBIR Phase I, II, and III construct. Findings from the Tiger Team Initiative indicate that there is a lack of transition planning, prime contractor involvement and other systemic weaknesses within the current process.

Figure 22 | Navy SBIR Processes
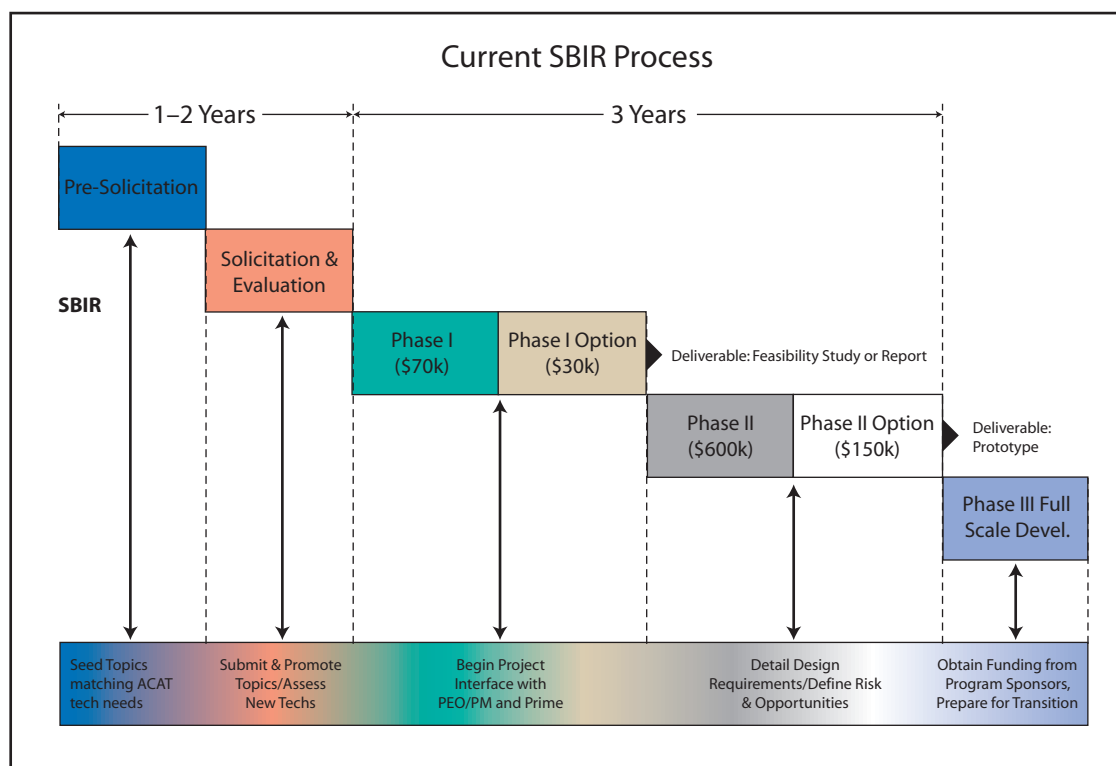
Navy SBIR transitions could improve through better transition planning and prime contractor involvement, and by implementing GAO recommendations for gated decision-making, as Navy is already attempting on a pilot basis.

2.2.2. Background

The GAO report on best practices in technology transition and the NAVAIR AIRspeed SBIR Six Sigma Study recommend a gated process as an efficient and systematic methodology for managing technology exploration, development and transition. The recommended process includes formalized gates that are essentially checkpoints for specific performance. Implementation of an overall SBIR process in performance phases with specific gates provides a more logical SBIR management strategy and allows early alignment to acquisition program needs. That in turn will make for easier SBIR transitions into acquisition programs of record.
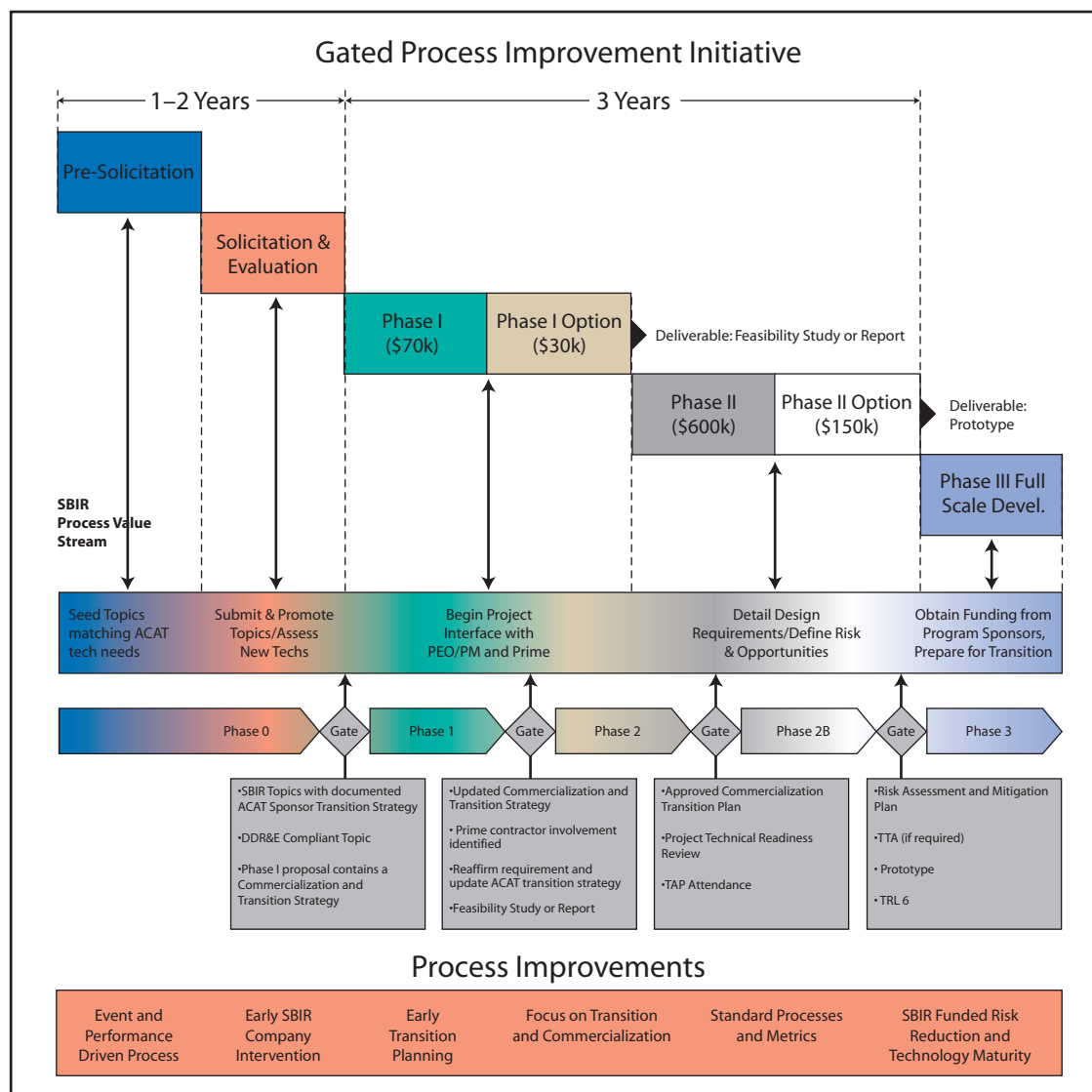
2.2.3. Discussion

A number of best practices initiatives have bee identified and a wide range of improvement recommendations have been made in this report. In order to effectively implement and execute these recommendations, the study team recommends the Navy SBIR Program Director implement a strategic "Project Process Initiative" with the goal of achieving program-wide improvement through use of a gated process. As part of this initiative, the study team recommends the incorporation of improved "performance gates," which establish the entry/exit criteria and deliverables for each phase into the current SBIR process.

Table 1 | Gated Process Improvement Initiative

Initiative Objective	Desired Benefit
Event and Performance Driven Processes	Uniform Performance Gate Deliverables Cost-efficient and uniform Program execution across SYSCOMs and Navy SBIR Enterprise Uniform training of value stream participants
Early SBIR Company Intervention	Increase supplier reliability Increase technology maturity
Early Transition Planning	Increase SBIR Technologies formally tied to Warfighter requirements Formalize ties to Acquisition programs and processes Early identification of T&E funding and other transition requirements
Focus on Transition and Commercialization	Promotion of dual use of SBIR technologies Early identification of Phase III transition and commercialization strategies
Standard Processes, Documentation and Metrics	Cost-efficient and uniform Program execution across SYSCOMs and Navy SBIR Enterprise Apples-to-apples performance measurement across SYSCOM programs Accelerate bureaucratic processes Improve Program Management with reliable data and consistent metrics
Funded Risk Reduction and Technology Maturation	Achieve TRL 6 for Acquisition Program Transition Formalize Transition process and tie SBIR process to Acquisition Process Incentivize Acquisition Programs and Primes through shared funding Improve SBIR transitions by facilitating transition risk reduction into PORs

## Figure 23 | Gated Process Improvement Initiative

The following table and figure illustrate the objectives and top-level concept of an improved Navy SBIR Gated Process. A discussion of each phase follows.

2.2.3.1. Phase 0: Topic Generation (SBIR Funded)
2.2.3.1.1. Process Improvements

a. Require a "Transition Strategy" or roadmap be provided by topic sponsors indicating the intended transition for the technology (i.e. Weapon System, Future Naval Capability, Acquisition Program Requirement, etc.).
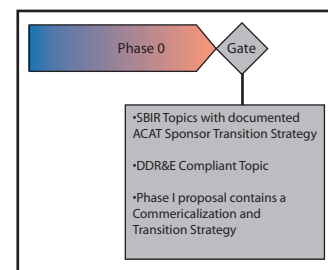
b. Initiation of a formal prime contractor input process into the topic generation process (if appropriate).

c. Provide topic authors (TPOCs, PMO personnel, etc.) with topic generation training that uniformly promulgates DDR&E topic guidance.
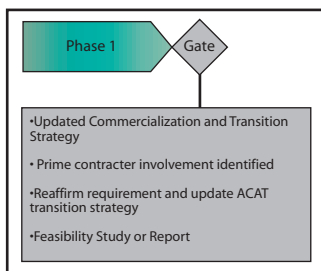
2.2.3.1.2. Performance Gate Deliverables

a. Published SBIR Topics with documented 'Transition Strategies' provided by the topic author and sponsoring PMO. Strategies should contain enough detail to provide SBIR companies with sufficient information to support a Commercialization and Transition Strategy in their Phase I and II proposals

b. Topics with content in alignment with DDR&E guidance

2.2.3.1.3. Phase 0 Changes and Rationale

Transition strategies are introduced to ensure that the topic authors develop topics that are aligned to warfighter needs and have a potential transition path to eventually field the technology. Desired impact: Increased percentage of SBIR transitions. Additional training is recommended to improve topic alignment with DDR&E guidance. Desired impact: more efficiency to speed overall SBIR process leading to quicker transition of SBIR technologies.

2.2.3.2. Phase 1: Feasibility (SBIR Funded)
2.2.3.2.1. Process Improvements

Phase 1 Gate

•Updated Commercialization and Transition Strategy

• Prime contracter involvement identified

•Reaffirm requirement and update ACAT transition strategy

•Feasibility Study or Report

a. Initiate a Phase I intervention which provides the SBIR companies transition strategy/plan assistance, information on contracting and DCAA audit requirements.

b. Expand the existing Commercialization Report submitted by SBIR companies as part of their proposal submission to include a 'Transition Strategy' which outlines the company's plan for commercialization and/or transitioning the technology into a DoD Weapon System or Platform. The report should also identify any anticipated prime contractor involvement.

2.2.3.2.2. Performance Gate Deliverables

<u>Entry</u>

a. Phase I proposal which contains a Commercialization and Transition Strategy

Exit
a. Updated Commercialization and Transition Strategy
b. Prime contractor involvement identified and appropriate actions initiated if transition expected in existing acquisition program
c. Topic sponsors reaffirm requirement and update transition strategy during down select of Phase I projects for Phase II. Information provided to firms invited to continue into Phase II

2.2.3.2.3. Phase I Changes and Rationale:

SBIR company transition strategies are introduced to ensure that the companies appreciate the need for a potential transition path to eventually field the technology. If the transition path will be through work with a prime contractor, then an effort to build a preliminary linkage with the prime is desired to ensure that the appropriate industry driven conditions will be met for SBIR technology use.

i. Desired impact: Increased percentage of SBIR transitions. Additional or refined transition information is provided by topic sponsors to assist the SBIRs company.

ii. Desired impact: more efficiency to speed overall SBIR process leading to quicker transition of SBIR technologies.

2.2.3.3. Phase 2: Prototype Development (SBIR Funded)
2.2.3.3.1. Process Improvements

Phase 2 | Gate

•Approved Commercialization Transition Plan

•Project Technical Readiness Review

•TAP Attendance

a. Expand the existing Phase II proposal's "Commercialization Report" to include a preliminary Transition plan. These documents should be contractual deliverables which are updated at the end of year one and submitted to the TPOC for approval.
b. Revalidated sponsor requirement and Transition Strategy. This update is formally discussed by TPOCs during Phase II Kick-off meeting
c. Consider providing the Transition Assistance Program (TAP) earlier during Year 1 of Phase II
d. Expand TAP or provide additional intervention to cover:
  i. Business planning as it relates to growth required to transition from Phase II to Phase III (capital investment, hiring, Quality Assurance systems, etc.)
  ii. Manufacturing
  iii. Risk Management in a DoD Weapons System or Program
  iv. Government Contract Compliance issues.
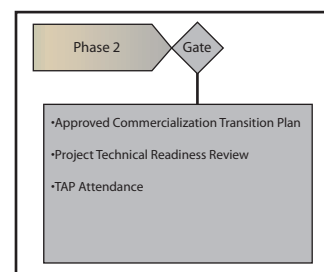
e. Require a formal project review at the end of Year 1 (prior to execution of second option). Note: Examples of successful review processes include NAVSEA dedicated PEO project reviews at the end of year 1 and NAVAIR CPP portfolio review utilizing web-based tools.

2.2.3.3.2. Performance Gate Deliverables

Entry

    a. Phase II proposals which contain Commercialization Reports and Transition Plans

Exit

    a. Updated Commercialization and Transition Plan submitted to the TPOC by SBIR Company for Government approval at the end of Option Year 1

    b. Project Review conducted at the end of Option Year 1

    c. TAP Attendance (voluntary)

2.2.3.3.3. Phase 2 Changes and Rationale

Transition plans are introduced to formalize the transition planning. Desired impact: Improved focus on testing and resources required to demonstrate the technology and transition it into PORs. Sponsors at OPNAV or program level are required to revalidate the requirement for the technology to avoid more investment if the technologies are no longer required. Desired impact: Increased percentage of SBIR transitions. Moving TAP earlier and increasing emphasis on transition would provide better timing for small companies as they begin to look at the transition process. Desired impact: more efficiency to speed overall SBIR process leading to rapid transition of SBIR technologies.

2.2.3.4. Phase 2B: Risk Reduction and Technology Maturation (if required)

2.2.3.4.1. (SBIR and Acquisition Program Shared Funding) Process Improvements
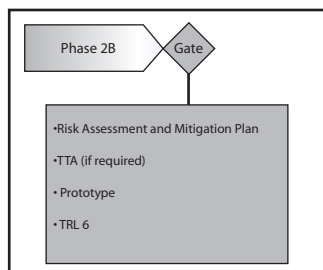
    a. Initiate Phase 2B as required to facilitate technology transitions into PORs.

    b. Promulgate guidance for expanded SBIR contract ceilings, SBIR investment strategies for funding T&E, documentation requirements, conduct of supplier Transition Risk Assessments and due diligence associated with significant SBIR funded transition investments.

    c. Execute Technology Transition Agreements (TTA) with applicable value stream participants (Acquisition PMOs, SBIR PMs, SBIR Com-

panies, primes, investors, etc.)
   d. Provide focused supplier intervention and assistance to address transition risks
   e. Assign SBIR Transition Managers at the PEO level and/or large PMOs with multiple SBIR transitions to facilitate execution of the TTA

2.2.3.4.2. Performance Gate Deliverables

Entry
   a. Supplier Transition Risk Assessment and Risk Mitigation Plans submitted for Government approval
   b. Technology Transition Agreement (TTA) to include detailed project plan identifying funding sources, funding profiles by Fiscal Year (FY) and test planning to demonstrate capability and technical maturity
   c. Transition Manager(s) assigned at the PEO or PMO level to facilitate execution of the TTA

Exit
   a. SBIR Technology at or above TRL 6

Phase 2B Changes and Rationale: Transition plans and formal Technology Transition Agreements are executed in this phase. The Transition Manager, acting for the acquisition program, ensures that prerequisites for transition are identified and completed. Desired impact: Increased percentage of SBIR transitions and more rapid incorporation of technologies through close liaison with the sponsoring program office.

2.2.3.5. Phase 3: Program of Record (POR) transition (Non-SBIR Funded) Commercialization or Integration into Acquisition Program
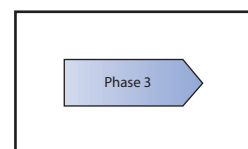
2.2.3.5.1. Process Improvements

   a. Initiate a metric collection strategy to support Phase III and POR transitions

2.2.3.5.2. Performance Gate Deliverables

   a. Transition success and rate data

2.2.3.5.3. Phase 3 Changes and Rationale

Introduction of a standardized metrics set is required to evaluate SBIR and CPP success and to capture lessons for improvement.

Phase 3

2.2.3.5.4. Outreach and Education

An element essential to the successful implementation of this initiative will be a robust, effective outreach and the education of the Navy SBIR Enterprise value stream participants. Consequently, as part of the training strategy, The Tiger Team recommends implementation of web-based training that is standardized across the program (with some degree of flexibility to allow tailoring at the SYSCOM level) prior to process improvement changes to ensure SBIR value stream participants all have access to information on the new processes.

The web-based, standardized training should include:

- SBIR Process Changes
- Navy SBIR Policy and Program Execution Guidance
- TPOC general duties and responsibilities
- Transition Manager general duties and responsibilities
- Topic generation guidelines to ensure DDR&E compliance
- SBIR Data Rights

2.2.3.5.5. Recommendation

Implementing the Gated Process Improvement Initiative will require the commitment of the SBIR Program leadership, a detailed plan of action and resources. Consequently, the Tiger Team recommends that the Navy SBIR Program Director charter a Process Action Team (PAT) consisting of the SYSCOM SBIR Program Managers to plan, implement and manage this initiative. The Web-based training noted above is included as an opportunity to incorporate multiple objectives in a single, accessible training package supporting this initiative.

2.2.3.5.6. Information Sources and References

- "Best Practices: Stronger Practices Needed to Improve DOD Technology Transition Processes", General Accounting Office, Report No.: GAO-06-883, September 2006

- Interview and briefings by Dale Moore, Deputy Coordinator NAVAIR Airspeed Project; NAVAIR Airspeed SBIR Six Sigma Stud

2.3. Program Management Initiative

2.3.1. Issue

Although Navy Open Architecture promises to expand opportunities for inclusion of more SBIR technologies, an accessible infrastructure that would enable more direct Small Business participation is not readily available.

The Program Management Strategic Initiative addresses the need for improved Navy-wide opportunity for the participation of small businesses in system development and acquisition. In order to be fair and open, the opportunities presented must also be in a competitive environment. The thrust of this initiative is to expand opportunities through an enhanced Navy Open Architecture implementation. The strategic initiative also focuses on achieving greater efficiencies in the SBIR administration and management processes to shorten the overall timeline from initiation of a topic until transition into an acquisition program of record. The net results of a successful enterprise management initiative will be more opportunity for Small Businesses, especially through SBIR, and more rapid assimilation of technologies generated by small business into the acquisition mainstream.

2.3.2. Background

Navy PMs, government teams and prime contractors have few incentives to include SBIR technologies which may be considered high risk in developing systems. From the program and prime contractor perspective, the risk may be significant because they have little or no direct authority over SBIR technology development, and programs can only monitor progress. Although there are means to augment SBIR funding through Fast Track and Enhanced Phase II programs, SBIR projects still remain outside the program span of control until Phase III. Even then, there may be significant hurdles before a technology is ready for implementation in a Program of Record.

For all of these reasons, SBIR technologies are usually considered only during the Technology Development Phase and included following a Technology Readiness Assessment. Technologies selected must be fully mature and available by system Preliminary Design Review or, typically, implementation must await programming as part of Planned Product Improvement or inclusion in the next major program design spiral. The overall result is limited opportunity for small businesses to participate in major system development except as a subcontractor. SBIR companies are almost completely excluded unless the timing and maturity of their product fits a small window in the major system development timeline. At the Navy Enterprise level, a significant amount of RDT&E funding is being invested in SBIR

To realize Navy Open Architecture opportunities, an accessible NOA infrastructure must be created, and SBIR process management improvements must occur to make SBIR solutions more competitive and mature in shorter timeframes.

technology without an efficient means to get the technology to the warf-ighter rapidly.

2.3.3. Discussion

The vision of Navy Open Architecture is to improve and sustain capability through modular changes and system improvements at relatively low risk and low cost through the standardization of system interfaces and design features. The Navy is moving to open system development to expand acqui-sition options and take advantage of more competition. Small Businesses are ready to meet those needs, if provided appropriate opportunities.

To realize NOA opportunity, varied resources must be made available early and inexpensively to facilitate test of SBIR hardware/software engineering designs in environments that simulate actual Open System environments…

Modular, Open Architecture can mitigate much of the risk involved with new technologies, expand competitive options, and reduce overall costs if sufficient resources are made available early in the program to develop an infrastructure that is accessible to many companies who can experiment and test their ideas and engineering designs in an environment that reasonably replicates the environment expected for the major open system design. The infrastructure investment needed by the Navy includes well defined physi-cal and electronic interface models, behavior models and hardware mock-ups with available reference scenarios, data collection and analysis to be able to measure performance in a simulated environment. Making this in-frastructure available at low cost to independent developers is equivalent to making a developer's tool kit available to software developers. The system behavior models, well-defined interfaces and performance thresholds in a simulation environment will provide well defined technical prerequisites for technology insertion and automatically resolve a primary concern ex-pressed in the SBIR company survey for better understanding of technology insertion requirements, process and timeline.

If components and SBIR product designs could be readily tested and veri-fied without substantial program office or prime contractor involvement, then the SBIR projects could self-manage to the point where a threshold performance and relevant product maturity is achieved. Significant barriers to transition would be removed and competition could be more open.

A more advanced step matched to SBIR Phase III efforts and designed to enable independent system integration activity and more mature integration processes would be allow access to government or contractor (under DFAR clauses 252.227-7025 and 252.227.7018) stand-alone laboratory equipment or the Navy's Distributed Engineering Plant for Hardware-in-the-Loop module testing. If encouraged as a component of Phase III SBIR develop-ment, this access could permit demonstration of SBIR technologies through

TRL 6 at the component level. Access (at no or low cost) to the Navy Distributed Engineering Plant (DEP) or other system hardware and computer programs as part of an enterprise approach would permit small companies to compete directly against all others for component system development with competitive selection based upon performance in the model. It would also permit small and mid-sized companies to compete more readily for development of new sensors and other, more complex hardware systems for consideration as a part of the larger weapon system. The Navy already invests in a similar process that permits experimentation in an operational environment at the Fleet level through Sea Trials.

… such as Navy's Distributed Engineering Plant for Hardware-In-The-Loop testing and the Navy Distributed Engineering Plant, and other major weapon system design interfaces – but major system acquisition must be decoupled from alternative component development, if innovative technologies are to be integrated.

Important advantages can be gained in the decoupling of major system acquisition timeline from alternative component development timelines. Major systems can be developed using mature technologies and reduced risk while maintaining a strategy for more advanced component replacement when requisite performance and maturity have been demonstrated. Competitors for advanced components will have greater insight into system design and will be able to deliver higher quality products. In many cases, SBIR technologies, as replacement components, can be substituted for an existing component at any time during the SD&D phase except during final preparations prior to major operational testing. This means rapid integration of new technologies and continuous product improvement at relatively low cost when the technologies are ready for transition.

2.3.4. Recommendation

Provide recommendation to Navy Acquisition Leadership to support and expand Navy Open Architecture tenants to permit no or low cost access to major weapon system design interfaces and appropriate components, modeling and test facilities within appropriate security policy. The LCS program, with its Sea Frame concept, appears to be the best candidate to serve as a pilot program for this concept.

2.3.5. Information Sources and References

- Interview with CAPT Eric Sweigard, OPNAV N866, 3 October 2006
- Interview with Mr. Richard McNamara, Deputy PEO, PEO Submarines, 30 November 2006
- Interview with Mr. William Johnson, PEO IWS7, 6 February 2007
- Interview with CDR Dave Byers and Bob Cepek, OPNAV N872, 21 November 2006
- Office of the Chief of Naval Operations Letter 9010, Ser N6N7/5U916276 of 23 December 2005, Subj: REQUIREMENT FOR OPEN ARCHITECTURE (OA) IMPLEMENTATION

- Department of the Navy Acquisition Plan Guide of March 2007, Section 6.4.7
- Naval Open Architecture Contract Guidebook, Version 1.0 of 7 July 2006, Chapter B, Subfactor 1c.

2.3.6. Develop Navy-wide Enterprise Database and Tools for SBIR Management

2.3.6.1. Issue

Data management within the Navy SBIR Program is fragmented and inconsistent. A common Program Manager's Database is difficult to use and is very labor intensive to maintain. Accurate SBIR transition data is not available except where manually tracked and updated frequently.

2.3.6.2. Background

Several interview reports indicate that useable data, particularly for transition monitoring, are not readily available. Those PEOs and SYSCOMS that do have reliable data found a means to manually obtain the data through personal telephone calls and interviews with SBIR companies. Some PEOs track transition success by the amount of external (non-SBIR) funding applied, some by a ratio of non-SBIR funding applied over amount of SBIR funding applied, and still others use the number of technologies transitioned. Also noted were several instances of SBIR duplication and poor knowledge sharing between SYSCOMS and PEOs across the Naval Enterprise.

2.3.6.3. Discussion

Interviewers were anxious to preserve the independence and distributed management of the Navy SBIR program and hesitated to ask for new standards. However; many recognized that some element of standardization is required for reporting purposes and for efficient program management.

2.3.6.4. Recommendation

To avoid significant disruption within the existing distributed organization, the Tiger Team recommends that the Director of the Navy SBIR Program initially establish a minimum set of standard metrics for use in the program with a follow-on objective of incorporating many of the metrics noted in section 5.3. We also recommend the development of a web-based information knowledge portal that includes the ability to pull data from SYSCOM databases if needed, in order to serve as a virtual common database. The knowledge portal could be extended to include the web-based training noted previously in the Gated Process Improvement Initiative.

Useable SBIR data for transition monitoring, which must reside at the PEO and SYSCOM level, is scant due to decentralized and inconsistent data management policies, tools and procedures. Standardized metrics and a web-based data portal are vital needs.

2.3.7. Achieve Greater Efficiencies in the SBIR Administration Process
2.3.7.1. Issue

The time from topic generation until actual topic development under a Phase II contract award is excessive when compared to the overall contract value and complexity. Until Phase II contract award, the government funding investment is $100k or less, but the time involved (excluding actual SBIR Phase I development) is several months. Included below are four related process and management elements and associated study team recommendations.

2.3.7.1.1. Expansive topic generation and review process (internal Department of the Navy)

2.3.7.1.1.1. Background:

As noted in section 5.2.3, initial SBIR topic generation and reviews take approximately nine months. Up to six months are spent within the SYSCOMs and PEOs in a series of reviews and topic refinement actions. The long topic development process runs counter to the any precept of critical warfighter need. If the need is critical, then nine months to consider and approve a topic is excessive.

2.3.7.1.1.2. Discussion

Rapid response to critical warfighter needs have been demonstrated in the Navy and elsewhere. One example is the process used by the Joint Improvised Explosive Device Defeat Organization (JIEDDO) for rapid technology insertion. One of the methods used by JIEDDO to reduce processing time is to follow a "battle rhythm" where specific tasks and reviews are scheduled frequently and routinely to minimize process delay and to facilitate rapid decisions. Essentially review and approval authorities are required to act on each topic or the topic will be forwarded to the next stage automatically. Once the rhythm was established, discipline improved and topics moved quickly through the selection process.

2.3.7.1.1.3. Recommendation

SBIR Program Manager and SBIR SYSCOM team review the JIEDDO process and establish a similar prototype process for SBIR topic generation with appropriate metrics in place to monitor and adjust performance and apply lessons learned to the overall Navy SBIR topic selection process.

Gap reduction of time elapsed from topic generation to SBIR Phase II award may be excessive, and the Phase I award is small in relation to work needed and time consumed. The JIEDDO "battle rhythm" model of frequent reviews to minimize delays and ensure decisions is recommended.

The SBIR Phase I contracting process could be expedited through consolidated contracting and use of purchase orders.

2.3.7.1.2. Lengthy SBIR Phase I contract award process (internal Department of the Navy)

2.3.7.1.2.1. Background
This portion of the SBIR process involves the evaluation of proposals, selection/approval of awardees, contract negotiation, and contract award activities. Both DoD and Navy require a maximum of 4 months between the close of the solicitation and the Phase I contract award, however, there is no specific guidance as to the level of due diligence that must occur to justify a Phase I award. Subsequently, each SYSCOM within the Navy has taken different approaches to the number of evaluators required, the fidelity of evaluations, and the contract vehicles for Phase I awards.

2.3.7.1.2.2. Discussion
Navy SBIR Phase I awards typically do not exceed $100K. Many of the SBIR community interviewed believe that the amount of due diligence and contract types currently utilized are mismatched compared to the level of funding and the type of work being performed. In an effort to realign this mismatch, organizations such as ONR and NAVSEA have streamlined the contracting award process by moving to purchase orders or centralized Phase I contracting offices. ONR also opts for single evaluators in many cases to further streamline the evaluation process. PEO Ships SBIR Coordinator Elizabeth Madden commented that having more evaluators often lengthens the Phase I award process as balancing schedules and availability of numerous evaluators is much more challenging than that of a single evaluator.

2.3.7.1.2.3. Recommendation
Navy SBIR maintain distributed control, but require all SYSCOMS and PEOs adopt use of a single or consolidated Phase I Contract office, a single evaluator and use of purchase orders to speed Phase I contract actions.

2.3.7.1.3. "Time Without Money" Gap for Awardees Between Phase I and Phase II

2.3.7.1.3.1. Background
NAVSEA and potentially other SYSCOMs are encountering excessive delays between the completion of Phase I and Phase II contract award. Although contracting actions are a contributing factor and are addressed separately in the Contracting Study Initiative in Section 4-4, there are also noted delays in the assessment and decision process for moving into Phase II.

According to the NAVSEA SBIR Process Manual, TPOCs are to determine the eligibility of the Phase I contractor to submit a Phase II proposal and submit a recommendation to the Phase I Sponsor, the NAVSEA SBIR Program Manager, and the PCO between 90 and 180 days after Phase I contract execution. A disconnect occurs when TPOCs are not comfortable recommending or requesting a Phase II proposal from any Phase I awardees until all Phase I efforts are completed and the TPOC has reviewed all final reports. Since final reports are typically submitted 30 days after the completion of the effort, small businesses often find themselves in a minimum 1-2 month funding gap while the decision to request a Phase II proposal is being made. Moreover, timing does not account for the internal PEO decision processes associated with determining Phase II invitees.

2.3.7.1.3.2. Discussion

According to interviewees and SBIR companies surveyed this internal decision process adds months to the invitation aspect of the process; creating an even larger gap between Phase I and Phase II activities. Once the decision to request a Phase II proposal is made, Phase I options are typically exercised, but again, this is typically months after the small business has completed its Phase I efforts. Furthermore, even if a Phase I options is executed, the funding value ($30K-$50K) is insufficient in keeping principal SBC personnel fully funded during the Phase II proposal evaluation and contract award process which spans eight (8) months or longer.

Gap reduction of time elapsed between Phase I and II could be accomplished through introduction of the gated decision process.

The SBIR Phase II selection process is inherently much more complex than the Phase I selection process. Phase II represents a much greater investment in funding and resources by the government and represents a level of commitment to the SBIR company that the Phase II product will be considered for further development if performance and maturity are adequate. As noted in the Gated Process Improvement Initiative, current phases of SBIR development are contract event driven. An improved phasing plan based upon specific performance gates along with earlier involvement by acquisition programs in planning for transition should help reduce gaps between SBIR phases.

2.3.7.1.3.3. Recommendation

The SBIR Director, as part of Gated Process Improvement, should provide implementation guidance to include tailored and program specific Phase I performance gate exit criteria in sufficient detail to permit rapid and potentially pre-approved Phase II selection, assuming all Phase I exit criteria is met. If multiple Phase I contracts are awarded on a single SBIR topic, ensure that selection criteria are included in the Phase I exit criteria to facilitate the competitive selection process.

2.3.7.1.4. SBIR Topics May Not Track With Warfighter Needs Due to DDR&E Policy

2.3.7.1.4.1. Background

SBIR Topic Selection Policy and Practices are not well matched to near term warfighter need (DDR&E). DDR&E SBIR topic selection policy appears to favor advanced technological innovation over acquisition programmatic needs to obtain the greatest improvement in warfighting capability. This policy interpretation focuses on new technology and limits flexibility to achieve innovation in other areas of warfighter need. Furthermore, technically innovative SBIR topics tend to be higher risk; limiting potential opportunities for transition into acquisition programs of record.

DDR&E review of SBIR draft topics appears to foster a disconnect between technology innovation and the advanced technology needs of acquisition programs—although 80%+ of Navy SBIR topics coming from the PEOs.

Several interviews with SYSCOM and PEO SBIR Program Managers, indicated frustration with the DDR&E SBIR topic screening and approval process. Many had experienced rejection of topics that would be readily accepted for transition into programs of record. DDR&E feedback indicated that the topics were not technically innovative (reflecting technical risk) within the intent of the SBIR program. Some individuals indicated that up to 50% of SBIR topics submitted were rejected as not being sufficiently "innovative." Current OSD SBIR and STTR Topic Criteria highlight the distinction of technical risk as a condition where "technical feasibility has not yet been established."

2.3.7.1.4.2. Discussion

Program innovation is defined as "something new or improved, having marketable potential, including (1) development of new technologies, (2) refinement of existing technologies, or (3) development of new applications for existing technologies."[21] Innovation in the S&T community typically means new science or advanced technology.

"The challenge is to achieve a balance of innovation, risk and application (market potential) to optimize DoD SBIR investment."

In the acquisition community, innovation can also apply to management tools, enhancements for life cycle cost reductions, improved metrics and assessment capability, and a host of other program improvements. As noted in an October 2005 Defense Science Board report, "more attention needs to be paid to using technology to reduce the cost of acquiring and sustaining capabilities."[22] Acquisition program managers are more apt to support transition of technologies that can directly fulfill a programmatic need over

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[21] DoD SBIR Desk Reference, Annex A, paragraph 3(p);
http://www.dodsbir.net/deskreference/annex_a.asp

those that will require significant development. As noted in the DoD SBIR Desk Reference, "Agency criteria used to evaluate SBIR proposals must give consideration to the scientific and technical merit and feasibility of the proposal along with its potential for commercialization. Considerations may also include program balance or critical agency requirements." [23]

In DoD, commercialization often implies the potential for transition into acquisition programs where the technologies will be included in military systems. Those who participate in topic selection and proposal evaluation must continually trade-off near term, immediate needs against long term, strategic technology investments that maintains our military edge for the future. The challenge is to achieve a balance of innovation, risk and application (market potential) to optimize DoD SBIR investment.

The existing Navy SBIR program has an inherent balance of near term and long term technology objectives and risk through an allocation of SBIR topics to the acquisition community with near term needs and to the Office of Naval Research with longer term, higher innovation, technology goals. Over 80% of Navy SBIR topics now come from the Acquisition Community . Importantly, those topics that remain are more heavily early research oriented and the emphasis compares favorably with the overall percentage of research oriented funding invested by DoD (BA 6.1 – 6.3 is 14% of total FY08 RDT&E Budget Estimate). This issue was previously raised however; IPT recommendations made in 2004 were not significantly acted upon by DDR&E.

2.3.7.1.4.3. Recommendation

In view of Congressional CPP language placing greater emphasis on transition in support of warfighter needs, we recommend that the Navy SBIR Program Manager submit a formal recommendation (see Recommended Document Draft, below) to DDR&E requesting open publication of DDR&E topic selection policy to include consideration for transition potential and a balance of near term and long term application. The objective should be a policy of consistent selection criteria, balanced between topics that are highly innovative and technologically disruptive to those that can be readily applied in near term for more rapid and incremental benefit.

DDR&E selection policy for SBIR topics should "include consideration for transition potential and balance near-term and long-term application," with a memo from the Navy SBIR Director launching the process of policy revision.

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[22] Defense Science Board Task Force report on The Roles and Authorities of the Director of Defense Research and Engineering, (Washington D.C., October 2005)
[23] DoD SBIR Desk Reference, Paragraph 4(a)(2)

2.3.7.2. Recommended Document Draft
MEMORANDUM FOR DoD SBIR PROGRAM ADMINSTRATION

From: Director, DoN SBIR Program

Subj: TOPIC REVIEW CRITERIA: RECOMMENDATION FOR CHANGES

Ref: (a) DoD Criteria for Topic Acceptance located at
www.dodsbir.net/topicreview

1. As part of the Navy's action to develop a Commercialization Pilot Program Implementation Plan, I established a Tiger Team to investigate means to accelerate SBIR technology transition. In the course of their investigation they interviewed several personnel from Acquisition Program Executive Offices and individual Program offices; conducted surveys of Small Business, Prime Contractors and Technology Points of Contact (TPOCs); and reviewed relevant reference material. One of the most consistent issues raised in interviews and surveys was an imbalance in effort applied towards topic selection compared to the actual SBIR development and transition. Specifically noted was a consistent rejection, rework and redefinition of topics during DDR&E topic review for topics that were not interpreted as technically challenging and innovative. The acquisition community is seeking more relevancies in topic selection.

2. Similar feedback and specific Integrated Process Team recommendations made in 2004 were never fully acted upon by DDR&E. Conditions have changed, however, with much greater Congressional emphasis placed on obtaining rapid transition of technologies with specific interest in SBIR technology transition. We recommend that the issue be revisited by DDR&E.

3. In their report to me, the Tiger Team pointed out that the Navy has an inherently balanced approach to SBIR topic selection and funding. By allocating topics in approximate parity to percentages applied to SBIR funding allocations within each of the budget activities, the Navy reserves a portion of SBIR topics to focus on relatively high risk, high payoff, and advanced technologies through the Office of Naval Research. Other topics are more closely associated with 6.4-6.7 RDT&E

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[24] Navy SBIR/STTR Program Overview, http://www.navysbir.com/presentations.htm
[25] Office of the Under Secretary of Defense (Comptroller) RDT&E Programs, DoD Budget FY2008. (Washington D.C., February 2007)

system development activities in acquisition program offices and can be targeted against near term, high-payoff incremental improvements. These topics can more readily align with practices proven to provide improved transition success. As noted in GAO-06-883 Report on "Best Practices, Stronger Practices Needed to Improve DoD Technology Transition Practices," topics are more apt to be successful in transition if they are relevant, marketable, and gain product line support from the acquisition community. The process to align topics more closely with Acquisition programs is also consistent with the Congressional Authorization language in Sec 252, Public Law 109-163 (NDAA, FY2006) and related Commercialization Pilot Program.

4. We recommend that the office of DDR&E apply a balanced portfolio approach to SBIR topic selection to improve alignment of topics to the acquisition customer, while retaining a percentage of topics for more challenging and innovative technology exploration. In order to accomplish this, we specifically recommend that topic allocation align loosely with each of the fiscal year budget activities (6.1-6.7). As part of a related process change, we also recommend the following changes to the DDR&E SBIR and STTR Topic Criteria located at reference (a):

   i. Change Criterion 1 to read "Topics will solicit Innovation in R&D." The definitions of "Innovation" and "R&D" are as currently provided in the SBIR Policy Directive

   ii. Change Criterion 4 to read "Topics will include examples of possible Phase III military and/or commercial application"

These changes to DDR&E Topic Criteria are intended to improve the overall DoD SBIR and STTR technology transition potential and align topic selection more closely to the military application.

Respectfully,

John R. Williams

2.4. Contracting Initiative

2.4.1. Issue

Insufficient number of trained personnel to adequately support timely SBIR contract actions

2.4.2. Background

Significant feedback from interviews and surveys indicate that extended or delayed SBIR contract actions represent the largest single category of problems related to SBIR process delays. There were several reports of "contract actions take too long" and other indications that insufficient personnel may be a problem.

2.4.3. Discussion

Navy has insufficient "boots on the ground" to adequately support timely SBIR contract and other administrative work. The addition of PEO-level Transition Manager (termed "Technology Manager" in the relevant Navy SBIR SECNAVINST, but little implemented) could be decisive.

When investigated, there appear to be several related causes for contract delay:

a. SBIR contracts are relatively small compared to other military contracting actions raising an issue of priority. Small contracts are usually lower in priority than large contracts.

b. There is a lack of consistency associated with contracting action in the Navy. A contributing factor is that are 28 separate DoD Activity Address Codes (DODACs) associated with SBIR contracting in the Navy.

c. The funding process may be dependent upon serial decisions that accumulate processing time.

d. TPOCs are not well trained and do not provide adequate guidance and support to Small Businesses preparing for government contracts

e. Proposal Request packages and Statements of Work are of poor quality and must be rewritten.

f. Lag time in coordination between the contracts individual and the TPOC and in some cases the Program Manager leads to long contract action delays. Program office personnel are difficult to access or respond slowly to questions.

g. Multitasking and heavy workloads for contract personnel and TPOCs lead to reduction in dedicated time for SBIR contract actions.

h. Small businesses do not fully understand all of the administrative requirements of the SBIR program.

i. There have been instances of funding not being transferred and fully in place when the contract is signed, which causes a delay in starting the work.

Although there may be room for some efficiencies and better training, the issue of adequate human resources should be considered in more depth. Significant discussion during interviews pointed to a need for more contracting personnel. Discussion also highlighted a need for either more TPOC personnel or as noted elsewhere in this report, a need for a Transition Manager to work closely with the acquisition organizations on transition process and issues. The addition of a Transition Manager to work with the TPOC and directly with the program office would help focus attention on SBIR contract actions that are the responsibility of the program office. Due to the many variables encountered during our research, we were unable to fully explore the need and benefits of increased manning in contracting or in the acquisition program offices.

2.4.4. Recommendation

Naval SBIR Director provide resources from SBIR Administrative funding and direct a personnel manning study focused upon Contracting personnel and TPOCs to establish if personnel shortages exist, and if so, the optimum manning required for each position to support timely SBIR contracting actions. This study should also include strong consideration for the addition of a Transition Manager position described in section 4.4.1 and further supported in Section 5.2.2 to improve transition management and provide greater program office support for contracting actions.

2.4.5. Information Sources and References

- Interview with Mr. Richard McNamara, Deputy PEO, PEO Submarines, 30 November 2006
- Interview with Mr. Douglas Marker, PEO IWS, 29 November 2006
- Interview with Mr. Glen Sturtevant and Ms Beth Madden, PEO Ships, 16 February 2007

Appendix A – Terms, Definitions and Acronyms

Accelerate:
a. To speed development of new concepts and technologies and to stream-line the procedures that facilitates their rapid implementation.

b. As stated in the *DoD Manager's Guide to Technology Transfer in an Evolutionary Acquisition Environment,* "Timeliness [of technology transition] ... is important. This requires compressed development and acquisition cycles for rapidly advancing technologies."

c. *For the Navy CPP program*: decreasing the Time to Transition and/or improving the Rate of Transition to achieve more rapid application of SBIR technologies to critical military requirements.

- **Time to Transition** - The time from Phase I award to successful insertion into an acquisition Program of Record or other military service use.

- **Rate of Transition** - The increase in the number of SBIR technologies transitioned compared to a given time.

Commercialization: The process of developing marketable products or services and producing and delivering products or services for sale (whether by the originating party or by others) to government or commercial markets.

Commercialization Pilot Program (CPP): The 2006 National Defense Authorization Act Sec. 252, and further guidance from USD(AT&L), directed the Department of Defense and its military departments to establish a Commercialization Pilot Program to accelerate the transition of technologies, products, and services developed under the DoD SBIR Program. CPP administrative processes developed in each service must identify SBIR candidates that meet high priority military requirements and define the criteria and procedures used to improve connections between Navy SBIR program managers, SBIR technology providers, prime contractors/integrators, and the naval acquisition communities. 1% of SBIR funding is allocated to this four-year effort.

CPP Candidate: A SBIR project which has been submitted by a SYSCOM SBIR Program Manager to the Navy SBIR Program Manager for consideration as a CPP Project. Sufficient Due Diligence has been conducted to verify that the following minimum criteria have been met:

- Is or has been a DoD Phase I or II SBIR topic
- Has Phase III transition support and clearly identified sponsor
- Transition plan identified

- Acquisition Program of Record for transition and/ or "Military Requirement" identified
- Endorsement by PEO, Fleet, OPNAV or other Navy source
- Needs assistance or funding to successfully complete or accelerate the transition process

CPP Project: A CPP Candidate which has been approved by the Secretary of the Navy (or designee) for reporting to Congress under the 2006 National Defense Authorization Act. The Navy SBIR Director will monitor and report on the progress of these designated projects under the Navy CPP Program, based on input from SYSCOMs and PEOs.

CPP Success: The CPP Project completes the transition process into an acquisition program of record or other approved use, which will be identified by the following milestones:

- Is completely funded by non-SBIR funds
- Successfully accomplishes a pre-determined programmatic milestone such as (but not limited to):
  - Approved and incorporated into system design at Critical Design Review
  - Delivery of End Item
  - Limited Rate or Full Production

Due Diligence: The process of collecting information, data and investigating a SBIR Company and the associated topic to verify and document that the topic and SBIR project meets the criteria to support its designation and submission by the Navy SBIR Program Manager to the Secretary of the Navy for inclusion and reporting as a CPP Project.

Fast Track: Since October 1995, the DoD SBIR and STTR programs have featured a "Fast Track" process for SBIR/STTR projects that attract outside investors who will match phase II funding, in cash, contingent on the project's selection for Phase II award. Projects that obtain such outside investments and thereby qualify for the Fast Track will (subject to qualifications described in the solicitation):

- Receive interim funding of $30,000 to $50,000 between phases I and II where applicable;
- Be evaluated for Phase II award under a separate, expedited process; and
- Be selected for Phase II award provided they meet or exceed a threshold of "technically sufficient" and have substantially met their Phase I technical goals.

Consistent with DoD policy, this process should prevent any significant gaps in funding between Phases I and II for Fast Track projects. For further information, see: http://www.acq.osd.mil/osbp/sbir/fasttrack/index.htm.

High Priority Military Need/Requirement:

a. The urgent need or demand for personnel, equipment, facilities, other resources, or services, by specified quantities for specific periods of time or at a specified time.

b. For use in budgeting, item requirements should be screened as to individual priority and approved in the light of total available budget resources.

c. For CPP: Those SBIR projects that have been accepted as candidates to fulfill high priority requirements within acquisition Programs of Record or for Future Naval Capabilities.

Incentive:

a. *Incentives* can be monetary or non-monetary, and should be positive but balanced, when necessary, with remedies for missing specific program targets or objectives. They can be based on price, cost, schedule and/or performance. Regardless of the final composition and structure of the incentive(s), the goal is to encourage and motivate optimal performance.

b. *Contractual Incentive:* [...] consists of both contract incentives, and incentive relationships and strategies.

c. *Contract Incentive* refers to the monetary or non-monetary structural motivators, embodied in or arising from the terms and conditions of the contract, that influence the behavior of the buyer and the seller toward accomplishing desired contractual outcomes.

d. *Incentive Relationship/Strategy* refers to those factors that influence the motivation of the buyer and the seller and directly impact their approach to the total business process.

e. *Total Business Process* includes requirements generation and definition, acquisition strategy and business case considerations, the award process, and post-award performance—all focused on attaining desired outcomes.

Phase II Enhancement:

Since 2000, DoD agencies have developed their own Phase II Enhancement policy to further encourage the transition of SBIR research into DoD acquisition programs as well as the private sector. Under this policy, the Component will provide a Phase II project with additional Phase II SBIR or STTR funding matching the investment funds the awardee obtains from non-SBIR/non-STTR sources such as DoD acquisition programs or the private sector. Phase II Enhancements (also called Phase II Plus) will:

- Extend an existing Phase II contract for up to one year; and
- Match up to $500,000 of non-SBIR/non-STTR funds.

If selected for Enhancement, the funds from the outside investor must be transferred to the company before the SBIR/STTR-matching funds will be added to the Phase II contract. It is possible for a phase II project to receive additional SBIR/STTR funds from both Fast Track and Phase II Enhancement as long as the outside investment for Fast Track is separate and distinct from the outside investment for Phase II Enhancement. For further information on Phase II Enhancement see website at: http://www.acq.osd.mil/osbp/sbir/fasttrack/index.htm

Phase III:
SBIR Phase III refers to work that derives from, extends, or logically concludes effort(s) performed under prior SBIR funding agreements, but is funded by sources other than the SBIR Program. Phase III work is typically oriented towards commercialization of SBIR research or technology.

Each of the following types of activity constitutes SBIR Phase III work:
a. Commercial application of SBIR-funded R/R&D financed by non-Federal sources of capital (Note: The guidance in this Policy Directive regarding SBIR Phase III pertains to the non-SBIR federally-funded work described in b) and c) below. It does not address the nature of private agreements the SBIR firm may make in the commercialization of its technology);

b. SBIR-derived products or services intended for use by the Federal Government, funded by non-SBIR sources of Federal funding;

c. Continuation of R/R&D that has been competitively selected using peer review or scientific review criteria, funded by non-SBIR Federal funding sources.

Technology Transition: Process of developing critical technology up to and including insertion into military systems to provide an effective weapons and support system, in the quantity and quality needed by the warfighter to carry out assigned missions.

Technical Point of Contact (TPOC): The TPOC is the primary point of contact between the government and the small business throughout the SBIR phases. The TPOC assists and guides the Small Business Concern (SBC) and evaluates SBC performance.

Transition Manager: Described as the "relationship manager" in the GAO report GAO-06-883 *Best Practices; Stronger Practices Needed to Improve DoD Technology Transition Process,* this individual is assigned within the acquisition program office, if possible, or at least at the PEO level to take ownership of the transition process and complete or monitor the actions delineated in the formalized Technology Transition Agreement.

Acronym	Meaning
AIRTEC	Air Warfare Technology
ASN(RDA)	Assistant Secretary of the Navy for Research, Development and Acquisition
COTR	Contracting Officer's Technical Representative
CPP	Commercialization Pilot Program
DoD	Department of Defense
DoDAAC	DoD Activity Address Codes
DUSD(S&T)	Deputy Under Secretary of Defense for Science and Technology
GAO	Government Accounting Office
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
ONR	Office of Naval Research
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
PEO	Program Executive Officers
PM	Program Manager
POR	Acquisition Program of Record
R&D	Research and Development
ROI	Return on Investment
S&T	Science and Technology
SAT	SBIR Accelerated Transition
SBC	Small Business Concerns
SBIR	Small Business Innovation Research
SPAWAR	Space and Naval Warfare Command
STTR	Small Business Technology Transfer
SURFTEC	Surface Warfare Technology
SYSCOM	Systems Command
T&E	Test and Evaluation
TAP	Transition Assistance Program
TPOC	Technical Point of Contact
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology and Logistics

Appendix B- Technology Transition Plan, Technology Transition Agreement

Technology Transition Plan (Proposed prerequisite for Phase II, update for Phase IIb)

- Project title
- Contract number
- SBIR topic
- Sponsoring Command
- Company name and relevant contact information:
- TPOC names and relevant contact information
- SBIR program manager and relevant contact information
- Need Addressed, Timing, and Involved Parties
- SBIR Project and Expected Outcomes
- Milestones
- TRL
- Risk
- Test
- Measure of Success
- TRL date

SBIR	Milestone	TRL	Risk-Test	Measure of success	TRL date
Phase 2-Yr 1					
Phase 2-Yr 2					
Option 1					
Option 2					

- Hurdles and Contingencies
- Technology Maturation

TRL	Required Tests, Demos, and next steps	Target date	Estimated Funding required	Organizations to be involved

- Potential Funding sources and Transition Strategies

Technology Transition Agreement

Instructions for a

TECHNOLOGY TRANSFER AGREEMENT

For

(Project Title)

a SBIR Commercialization Pilot Program Project

INTRODUCTION

This Technology Transition Agreement (TTA) documents the commitment of the acquisition program sponsor (intended receiver of a technology or capability development), requirements / resource sponsor, RDT&E activity principal (manager of the SBIR/STTR CPP project), SYSCOM SBIR Manager, SBIR/STTR firm, and any other decision makers or funding sources in the transition path, to develop, deliver, and integrate a technology/product into an acquisition program. The following elements should be considered for inclusion in the TTA to support a gated transition process. Not every one of these elements is appropriate for every agreement, but each element should be considered for inclusion.

The status of the technology transfer resulting from this agreement will be reviewed annually, with acquisition program sponsor and the SBIR office. These reviews should address technical progress, reconfirm need and future planning, review program financial commitment to eventual fleet deployment, and determine if the effort should continue.

I. OVERVIEW

1. Business Case *one paragraph*

This section should document the technology to be transitioned and the benefits to the Navy. In addition, please provide a brief summary of how SBIR/SAT funding will allow this to happen.

> *Example*
>
> The purpose of this agreement is to advance the state of wide band radio frequency technology and reduce system costs to the point at which deployment on board ship is cost effective. SBIR/SAT funding will be used to dramatically reduce the system cost by increasing the number of filters that can be cooled per cryocooler unit. The funding will also be used to automate the system-tuning feature, which should increase system response time and reduce work force requirements, and validate the technology in shipboard demonstration planned for 2Q2009.

2. Operational Need *one paragraph*

This section should document the problem to be addressed including how the high priority need was determined. Resource sponsor signature on this agreement implies validation of requirement.

> *Example*
>
> Current shipboard operational systems prevent detection/reception of some UHF signals. Existing filtering technology degrades signals and/or otherwise affects the noise signature. The proposed technology provides superior filtering capability especially in signal ranges of interest in the global war on terrorism. The operational need was identified by PMW-180 during SSEE, Increment E installation and the requirement is documented in the SSEE, Increment F, CDD Number 675-71-05, dated 11 October 2005.

3. Target Acquisition Program *one paragraph*

This section should identify the Program of Record and its key POCs, current phase, next milestone date, and insertion date.

> *Example*
>
> POR: Name (e.g., Ship Signal Exploitation Equipment)
>
> Program Manager: Name, email, phone
>
> POR CPP POC: Name, email, phone
>
> Current Phase of Life Cycle from Defense Acquisition System
>
> (e.g., Tech Development Stage)
>
> Date of Next Milestone: (e.g., Milestone B, scheduled Mar 2008)
>
> Insertion Date: (Date this CPP technology will be inserted into platform/fielded system)

II. PROJECT INFORMATION

1. Integration Strategy

In subsections below, summarize the current state of development of the subject technology, future development required for transition, and the integration process that will ensure successful transition.

1.1 Current Status of Proposed Technology Solution *one sentence*

Summarize the current state of development of the subject technology, including a TRL estimate and justification for this estimate.

1.2 Technology Integration Process and Funding

several paragraphs plus Table 1-Excel chart

In this section summarize the major tasks to be performed, the objective of each task, the total funds required for the task, the task start and end date, the exit criteria or other criteria used to verify task completion, and an indication if any future funding or other tasks is dependent on successful completion of the task. (Note: This section should be used as basis for contract SOW/deliverables)

In Table 1, detail the key tasks for transitioning and integrating the technology/product into the acquisition program along with their TRL levels. Identify funding sources for the CPP/SAT project (including match and complimentary project effort) and post-CPP/SAT efforts related to transition to LRIP/Production.

Provide an addendum as part IV, if necessary, to include other information required in the transition process. This could include key interface requirements and associated documentation, support of Technology Interchange Meetings, training and shared responsibility agreements, etc.

2. Risks *one paragraph per subsection*

In subsections below, briefly describe the assessment of project risk in four categories cited below. Describe efforts that were/will be conducted to mitigate these, e.g., a Risk Mitigation Plan.

2.1 *Technical Risk* is LOW/ MEDIUM /HIGH. Brief reason for ranking. Technical risk is an estimate of the potential that the proposed technology will not meet the necessary performance specifications (cite exit criteria), or is deficient in some other essential parameter (e.g., weight, volume, power consumption, reliability, maintainability, etc.).

2.2 *Schedule Risk* is LOW/ MEDIUM /HIGH. Brief reason for ranking. Schedule risk is an estimate of the potential for the effort proposed in this TTP, to not meet scheduled deadlines.

2.3 *Cost Risk* is LOW/ MEDIUM /HIGH. Brief reason for ranking. Cost risk is an estimate of the potential for the proposed effort to fail to meet target costs for either development, acquisition, or operations and maintenance.

2.4 *Business Risk* is LOW/ MEDIUM /HIGH. Brief reason for ranking. Business risk is an estimate of the potential for the failure of the supplier of the proposed technology to either produce the product in a timely manner or in adequate quantity, or to be able to provide support for the product throughout the intended operational lifetime.

3. Seminal Transition Event *one paragraph*
Briefly describe the Seminal Transition Event (STE) that will constitute a definitive end point in this proposed technology transition initiative, providing a capability delivery date. (Note that in most cases the STE will be defined when the technology in question moves into acquisition.) Include a timeframe for the event (Q1 200X, etc.). Cite the specific transition (exit) criteria that must be met prior to transition (e.g. TRL, certifications, size, weight etc.).

III. TTA SIGNATORIES

Technology transition agreements should be signed to commit participating organizations to the plan outlined in the agreement. To realize the benefits described herein, and fully aware of the residual risks, the undersigned do hereby agree to execute this agreement to the best of their ability in accordance with transition requirements, schedule and funding commitments stated above.

_____

SYSCOM SBIR PM   DATE

_____

PROGRAM OF RECORD MANAGER   DATE

_____

PEO   DATE

_____

REQUIREMENTS OFFICER   DATE

- OR -

_____

Other Appropriate OPNAV Code   DATE
Title

TECHNOLOGY INTEGRATION PROCESS AND FUNDING

TECHNOLOGY INTEGRATION PROCESS	Year 1				Year 2				Year 3				Year 4				Year 5				TRL-In	TRL-Out	Total Cost
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Transition Effort																							
Harden Design																					4	4	150K
Build Prototype																					4	5	600K
Environmental Testing																					5	5	200K
System Test																					5	6	250K
Integration																							
Field Test																					6	7	300K
Mfg Cost Reduction																					6	7	1.5M
Sea Trials																					7	8	750K
Production																							
LRIP																					8	9	10.0M
Full Rate																							90.0M

FUNDING PROFILE	Year 1	Year 2	Year 3	Year 4	Year 5	Total Amount
SAT Project						
SAT Program	500K					$500,000
SYSCOM SBIR		750K				$750,000
Small Business (Self)	100K					$100,000
Prime/Sys Integrator		750K				$750,000
Gov't Non SBIR Source: PEO Ships PE: 0604xxx			750K			$750,000
In-Kind Source: Test Samples Item: NSWC CD		150K				$150,000
Post-SAT Project						
Transition/Insertion Source: PMS501 PE: 0605xxx			750K			$750,000
Production Source: PE:			3.0M	7.0M	9.0M	$100,000,000

Appendix C – Incentives for Small Business

The objective of SBC incentives is to provide opportunity enhancements for increased market attractiveness of SBIR technology components.

The government could provide open and very low cost access to DoD System models and test beds to permit small businesses to better prepare for SBIR testing and integration into larger systems. Low cost access would represent a win-win approach where the SBC can develop a lower risk solution with greater market potential and the government has access to SBIR technologies with higher quality and maturity.

The government could develop or expand pre-screening of SBCs for DoD competition to allow SBC participation in many systems through a single application and certification. For instance, if a company was pre-screened, it could obtain Common Access Card capability for selected employees and with government cooperation, have access to several government unclassified web-sites through a single gateway process to gain a better appreciation of capability related government need and individual system process.

SBIR funds could be applied to permit scheduled availability of testing opportunities at government sites. Better SBC understanding of engineering needs and system interfaces would result in better SBIR product quality and maturity. The Littoral Combat Ship should be considered to develop a pilot program, based upon the Sea Frame Concept.

Appendix D – List of Study Interviewees

Name	Organization
CAPT Eric Sweigard	OPNAV N866
Michael McCrave	OPNAV N866OI
Linda Whittington	SPAWAR/PEO C4I Corporate SBIR Program
Dick McNamara	PEO Subs
Irma Turcois-Payne	
Glen Sturtevant	PEO Ships
Beth Madden	
Jim Alper	Joint Strike Fighter Program Office
RADM Charles S. Hamilton, III	PEO Ships
Rob McHenry	LCS Program Office (PMS 501)
Janet Jaensch	NAVSEA Corporate
Bill White	SBIR Program
Mike McGuire	
Ralph Skiano	PMW-180 and SPAWAR
Ed Mozely	
Bob Knight	
Bob Baker	
Rob Pei	
Ed Anderson	PEO(W), Dep PEO
Hank Hinkle	PEO(T), Dep PEO
Janet McGovern	NAVAIRSYSCOM Corporate SBIR Program
Tom Hill	Director of Contracting NAWCAD, Lakehurst
William Johnson	Future Combat System Open Architecture Office (PEO IWS7)
Douglas Marker	PEO IWS SBIR Program
Dale Moore	NAVAIRSYSCOM
Eric Pitt	PEO Carriers
	SBIR Program
CAPT Raymer	Fleet Forces Command
CAPT Montana	
Mike Meyers	
CAPT Albano	OPNAV N882
Jenny Servo	President, Dawnbreaker, Inc. (NAVY SBIR Transition Assistance)
Bobby Burt	OPNAV 852
CDR Dave Byers	OPNAV N872
Bob Cepek	
William McGregor	OPNAV N880 Science Advisor

Appendix E – Survey Responses from SBIR Phase II Firms and TPOCS

What Constitutes Best Practice for Technology Transition?

During 2006 and 2007, the Navy SBIR Program office anonymously surveyed 165 SBIR Phase II firms and 149 TPOCs/COTRs on defense industry commercialization of advanced technology.

The purpose of these interviews was to identify and prioritize the best DoD technology transition practices regarding the Program of Record, with a Navy emphasis and using questions that were designed to elicit succinct, specific and factual answers. The questions, asked in full of each interviewee, allowed the team to convert responses into data. The prior inability to validate best transition practices for a majority of transition stream participants issue from a variety of reasons including: a lack of good data, diverse methods of transition tracking not designed to generate broad data sets that indicate trends, and from the absence of surveys such as this one.

The surveys that were conducted are among the largest professional surveys ever undertaken on the process of SBIR technology transition and the key issues in defense transition from an SBIR perspective.

Both responding groups were evenly distributed and samples of both surveys, highlighting 13 related questions central to the ongoing technology transition, make up the remainder of Appendix E.
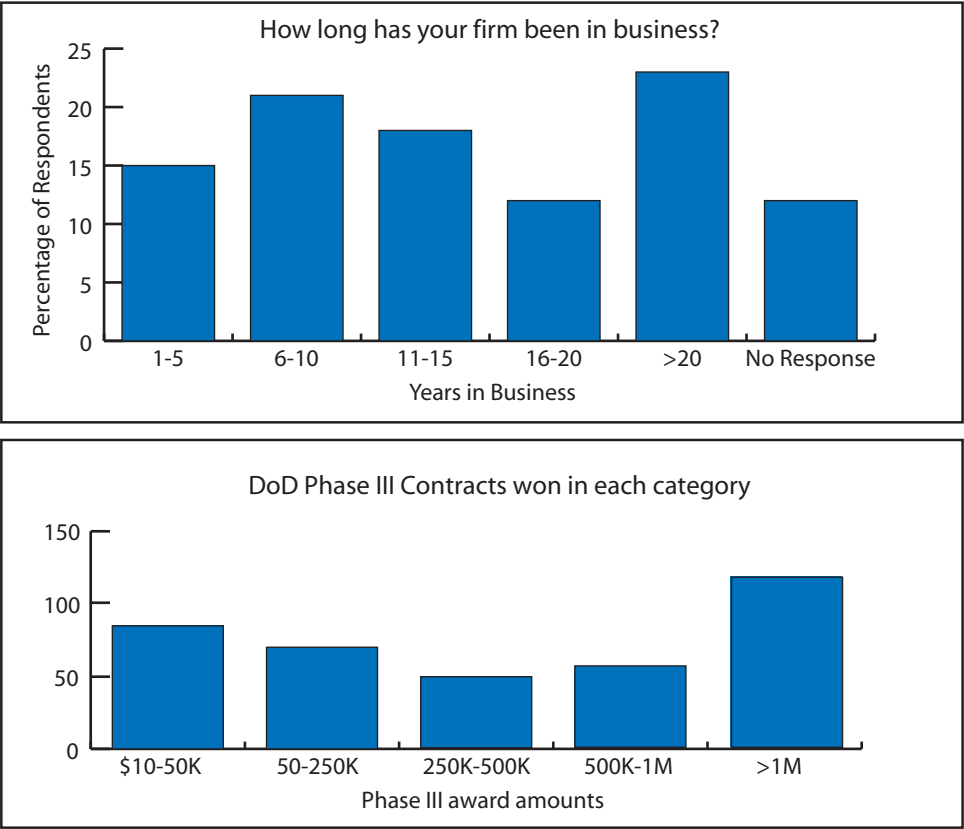
Figure 24a | SBIR Companies

How long has your firm been in business?

Percentage of Respondents (y-axis, 0 to 25)
Years in Business (x-axis): 1-5, 6-10, 11-15, 16-20, >20, No Response

DoD Phase III Contracts won in each category

(y-axis, 0 to 150)
Phase III award amounts (x-axis): $10-50K, 50-250K, 250K-500K, 500K-1M, >1M

Figure 24b | TPOCs

How many years of TPOC experience do you have?

Number of Respondents (y-axis, 0 to 80)
(x-axis): 1-5, 6-10, 11-25, 26 or more

In how many Phase III contracts have you participated as TPOC supplementing SBIR projects?

Number of Respondents (y-axis, 0 to 80)
(x-axis): 1-5, 6-10, 11-25, 26 or more

Was assistance from PEO/SYSCOM helpful in understanding/developing SBIR transition plan?

Do you believe that a SBIR Phase II proposal should include a detailed transition plan including objectives and activity schedules for post-Phase II transition work?

Do you believe that the government should play a role in plan preparation?

Figure 26a | SBIR Companies

How Important to SBIR Phase III transition is early (Phase I) involvment of the following?

Bar chart — Percentage of Respondents by category (Essential, Important, Not Important):

- Acquisition Sponsor: Essential 50, Important 41, Not Important 9
- Resource Sponsor: Essential 52, Important 40, Not Important 8
- Requirements Sponsor: Essential 59, Important 37, Not Important 4
- Prime/Other Contractor: Essential 34, Important 55, Not Important 11

Legend: Essential, Important, Not Important

Figure 26b | TPOCs

What practices or process impediments accelerate the speed and volume of transition of SBIR technology?

Bar chart — Number of Respondents:

- Early (Phase I) identification of key transition stream elements and POCs: 41
- Funding (including Phase III $) sufficient to mature SBIR technology: 31
- Understanding needs of and working with Primes, Integrators: 25
- Closer coordination with and/or enhancement of the Transition Assistance: 11
- Reducing gaps or delays in the SBIR contracts process: 11

(open question, called for a written response)

Did the TPOC make contact with the following?

Do you have an established linkage with an OPNAV Fleet representative or Resource Sponsor?

Have you formed linkages with Prime/sub-tier contractors, or Systems integrators?

How could linkage to PMS/PMA be improved?

Figure 28a | SBIR Companies

Which TPOC functionality has higher priority for your firm?

Percentage of Respondants

- Science and engineering skils: 30
- Skills in fielding a mature technology: 71

Figure 28b | TPOCs

What importance do the following skills have in your role as a successful SBIR TPOC?

Number of Respondants

- Science and engineering skils: 95
- Skills in fielding a mature technology: 49

Figure 29a | SBIR Companies

In which areas does your firm need assistance to ensure better commercialization success? (1 to 10 with 1 being most important)

Average of ranking

Understanding requirements for technology insertion by the contractor

Understand the insertion process and timeline

Sales & Marketing

Partnering and contract agreements

Certifications, licenses, etc.

Patents and intellectual property protection

Manfacturing

Fiscal planning for scaleup

Quality control

Pre- M&A work (e.g., valuation)

Accounting

Figure 29b | TPOCs

What do you need from the SBIR Program to more effectively perform your work?

Number of Respondants

Funding for labor, monitoring, review and communication

Training

Formal interface with Fleet customer and sponsor

SBIR Office support re PMA/PMS interface, and process management tools

Clear duty guidelines and updates re SBIR, OPNAV, PMA/PMS

Expedited and improved relationship with contracting elements

Figure 30a | SBIR Companies

What processes slow transition, or cause transition efforts to fail?
(First, Second, Third Nominations)

Figure 30b | TPOCs

What practices or process impediments accelerate the speed and volume of transition of SBIR technology?

Was the non-SBIR matching funds under Enhancement or Fast Track instrumental in transitioning the technology?

Do you believe that requiring some matching non-SBIR funds with Phase II option funds increases transition potential for SBIR projects?

Figure 32a | SBIR Companies

Are you likely to respond to bundled topics?

Percentage of Respondents

	Not likely	Somewhat likely	Very likely
Value	~18	~47	~35

Figure 32b | TPOCs

Does the practice of "bundling" Topics, so that SBIRs can comprise a system, affect transition?

	Somewhat affects transition	Greatly affects transition	Makes no difference
Value	~69	~20	~36

**Do you favor the process of soliciting
Topic concepts from defense contractors?**

**Does the practice of soliciting Topic ideas from
defense contractors affect transition?**

Figure 34a | SBIR Companies

Are the elapsed time gaps in the SBIR process getting longer or shorter?

Percentage				
Much longer ~12	Longer ~43	About the same ~28	Shorter ~17	Much shorter ~2

Figure 34b | TPOCs

What are the biggest obstacles in performing SBIR TPOC work?

Number of Respondents				
Insufficient time and funding for SBIR taskings, especially transition activities ~70	Inefficient, excessive WAWF process and slow contract shop response ~31	Constrained acquisition community resources and interest ~25	Lack of standardized TPOC procedures and transition processes ~17	SBIR perceived as low priority in S&T/R&D community ~12

What information do you need that is not available or difficult to obtain that would make SBIR work more productive?

Figure 35b | TPOCs

What do you need from the SBIR Program to help increase transitions?

Figure 36a | SBIR Companies

What are the key value-added services
offered by the Navy SBIR Program?

Percentage

- Transition Assistance Program (TAP): ~34
- Help in identifying and aligning transition stream elements: ~26
- Availability of Phase II Enhancements and Phase III funding: ~11
- Availability of SBIR funding for R&D and product development: ~10
- Advice and guidance of skilled, committed TPOCs: ~8

Figure 36b | TPOCs

What do you believe to be the practices of the Navy SBIR Program?

Number of Respondents

- Emphasis on meeting Fleet needs and SBIR transition: 18
- Small business tech innovation opportunity re defense needs: 15
- Topic development / management process: ~12
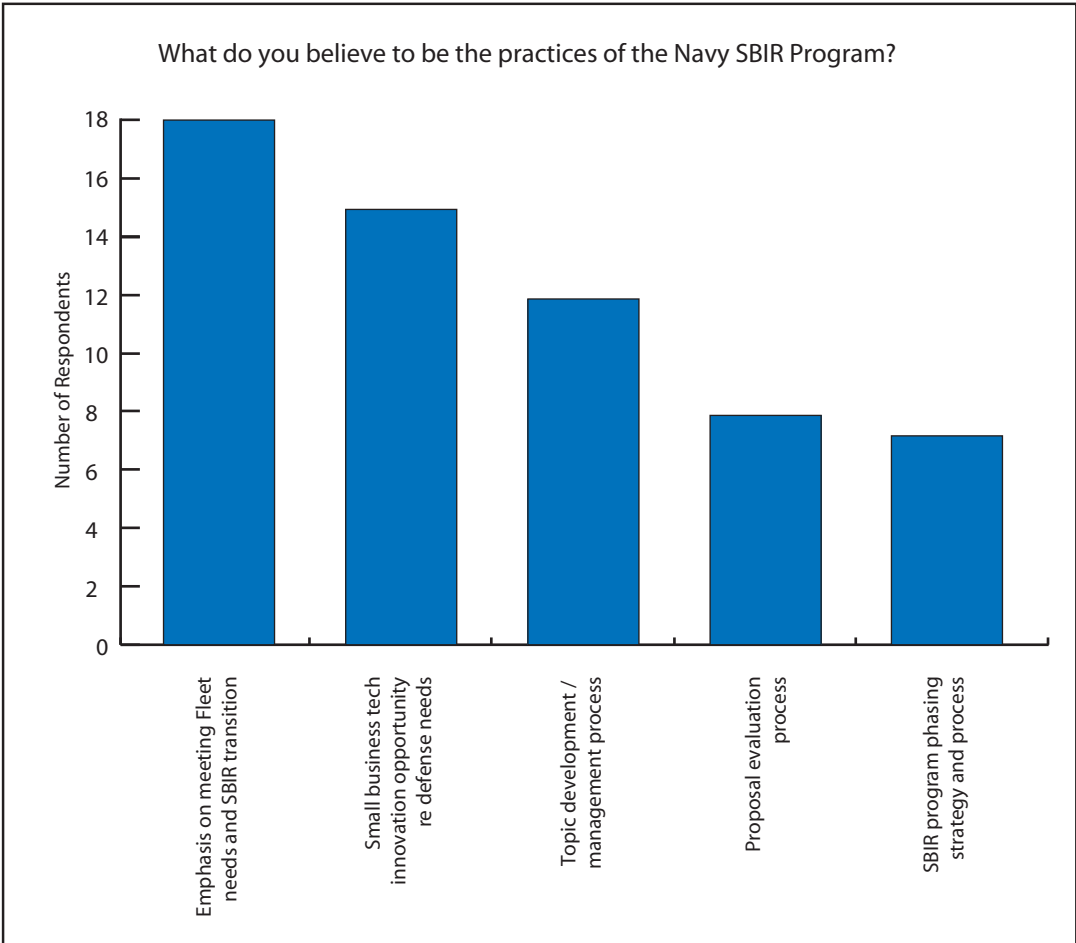- Proposal evaluation process: ~8
- SBIR program phasing strategy and process: ~7

Appendix F – Survey Responses from Prime Contractors

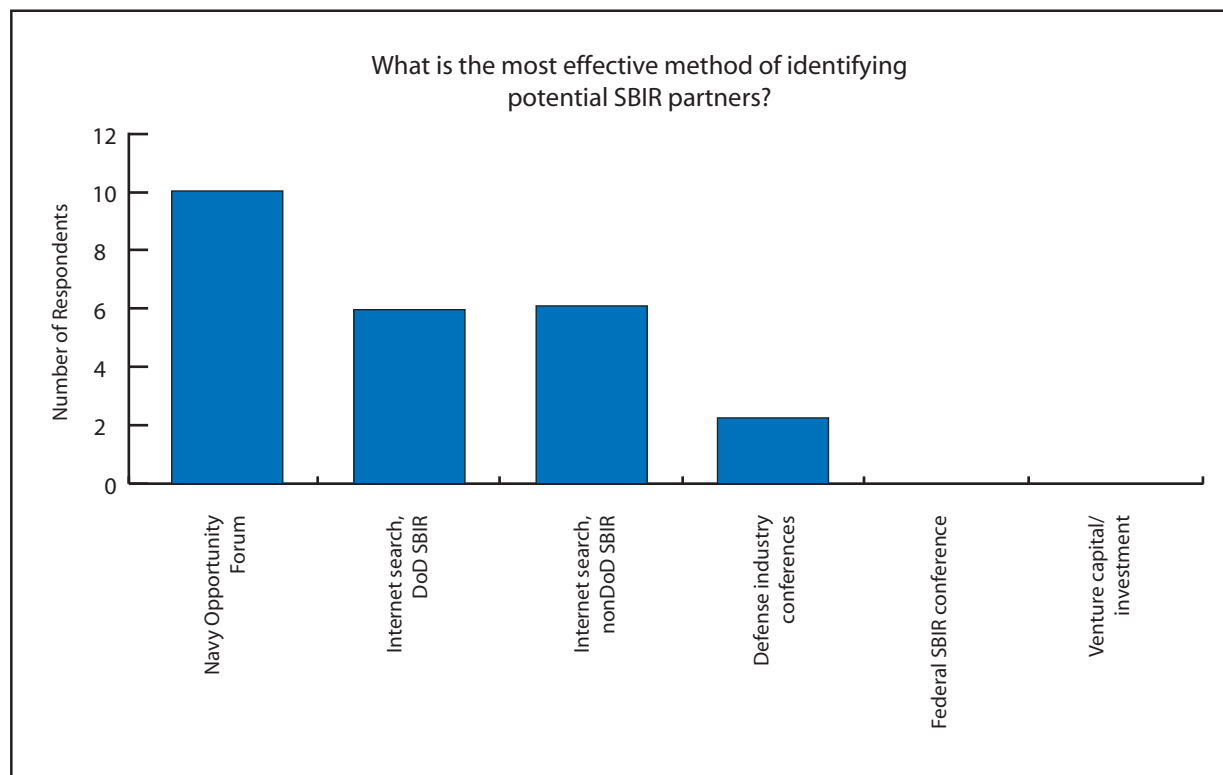## Figure 37 | What do Primes consider the most effective method to identify SBIR Prospects?

What is the most effective method of identifying potential SBIR partners?

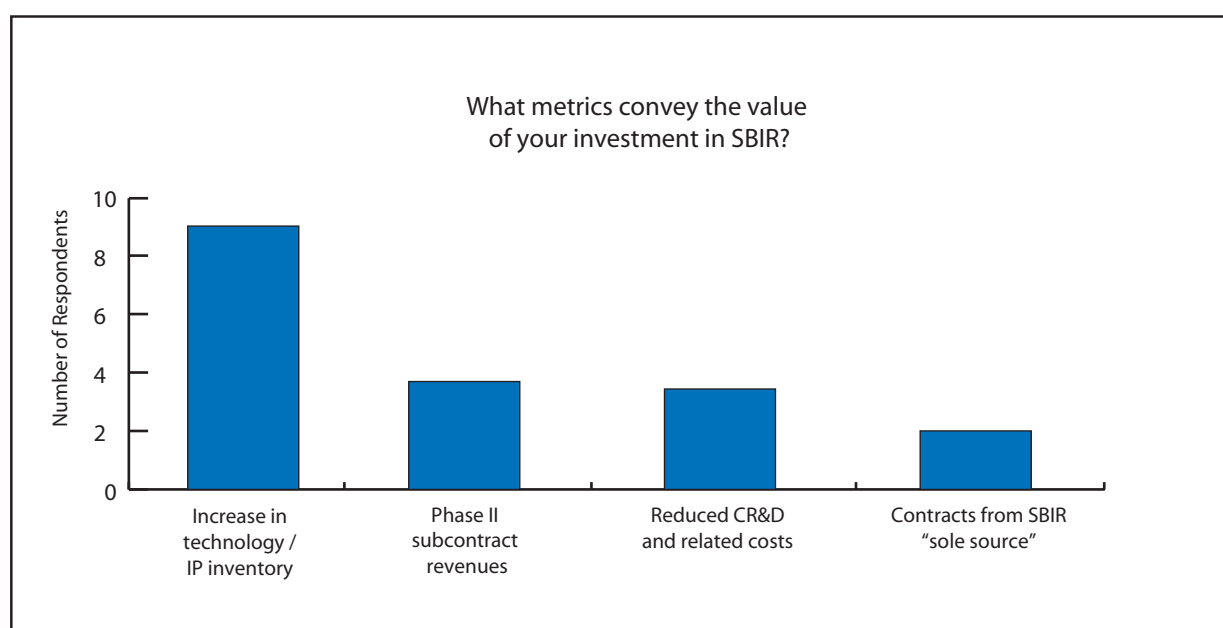## Figure 38 | What metric conveys the value of a Prime's investment in SBIR?

What metrics convey the value of your investment in SBIR?

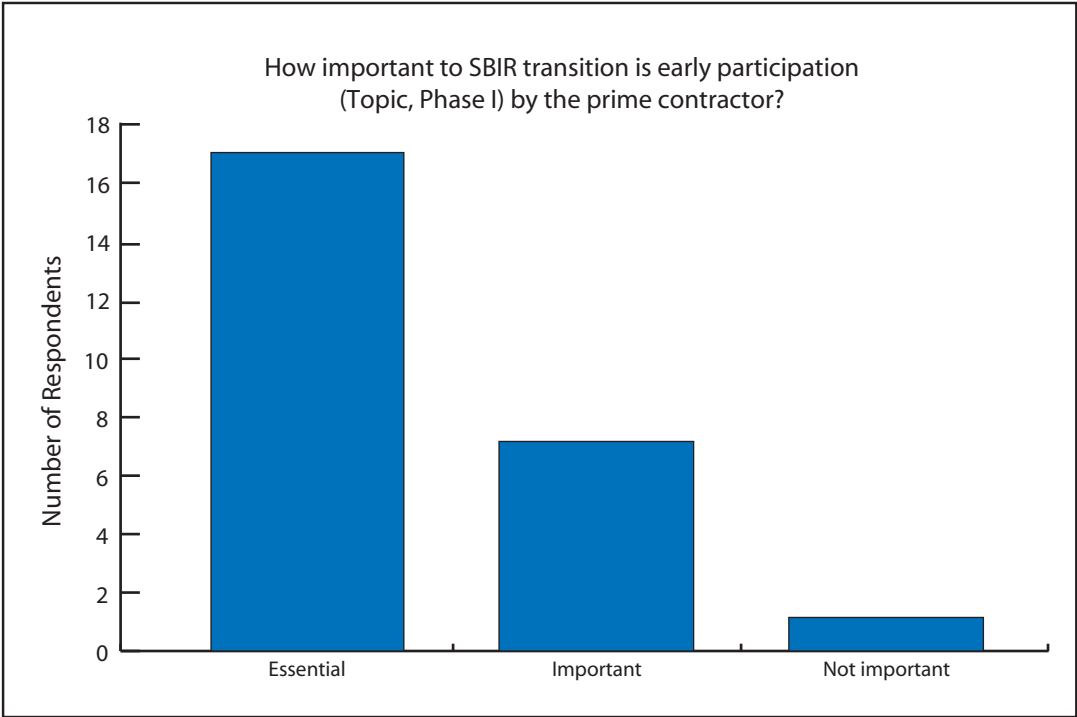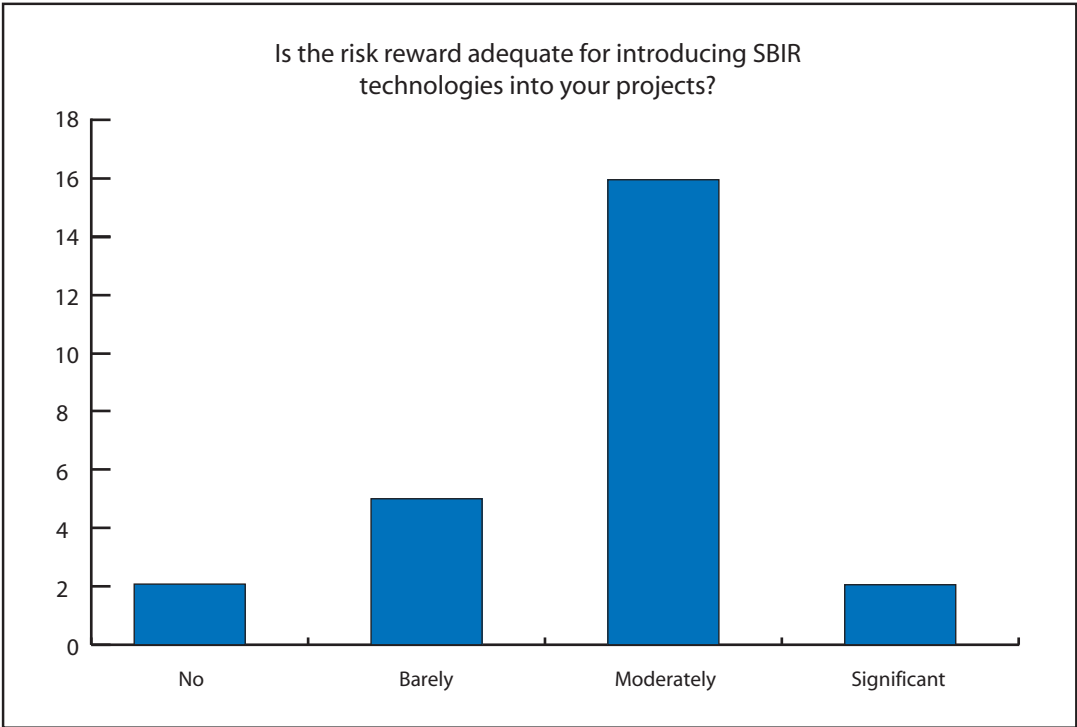## Figure 39 | How important is early partnership with a defense contractor to SBIR Transition?

How important to SBIR transition is early participation (Topic, Phase I) by the prime contractor?

Figure 40 | How do Primes Assess SBIR transition risk?

Is the risk reward adequate for introducing SBIR technologies into your projects?

What assistance do SBIR firms need?

- Understanding contractor's insertion needs
- Pre-M&A, such as valuation

- Sales & Marketing
- Patents and intellectual property management

- Partnering and contract agreements
- Accounts
- Quality control
- Certifications, licenses, etc.

- Manufacturing
- Fiscal planning for functions scaleup

Figure 41 | To better work with Primes, what assistance do SBIR firms need?
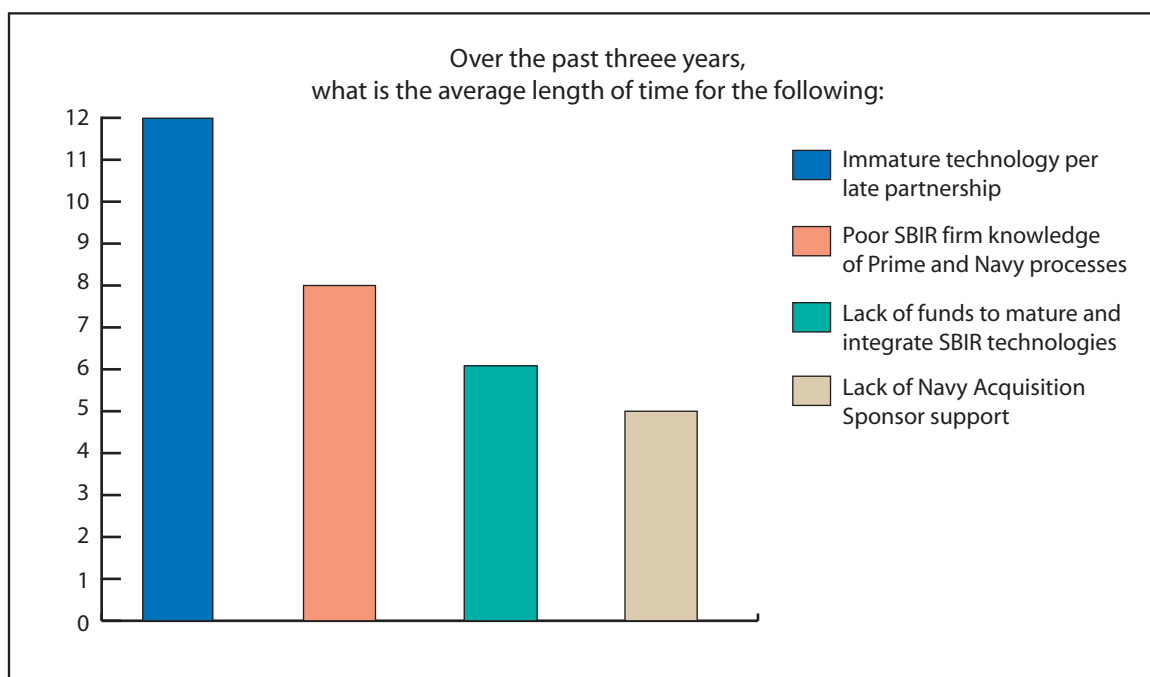

Over the past threee years,
what is the average length of time for the following:

Legend:
- Immature technology per late partnership
- Poor SBIR firm knowledge of Prime and Navy processes
- Lack of funds to mature and integrate SBIR technologies
- Lack of Navy Acquisition Sponsor support

Figure 42 | What impediments slow or stall SBIR transition efforts?

What other practices accelerate transition of SBIR technology into acquisition programs?
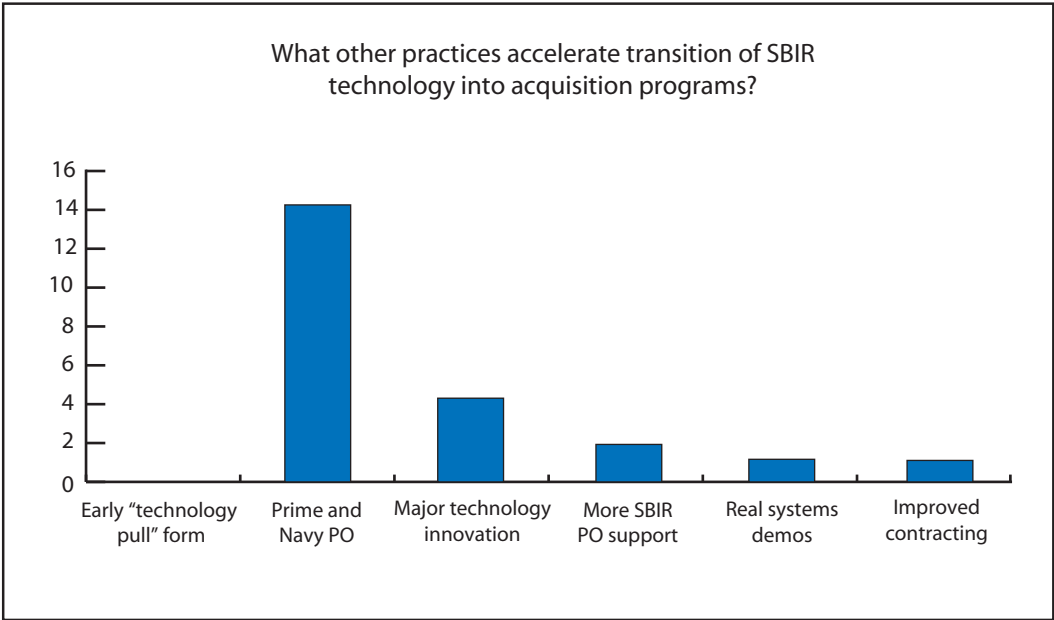
Figure 43 | What practices accelerate SBIR transition into acquisition programs?

TAP's value to SBIR firms re technology transition plan development and insertion target identification?
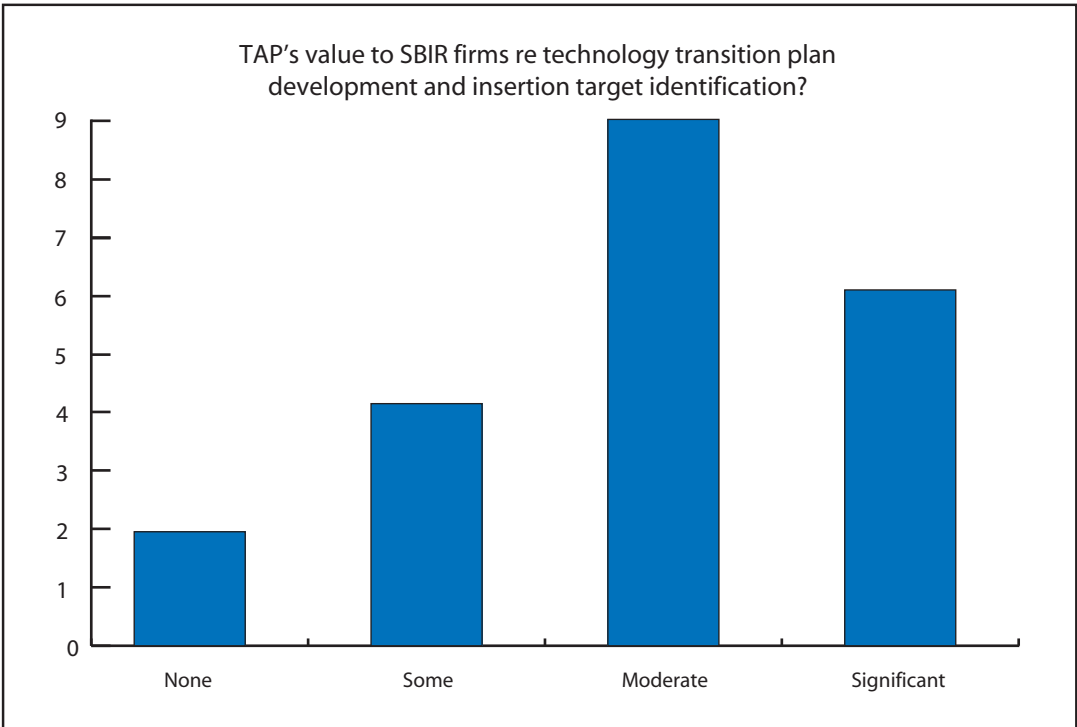
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