

U. S. Department of Defense
Small Business Innovation Research Program
Commercialization Pilot Program (CPP)

Report for Fiscal Year 2008



Office of the Under Secretary of Defense
(Acquisition, Technology & Logistics)

Office of Small Business Programs

April 2009

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EXECUTIVE SUMMARY

The United States Department of Defense (DoD) Small Business Innovation Research (SBIR) Commercialization Pilot Program (CPP) is an initiative authorized by section 252 of the National Defense Act for Fiscal Year 2006 (FY06), Public Law No. 109-163 (NDAA). Section 252 amends section 9 of the Small Business Act (15 U.S.C. 638) to add a new subsection 9(y), that authorizes the Secretary of Defense (SECDEF) and the Secretary of each Military Department (MILDEP) to create and administer a CPP. The purpose of the CPP is to accelerate the transition of SBIR-funded technologies to Phase III, to meet high priority military requirements. To fund the administrative cost of the pilot programs, section 9(y) authorizes use of an amount up to 1% of the SBIR set-aside budget. These funds may not be used to make Phase III awards. The pilot program is authorized through FY09.

In June 2006, the Under Secretary of Defense for Acquisition, Technology & Logistics (USD(AT&L)) requested that each MILDEP stand up activities that enhance the connectivity among SBIR-firms, prime contractors, and DoD science and technology and acquisition communities to facilitate the type of collaboration needed to enable effective technology commercialization/transition. The USD(AT&L) further requested that plans address improving the capability of SBIR firms to provide the identified technology to the Department, directly or as a subcontractor. The Army, Navy and Air Force established initiatives under CPP authority. A project's inclusion in the CPP is by invitation and at the discretion of each MILDEP. CPP participants may receive a variety of assistance services and/or opportunities to facilitate the transition of their projects.

Initial CPP implementation in FY06 focused on establishing programs among the MILDEPs, which constitute over 75% of the DoD SBIR program by budget, and likewise control a large majority of the Department's Research, Development, Test & Evaluation (RDT&E) and Procurement funding. CPP funds were set aside but not fully utilized in FY06. The MILDEPS made progress defining and beginning to implement CPP activities. During FY07, activities focused primarily on fully implementing plans set forth in FY06.

CPP implementation approaches developed by the MILDEPs vary in how SBIR projects with rapid transition potential are identified and selected, and what type of assistance will be provided to accelerate technology commercialization. The Air Force put "Transition Agents" in place among its product centers to support an SBIR technology "hunter-gather" process to identify and facilitate the transition of technologies addressing technology needs. Initial engagement with two of four product centers was completed with nine CPP candidates identified. The Army established a process whereby candidate technologies were identified via business and technology assessment, and selected projects received comprehensive transition planning and commercialization assistance. The Navy stood up a centralized SBIR Accelerated Transition (SAT) Program through which candidate projects submitted by industry and its Systems Commands were considered for additional funding. Major Navy Systems Commands also stood up their own CPP activities and the Navy initiated a broad assessment of all SBIR Program processes. In July 2007, the USD(AT&L) encouraged all additional DoD Components participating in the SBIR Program to also establish CPP initiatives utilizing the authority.

In FY08, all MILDEP CPP processes were in place and operating with CPP project selection and support in various stages of implementation. The Air Force expanded their CPP process to include more “Technology Match” workshops designed to include prime contractors in their CPP SBIR Program. The Air Force also instituted formal agreements among the relevant system program office and major contractor/supplier(s), the selected small business and the Air Force Research laboratory (AFRL) to document intent to transition the identified technology. The Army continues to identify candidate CPP projects through a process whereby technologies are identified via business and technology assessment. Additional Army SBIR funding is available to accelerate the transitions by expanding the projects’ research, development, test and evaluation. The Navy repeated their SAT process and added 39 new projects in FY08; 19 of their earlier projects have Phase III contracts exceeding a total of \$43 million, matching SBIR investment of \$36M. As noted earlier, in 12 July 2007 USD (AT&L) issued a memorandum to the heads of the remaining DoD Components participating in the SBIR Program encouraging implementation of CPP.

To date, no DoD Component beyond the Army, Navy and Air Force has utilized the authority. Some have decided to defer participation pending reauthorization of the SBIR program, or are waiting to gain a better understanding of the effectiveness of Army, Navy and Air Force CPP approaches, while others are simply too small in terms of budget to fund meaningful activities. However, all of these programs encourage commercialization and some have ongoing commercialization assistance efforts similar to CPP.

The Military Departments’ combined FY08 CPP budgets totaled \$8.7 million. Activities supported by these funds identified SBIR projects which in turn attracted or received an additional \$118 million in sales and third party funding. A total of 133 small business firms were selected to receive CPP support in FY08 and an additional 33 firms selected in previous years received support. Firm-reported SBIR Program data indicates that Army, Navy and Air Force CPP initiatives are associated with higher commercialization among selected projects, both in rate and magnitude, when compared to groupings of similar SBIR projects that did not receive CPP support. While we cannot prove that CPP caused this commercialization differential (there may, for example, be a high degree of self-selection among successful firms and projects), it is clear that the authority has been used to bring a great deal of attention to the challenge of identifying and commercializing promising SBIR technologies.

More robust data collection is required to better understand these preliminary but promising findings, and to provide greater insight into each initiative, as well as the broader challenge of SBIR technology commercialization. FY09 will be a critical year for the CPP in this regard as the CPP database is fully developed and populated. FY09 should also move focus from implementation and administration to employing the CPP as a tool to strategically and rapidly place innovation into DoD products to increase capability or reduced costs to ultimately provide our warfighter technological advantage.

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1.0 SUMMARY OF COMMERCIALIZATION PILOT PROGRAM (CPP) AUTHORIZATION

The Department of Defense (DoD) Commercialization Pilot Program (CPP) is an initiative authorized by section 252 of the National Defense Authorization Act for Fiscal Year 2006 (FY06), Public Law No. 109-163 (NDAA), which contained several provisions regarding the Small Business Innovation Research (SBIR) Program. Section 252 amended section 9 of the Small Business Act (15 U.S.C. 638) to add a new subsection 9(y), that authorizes the Secretary of Defense and the Secretary of each Military Department to create and administer a CPP. To fund the administrative cost of the pilot programs, section 9(y) authorizes use of up to 1% of the SBIR set-aside budget. These funds may not be used to make Phase III awards. The pilot program is authorized through FY09.

The purpose of the CPP is to accelerate the transition of technologies, products, and services developed under SBIR to Phase III and into the acquisition process. In carrying out the CPP, the Secretary of each Military Department is required to identify SBIR research programs that have the potential to transition rapidly to Phase III and into the acquisition process. The Secretary of each Military Department must certify in writing that, with respect to the selected programs, the successful transition of the program to Phase III and into the acquisition process is expected to meet high priority military requirements of the Military Department.

The Secretary of Defense is required to submit an evaluative report regarding activities under the CPP to the Committee on Armed Services and the Committee on Small Business Entrepreneurship of the U.S. Senate; and the Committee on Armed Services and the Committee on Small Business of the U.S. House of Representatives at the end of each fiscal year. The report is to include:

- An accounting of the funds used in the CPP;
- A detailed description of the CPP, including incentives and activities undertaken by acquisition program managers, program executive officers and prime contractors; and,
- A detailed compilation of results achieved by the CPP including the number of small business concerns assisted and the number of projects commercialized.

This required information is contained in the following sections and appendices of the report, broken out by participating DoD Component.

2.0 BACKGROUND: SBIR IN THE DEPARTMENT OF DEFENSE

Congress enacted the Small Business Innovation Development Act of 1982 (P.L. 97-219), establishing the SBIR Program. Stemming from studies indicating small high-technology businesses are cost-effective performers of research and development and are particularly capable of turning research and development (R&D) into new and helpful products and processes, the statute strengthened the role of small businesses in Federally-funded research and development. In passing the 1982 Act, Congress noted findings that technological innovation creates jobs, increases productivity, competition and economic growth, but while small businesses are the nation's principal source of significant innovation, the vast majority of Federally-funded R&D had been conducted by large businesses, universities, and government laboratories.

The SBIR Program is a government-wide program overseen by the Small Business Administration (SBA). Under the Act, each federal agency with an extramural budget for research or research and development (R/R&D) in excess of \$100 million for FY82 or thereafter must establish an SBIR Program. Currently, the Department of Defense and 11 other federal agencies within the U.S. government are required to have an SBIR program. Within the Department of Defense, 12 DoD Components participate in SBIR program: the Army, Navy, Air Force, and through the broader DoD Program, Defense Advanced Research Projects Agency (DARPA), Missile Defense Agency (MDA), Defense Threat Reduction Agency (DTRA), U.S. Special Operations Command (SOCOM), Joint Science and Technology Office of Chemical and Biological Defense (CBD), Office of the Secretary of Defense (through the Director, Defense Research Engineering), National Geospatial Intelligence Agency (NGA), Defense Microelectronics Activity (DMEA), and Defense Logistics Agency (DLA). NGA is a voluntary participant. Program oversight is provided by the DoD Office of Small Business Programs within the Office of the Under Secretary of Defense for Acquisition, Technology & Logistics.

Within the Defense Department, the SBIR Program is a tool to help drive capability to defeat any adversary on any battlefield. It contributes to this vision by funding focused technology development along with cultivating a capacity for materiel innovation in the defense industrial base to meet current and future warfighter needs. As such, SBIR is a tool to enable strategic and tactical acquisition excellence as a source of innovative solutions to enhance capabilities, reduce lifecycle costs, and address technical risk throughout the system acquisition lifecycle.

3.0 FISCAL YEAR 2008 CPP IMPLEMENTATION

This section is composed of separate subsections describing efforts undertaken by the Department to implement CPP authority. It outlines accomplishments of the Air Force, Army, and Navy, reports on CPP funds set aside and used, characterizes CPP activities, and describes results to date and anticipated future results.

Section 9(y) of the Small Business Act allows the broad implementation of CPP authority throughout the DoD SBIR Program through the Secretary of Defense and Secretaries of the Military Departments. Initial Department implementation focused on establishing robust programs among the Military Departments which constitute over 75% of the DoD SBIR Program by budget, and likewise control a large majority of DoD Research Development, Test and Evaluation (RDT&E) funding. The Department issued a memorandum to the remaining DoD Components in July 2007 providing encouragement to develop customized programs implementing CPP.

It is important to remember that CPP activities are funded from RDT&E appropriations which have two-year obligation authority. Therefore, FY08 funding not otherwise obligated in FY08 is available for obligation through September 30, 2009. An update of the FY08 funding will be included in the 2009 CPP Report.

3.1 Department of Defense CPP Overview

The Office of the Secretary of Defense has management oversight of the DoD Commercialization Pilot Program. At the Department level, several initiatives have been undertaken to advance participation in the CPP.

3.1.1 Guidance

Formal Guidance. On June 27, 2006, the USD (AT&L) issued a memorandum to the Secretary of each Military Department, providing guidance on CPP and requesting they conduct a portfolio review of recent SBIR Phase II projects to identify technologies with the greatest potential to meet known needs of programs of record. It stressed linking the science and technology and acquisition communities effectively and seeking high-potential cross-cutting technologies that serve joint technology needs. On July 12, 2007, the USD(AT&L) followed by issuing a memorandum to the Director of each of the remaining DoD Components participating in the SBIR Program, extending CPP authority and encouraging development of such a program customized to meet each Component's requirements. The memorandum emphasized ensuring that the SBIR Program is generating and funding the right projects, employing the right incentives and leveraging the technology, tools, and mechanisms available within the program.

Inclusion of SBIR in updated DoD Instruction 5000.02. In FY07, the Department proposed changes to DoD Instruction 5000.2, "Operation of the Defense Acquisition System," and the Defense Acquisition Guidebook (DAG). In December 2008, the following language was

included in the updated DoDI 5000.02 in Enclosure 2, “Procedures,” section 3, “User Needs and Technology Opportunities:”

“Program Managers shall consider use of technologies developed under the Small Business Innovation Research (SBIR) program and give favorable consideration to successful SBIR technologies.”

Further, in Enclosure 3, “Acquisition Categories (ACAT) and Milestone Decision Authority (MDA),” Section 2, “Technology Projects,” SBIR is identified as an activity that “facilitates and provides early joint technology and capability definition, development, experimentation, refinement, testing, and transition.”

These changes clarify the role of SBIR and responsibility of acquisition managers to use the SBIR Program as a source of technology solutions. DAG changes to follow will provide guidance on how to effectively engage the SBIR Program in technology and acquisition planning. In FY09, additional training material will be developed to further orient Program Managers and other acquisition, contracting and technology development personnel regarding how to successfully integrate SBIR into acquisition planning.

3.1.2 Outreach

Outreach is an important aspect of CPP implementation serving the function of educating and involving government and industry stakeholders in SBIR technology development and commercialization. The following efforts were executed in FY08:

DoD SBIR Beyond Phase II Conference. The most significant DoD-wide outreach event for the CPP is the annual DoD SBIR Beyond Phase II Conference. The 2008 Beyond SBIR Phase II Conference brought together stakeholders in the technology transition process including recent SBIR Phase II contract awardees, large business concerns, the government acquisition community, and scientists and technologists. It increased awareness of market opportunities created by SBIR investments, facilitated the development of relationships necessary to enable technology transition, and promoted jointness in the use of SBIR technology advancements.

At the 2008 conference, evaluative meetings were conducted with all the major stakeholders of the CPP program. These meetings captured stakeholder requisites and suggestions for improvements to the CPP which will form the foundation of the Department’s FY09 CPP program improvement efforts and inform changes in the 2009 Beyond Phase II Conference, September, 22-24, 2009 A preliminary conference agenda and additional information is available at: <http://www.acq.osd.mil/osbp/sbir/conferences/index.htm>.

Additional Outreach to Program Executive Offices (PEOs) and Program Managers (PMs). FY08 outreach to PEOs and Program Managers was achieved through the development of a Program Manager’s Checklist. The checklist was designed as a two-sided promotional brochure to target Government Program Managers and acquisition officials. The first side of the brochure provides general information about the SBIR and STTR program, and illustrates the three phases of the process. The second side offers a checklist of ways PEOs and PMs can get

involved with SBIR. The brochure was most recently distributed at the Fall 2008 PEO/Systems Command Summit and will be used as targeted outreach material for relevant future events.

Feedback from the Government PEOs and Program Managers at the 2008 Beyond Phase II Conference principally focused on their need to maximize use of their time, balancing the opportunity cost of time away from their office against the benefit of getting exposure to the entire DOD SBIR Program in one place as an important opportunity. To address their concerns and maximize the use of the Beyond Phase II Conference and their time, the 2009 event will include meeting rooms for the government acquisition community to conduct review meetings with their SBIR companies and/or prime contractors to obtain dual benefit from the conference. At the 2007 Beyond Phase II Conference, space was made available for several Joint Strike Fighter (JSF) Prognostic Health Monitoring (PHM) meetings capitalizing on the PHM small companies, GE, Pratt Whitney, Rolls Royce, and JSF engineers attending the conference. In addition to the Government Program Managers, several prime contractors noted that the value of having so many of the right people available in the attendee pool made the meeting timely and provided an efficient use of their time. By addressing PEO and Program Manager needs directly, and promoting a dual benefit at the Beyond Phase II Conference, outreach to these groups should be more effective.

3.1.3 Initiatives to Engage Prime Contractors

In response to prime contractor feedback, information will be more readily available on the DoD SBIR Website to provide CPP information to help facilitate prime contractor's use of the program. The space will be used to interface with the CPP database and create a non-proprietary report containing real-time CPP information needed to identify technological opportunities and to provide a communication path to CPP firms.

In addition, a workshop will be developed to educate large companies on the CPP authorization and how to get started with the Military Departments and DoD Components. This pilot workshop will be held at the 2009 Beyond Phase II Conference as well as at several major defense conferences. For the experienced prime contractor CPP participants, a room and time will be made available for a round table discussion to share best practices and identify future enhancements for the CPP.

3.1.4 Leveraging the Comprehensive Subcontracting Plan Test Program

The DoD Comprehensive Subcontracting Plan Test Program is a test program to determine whether comprehensive subcontracting plans, on a corporate, division, or plant-wide basis, will reduce administrative burdens while enhancing subcontracting opportunities for small and small disadvantaged business concerns. In FY08, contact was made with the representative points of contact from each of the Comprehensive Subcontracting participants to understand the relationship between their small business role and their corporate SBIR process, how they leverage the SBIR Program, and what activities are planned for the future.

A majority of representatives were familiar with CPP, routinely send their engineers to SBIR conferences, had some form of tracking SBIR participation, and had processes in place to

partner with SBIR firms, including standard nondisclosure agreements. While most did not have specific SBIR incentive awards, all had awards such as on-the-spot and end-of-year bonuses that could be used to reward SBIR partnering. One corporation specifically gives monetary awards for bringing in new small businesses with a larger award for identified high technology needs. Most have at least one person designated as a small business advocate, several had advocates at each geographical location and within divisions, and two had a tiered approach using their small business office and a more formal ethics level for disputes. In addition, another maintains a toll-free number specifically for small businesses to use for dispute resolution. Several representatives indicated plans for future improvements including a specific SBIR Business of the Year Award, increased recognition for engineers that find SBIR Phase III technologies (TRL 6 and higher), and better teaming between the small business office and the engineering communities.

3.1.5 SBIR Webcast Training Offered through Defense Acquisition University

In November 2007, OUSD(AT&L) provided a live webcast from the Defense Acquisition University (DAU). Since the initial viewing of 700 viewers in 2007, an additional 2,145 viewers have tuned in to learn how to utilize SBIR as a tool across the acquisition program lifecycle for leap-ahead capability or enabling technology development to tap innovation and address program needs. The webcast is available for viewing at the DAU website www.dau.mil.

In addition to the webcast, three Continuous Learning Modules (CLMs) are in development for planned for release in FY09. The modules include:

- 101: Introduces the learner to the SBIR and STTR Program origins, goals, processes and resources. It will replace an existing CLM.
- 201: Will provide practical instruction to leverage the SBIR Program to utilize technologies to address program needs. Focuses on the value of SBIR to the Program Manager, and the unique ability of SBIR to address technology needs throughout the program lifecycle.
- 301: Will continue practical instruction on leveraging SBIR technology and business benefits for acquisition program. It defines alternative approaches to incorporating SBIR technology development in core program development artifacts such as the technology development strategy and the acquisition strategy and technology transition planning documentation.

The following sections highlight the initiatives and accomplishments of the Military Departments and the other participating DoD Components in FY08.

3.1.6 The Technology Transition Initiative (TTI)

The Technology Transition Initiative (TTI), managed by the Office of the Deputy Under Secretary of Defense for Advanced Systems and Concepts, serves a function similar to CPP, addressing funding gaps between the time a technology is demonstrated and the time it can be funded and procured for use in an intended weapons system or operational capability for the warfighter. TTI accelerates the transition of mature technologies from DoD labs, R&D Centers,

and other DoD S&T funding accounts into DoD acquisition programs of record/procurement. A key contributor to the success of TTI is requiring up-front coordination between the S&T organization developing the technology and the Acquisition organization responsible for the program of record. TTI projects are not initiated until both parties sign a Technology Transition Agreement with the Office of Technology Transition, a feature of service CPP efforts described below. This approach has enabled the transition of many technologies that began as SBIR efforts, such as Warfighter Hearing Enhancements, which is providing a wide range of protective hearing devices to Navy aircraft carrier crew members, and Image Compression, which has transitioned an image and video data compression capability to Special Operations Mission Planning.

Other TTI projects that have recently transitioned or are on track to transition that originated from SBIRs include the following:

- Thermal Battery for Precision Guided Munitions
- Unmanned Sea Surface Vehicles for Littoral Combat Ship Missions
- Operational Gliders for Battlespace Reconnaissance and USW Surveillance
- n-Acetylcysteine (NAC) Clinical Trials
- AIM-9X Electronic Arm Firing Device
- Micro Electro-Mechanical Systems (MEMS) Medium Caliber Cartridge Improvements
- Improved Heating Technology (IHT) for the Unitized Group Ration - Express (UGR-E)
- Joint Service General Purpose Mask (JSGPM) Filter End-of-Service-Life Indicator

3.2 Air Force

3.2.1 Air Force CPP Overview

Managed by the Air Force Research Laboratory (AFRL) at Wright-Patterson AFB, Ohio, the Air Force (AF) CPP focuses on accelerating the transition of the technologies, products, and services developed under the SBIR Program to Phase III. The focus of AF CPP is on identifying SBIR-funded technologies with the potential to address program technology needs, principally through targeted match-making events, and coordinating follow-on activity among stakeholders to enable continued technology development and acquisition.

3.2.2 Air Force CPP Program Initiatives

During the past year, the AFRL Technology Executive Officer (TEO) and Air Force Program Executive Offices (PEO) increased efforts to strengthen the identification of high-priority PEO technology needs/challenges related to major acquisition programs and the communication of these needs to AFRL. A method for AFRL to respond to those needs, with proposed technology-based solutions, was also put in place as a derivative of this improved process. Since SBIR-developed technologies are part of the solution set that AFRL considers in addressing identified needs, the new requirements-gathering process itself forms the basis for five annual CPP workshops.

The purpose of these one-on-one “Technology Match” workshops is to identify areas of mutual interest between major contractors and small businesses with SBIR Phase II projects. Each workshop aligns with a particular PEO organization, with the exception of the F-22 and Joint Strike Fighter (JSF); these organizations share one workshop. The other workshops focus on the respective technology-based needs of the Space and Missile Systems Center (SMC), Air Armament Center (AAC), Electronic Systems Center (ESC), and Aeronautical Systems Center (ASC).

Following workshop activities, AF SBIR CPP Transition Agents contact participating prime/supply chain contractors to identify which small businesses are selected as potential partners. Upon confirming the teaming opportunity, Transition Agents re-engage with the corresponding product center that initiated the need and the Technical Point of Contact (TPOC) that manages the SBIR project.

3.2.3 The Air Force SBIR Technology Transition Plan (STTP)

The Air Force uses an STTP to formalize an agreement between the program office(s), the major contractor/supplier(s), the small business(s), and AFRL to develop the technology, acquisition strategy, financial strategy and direction, and to plan and prepare the transition strategy. The CPP Transition Agents perform follow-up associated with promising Business-to-Business (B2B) interactions. This includes identifying the current Technology Readiness Levels (TRL) and Manufacturing Readiness Levels (MRL), the TRL and MRL necessary to begin transition, the financial strategy to achieve these levels, and the roles and responsibilities of each of the critical technology transition stakeholders listed as members in the STTP.

If the Transition Agents identify unfunded requirements to complete the STTP, they help identify appropriate funding sources and assistance instruments. All parties make this agreement within the constraints imposed by mission requirements, funding and other resource availability, system schedules, and other factors beyond their control.

3.2.4 Generating AF SBIR CPP STTPs

The AF SBIR CPP Transition Agents have generated a total of 93 STTPs since program inception. Most are still in the draft stages. Of these 93, 15 are funded and progressing, 14 have been rescinded and the remaining continue to evolve.

Funded STTPs: Similar to the Phase II Enhancement Program, the Air Force SBIR Program provides additional funds to small businesses in support of STTPs that identify financial commitments of other key STTP stakeholders. To date, the Air Force provided approximately \$6.57 million of SBIR funds to small businesses under 15 different STTPs. These funds leveraged greater than \$17 million total from non-SBIR sources that include the AFRL, AF Programs of Record, the Manufacturing Technology (ManTech) Program, and Industry Independent Research & Development (IR&D) for a total of \$23.72 million.

Draft STTPs are sometimes not completed for a variety of reasons. For example, the technology may not be available when needed or the system integrator may have lost interest due, for example, to the level of associated risk. Two of the rescissions were due to the purchase of the small companies by larger ones, obviating the need for an agreement to document

partnership—these technologies will transition as a matter of course. The AF SBIR program office will continue to monitor these and submit success stories as a result of the acquisitions.

3.2.5 New SBIR CPP Approaches

The Departments of the Navy and Air Force SBIR Programs are jointly piloting an innovative approach to accelerating SBIR developed technologies. It involves collecting needs of AF and Navy programs of record for major contractors. Each Service data-mines their SBIR portfolio to identify potential matches. The specific major contractor then selects the small businesses to interview at an event at their facility.

Three major contractors—BAE Systems, Northrop Grumman Corporation, and Raytheon Missile Systems—volunteered to pilot this new approach. The BAE Systems workshop was held in August 08 with encouraging results. The Navy and AF plan to conduct these industry focused workshops with Northrop Grumman Corporation and Raytheon Missile Systems in early FY09. Following analysis of resulting workshop data, the Services will determine if these events should continue.

3.2.6 Air Force CPP Funding

Air Force CPP Budget					
SBIR FY 06 Budget	CPP FY06 Budget	SBIR FY07 Budget	CPP FY07 Budget	SBIR FY08 Budget	CPP FY08 Budget
\$313M	\$2.96M	\$328M	\$3.28M	\$337M	\$3.30M

3.2.7 Funding Narrative

FY06 CPP funds (\$2,960,118) were obligated on a Transition Support Contract to MacAulay Brown, Inc. (Mac-B) from September 2006 through September 2007. FY07 CPP funds (\$3,282,478) were fully obligated through an option to continue this support contract through September 2008. FY08 CPP (\$3,279,829) funds were fully obligated through a second option to continue this support through September 2009. Of the FY08 CPP budget, \$15,800 was set aside to support travel requirements.

3.2.8 Air Force CPP Results and Achievements

The ultimate goal of the Air Force CPP program is to transition small business developed technology to commercial and operational use. To date, the Air Force has two SBIR STTPs that are transitioning into operational use:

- **STTP 2007-4 Metal Fiber Brushes (MFBs).** The MFBs were successfully tested on a test cell engine in Sep 08 at Schenectady, NY. The Defense Holdings, Inc. product is projected to enter the Air Force supply system as a preferred spare following

successful flight tests. Manufacturing of the spares will take place in a Virginia Historically Underutilized Business Zone (HUBZone).

- **STTP 2007-5 B-2 1553 Avionics Bus Characterization and Integrity Toolset.** This test equipment completed security and safety testing and plans review on 8 Oct 08. The B-2 Program Office has granted approval to use these pre-production units. Initial delivery to Whiteman Air Force Base commenced in late 2008 with final delivery of the remaining units anticipated in the Fall of 2009.

3.3 Army

3.3.1 Army CPP Overview

The objective of the Army CPP is to increase SBIR transition and commercialization success, including accelerating the fielding of capabilities to Soldiers and facilitating investment by industry in the small business technology by:

- Identifying and assessing SBIR projects and companies with high transition potential that meet high-priority requirements.
- Providing market research and business plan development.
- Matching SBIR companies to customers and facilitating collaboration.
- Preparing detailed technology transition plans and agreements.
- Providing additional funding for select SBIR projects.

In addition, the Army continues its efforts supporting SBIR commercialization into acquisition programs and conducting expanded outreach, training, and collaboration opportunities for PEOs) and acquisition Program Managers (PMs). For example, acquisition PMs and PEOs have been actively involved in SBIR/STTR topic selection and management, with each PEO and direct reporting PM authorized to develop and manage topics directly.

3.3.2 Army CPP Program Initiatives

MILCOM Venture Partners (MILCOM), the Army contractor supporting CPP, conducted a detailed analysis of several hundred companies to determine the most promising among the Phase II activities. To understand each active Army Phase II SBIR project's potential for rapid transition and commercialization, a series of progressive screening processes were conducted to ultimately identify and recommend a limited set of CPP participants. Initial data collection efforts involved execution of an electronic Commercialization and Technology Assessment (CTA) questionnaire through the Army's Small Business Web Portal. The CTA contained over 180 questions to assess a firm's likelihood of transition and commercialization success based on factors typically exhibited by successful firms. Contact with all 487 active Phase II projects in May 2008 resulted in 264 companies voluntarily submitting a CTA questionnaire showing both

their interest and willingness to participate in the CPP. Preliminary analysis to identify CPP candidates involved two parallel processes: a) the CTA analysis that focused on a broad assessment of all eligible firms, and b) an internal “fast track” that focused on assessing a limited set of initially promising firms for early recommendation based on high-priority requirements and capability gaps from various commands. Data analysis of factors such as the business’ ability to support transition, how important the project is to the soldier, how quickly the project can transition, investment required, the TRL and MRL of the project and others were applied to identify over 140 companies for additional analysis.

A significant amount of data processing and validation took place in the fourth quarter of FY08 to support the multi-step recommendation process including detailed due diligence reviews with potential Army customers and stakeholders, SBIR companies’ management team, and potential commercial customers along with assessment of potential risk factors towards transition and commercial success. The government ultimately chose 25 projects for the CPP. See Appendix B for FY07 selections. FY08 selections are waiting for final approval from the Secretary of the Army.

3.3.3 Army CPP Program Enhancements

The Army SBIR Program Management Office (PMO) began two enhancements in FY08 in an effort to expand CPP impact. In June, Army SBIR PMO decided to modify the MILCOM contract to extend support for an additional year to the top 10 of the 25 selected companies from the previous year. These 10 participants are termed Extended Support Participants. Support to these 10 companies will carry into FY09 and will focus on two areas: a) transition planning and assistance; and b) customer collaboration. Given the multi-year timeline typically required to transition SBIR Phase II technology, these extended support activities are expected to accelerate product transition and expand commercial dual-use opportunities. See Appendix B for designation of FY07 firms receiving extended support during FY08.

In FY08, the Army also began work preparing for a comprehensive CPP portfolio assessment. This effort will be completed in FY09 with the intent of bringing as many key leaders from Army science and technology, PMs, and PEOs from across the Army into one location to review these CPP technologies and provide feedback about technology transition, applicability, and CPP improvement ideas. This assessment will also support continuous improvement of the Army’s CPP process. This will ensure that the CPP will not only recognize efforts for their potential return on investment but also promote efforts with strong potential to meet Warfighter requirements.

3.3.4 Army CPP Funding

Army CPP Budget					
SBIR FY 06 Budget	CPP FY06 Budget	SBIR FY07 Budget	CPP FY07 Budget	SBIR FY08 Budget	CPP FY08 Budget
\$243M	\$2.43M	\$243M	\$2.43M	\$270M	\$2.70M

3.3.5 Army CPP Funding Narrative

The Army CPP budget in FY07 was \$2.43 million (1% of the total Army FY07 SBIR budget of \$243 million). These funds were fully obligated in FY08 with approximately \$2.3 million allocated for contracted support services with MILCOM for Technology Transition Management, and the remaining \$0.1 million for other CPP administrative activities, including solicitation, award, and administration of the above contract.

The Army CPP budget for FY08 was \$2.70 million and those funds will be obligated in FY09. For the second straight year, the Army set aside \$15 million of SBIR funding to enhance the 25 most promising, on-going, Phase II activities with expanded research, development, test and evaluation to accelerate transition. Additionally, the Army continues to encourage its CPP vendor to facilitate the acquisition of third party (non-SBIR) funding for each SBIR company participating in the CPP through an incentive award based on the total sales and outside investments obtained by participating CPP companies.

3.3.6 Army CPP Results and Achievements

After completing collaboration and transition support activities with MILCOM, the FY07 CPP participants reported first-year transition impact and return on investment metrics. In aggregate, the 25 FY07 CPP participants received \$98.6M in combined third party funding and sales during the first annual CPP performance period, which concluded in the third quarter of FY08. This figure resulted in a Return on Investment (ROI) factor of 2.6, defined as cumulative total sales investment in the 25 selected companies since the government selected them to participate in CPP divided by total SBIR investment (CPP, Phase I and Phase II) of \$38.5 million to date in the 25 companies. Additionally, FY07 CPP participant efforts resulted in the following transition events: a) qualification and adoption of an electronic health and usage monitoring system for Special Operations Command's (SOCOM) rotary aircraft fleet that is expected to extend mission operations while reducing operational costs; b) selection as the baseline in-ear noise reduction and protection module for the tri-service Modular Aircrew Common Helmet (MACH) program; and c) initial qualification of a next generation hands-free voice controller for fielded Unattended Ground Vehicle (UGV) platforms.

3.4 Navy

3.4.1 Navy CPP Overview

The goal of the Navy CPP initiative is to accelerate and incentivize the transition of SBIR projects into high priority Navy systems by providing needed assistance to SBIR companies and key technology development and transition stakeholders. Success occurs when the SBIR developed technology is integrated into a product or service to meet an identified Navy or DoD need.

3.4.2 Navy CPP Program Goals

The Navy CPP approach has the following three (3) broad goals:

1. Formalize processes which clearly tie Acquisition Programs and military requirements to the SBIR program and Phase III;
2. Accelerate transition from Phase II to Phase III of technologies meeting high priority requirements; and,
3. Educate “transition stream” participants—stakeholders in the process of fully commercializing a technology—in CPP and best practices for Phase III.

3.4.3 Navy CPP Technology Transition Plan

Navy Acquisition Program Management Offices (PMOs) participate in the SBIR Program during topic generation, Phase II award selection and Phase III transition. As a result of the CPP, added emphasis has been placed on Phase III transition and the processes supporting this phase of the SBIR program. In response, specific improvements were initiated:

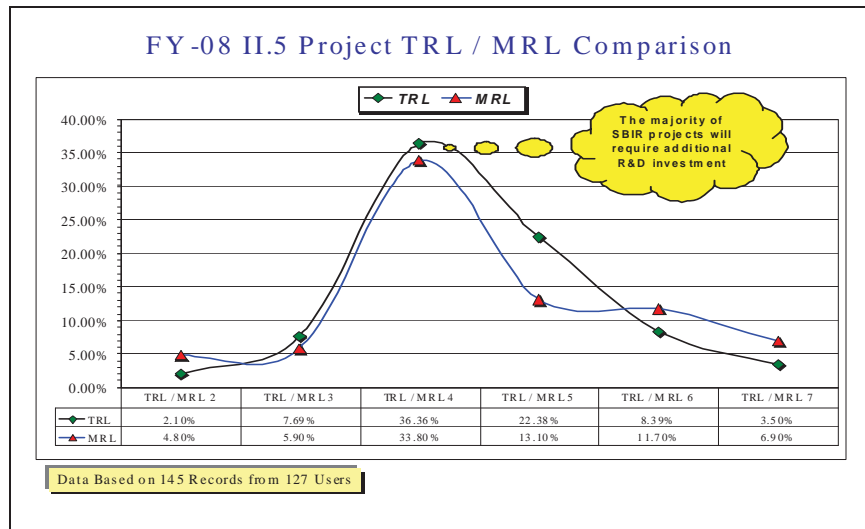
1. A standardization initiative regarding reports and quad chart formats was commenced to ensure common/best practices across the SYSCOMs and PEOs, reduce communication failures and data mismatches, and enhance ability to generate program health reports.
2. Deployment of Technology Integration Plans (TIPs) and Technology Roadmaps early in the SBIR development process to document an Acquisition Program’s strategy, to document the requirements supporting topic generation and to promote continued post-Phase II development of SBIR technologies.
3. Deployment of Technology Transition Agreements (TTAs) for post- Phase II and Phase III projects as a process focused on documenting technology needs and system requirements; establishing project risks and objectives; defining transition requirements in terms of technical maturity/demonstrated capabilities, cost and schedule; and documenting the funding commitments of the interested parties.
4. Initiation of a SBIR Technology Portfolio Management Process pilot involving periodic PMO evaluation and management of their SBIR Technology Portfolios. The pilot involves a PMO/PEO led formal evaluation process which encompasses the following specific activities:
 - Periodic and formal reviews of SBIR Technology Portfolios by the Acquisition PMOs and PEOs to encourage portfolio management, technology status awareness and early transition planning.
 - Early identification of SBIR technologies that meet a Navy weapon system that have a “high potential” for rapid transition.
 - Identification of investment and technology insertion strategies.

- Rigorous “due diligence” on the candidate projects selected for transition to include a Transition Risk Assessment (TRA) to identify the transition risks and the formulation of appropriate risk mitigation strategies.
5. Continue to provide Phase II transition assistance to all Phase II SBIR awardees. The Navy Transition Assistance Program (Navy TAP) provides Navy Phase II awardees with focused business planning, market assessment and transition planning assistance.

3.4.4 Phase II.5 Risk Reduction and Technology Maturation Phase

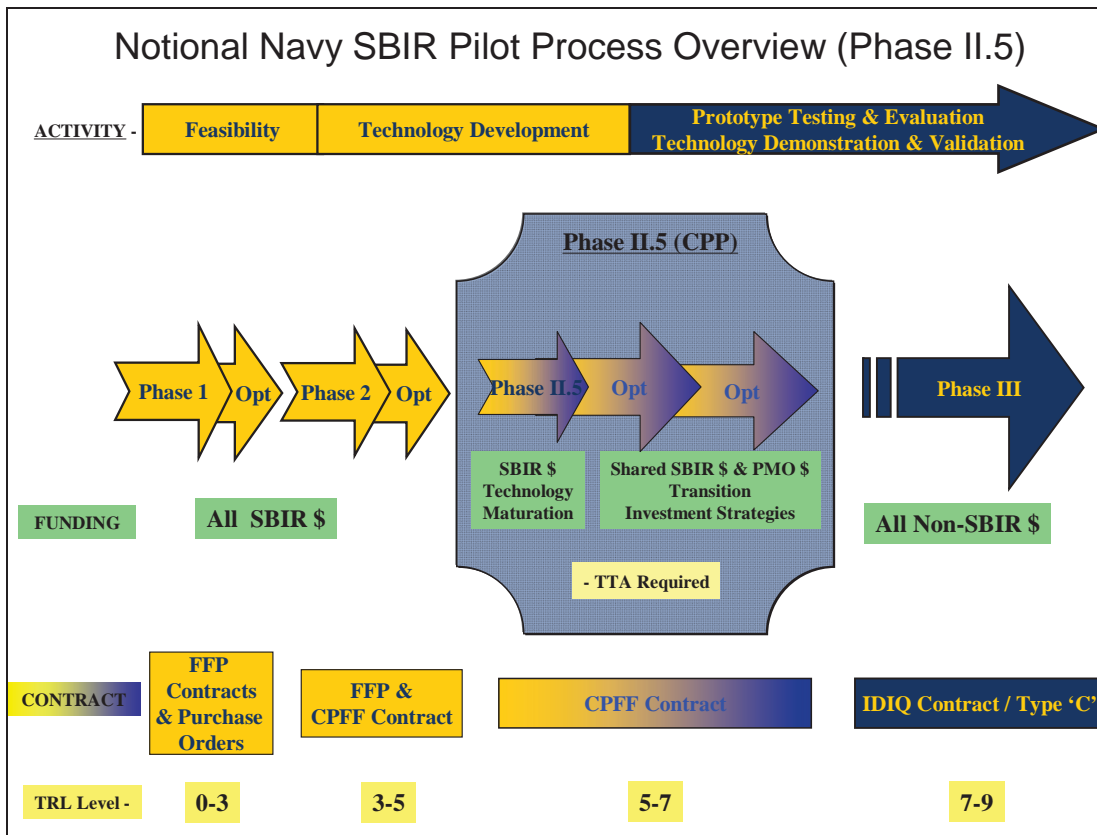
Figure 1 below, is Navy Systems Command (SYSCOM) data collected for 145 SBIR projects during a PMO/PEO CPP SBIR Technology Portfolio evaluation. As illustrated, the data indicates that the TRL and the MRL of a significant number of the SBIR projects are at or below level 5. This suggests that additional technology development and maturity work will be needed before the SBIR technology is ready for transition into a Program of Record.

Figure 1: Navy Phase II Projects TRL and MRL Comparisons:



In order to address this deficiency a “gated process” that included an interim post-Phase II SBIR technology maturity phase to provide continued SBIR technology maturity, shared SBIR and PMO transition investments and focused transition risk reduction was implemented to achieve a TRL 6 required for transition to an acquisition activity.

Figure 2: Conceptual Overview of Phase II.5 Implementation:



Specific activities undertaken by the Navy to facilitate the implementation of the Phase II.5 pilot include the following:

1. Directed 20% of SBIR funds to be allocated for CPP use by the Acquisition PMOs and PEOs to ensure technology maturation and enhance transition likelihood.
2. Utilized Technology Transition Agreements (TTAs) as a process focused on documenting technology needs and system requirements; establishing project risks and objectives; defining transition requirements in terms of technical maturity/demonstrated capabilities, cost and schedule; and documenting the funding commitments of the interested parties.
3. Customized and implemented a Technical Risk Identification and Mitigation (TRIMs) tool for Navy SBIR use to ensure optimal assessment of SBIR project risk from a transition perspective, and provide a roadmap of mitigation strategies.
4. Provided manufacturing and risk assessments assistance to firms/projects to assist in the development of reliable suppliers for acquisition offices or prime contractors with documented interest in Phase II technologies and to reduce transition risks.

5. Deployed of a web-based Technology Portfolio Evaluation Tool (TPET©) to facilitate the CPP project evaluation and selection process. The “web-based” TPET© facilitates “virtual” and simultaneous evaluation of hundreds of Navy SBIR topics by the TPOCs, PMOs, and PEOs distributed throughout the Navy SBIR Program’s geographic footprint.

6. Provided individual awards up to \$5,000 to TPOCs who effectively transitioned products.

3.4.5 Navy CPP Funding

Navy CPP Budget					
SBIR FY 06 Budget	CPP FY06 Budget	SBIR FY07 Budget	CPP FY07 Budget	SBIR FY08 Budget	CPP FY08 Budget
\$310M	\$3.07M	\$311M	\$3.11M	\$337M	\$2.667M

Figure 3: Description of Activities Funded by Navy CPP Admin Funds:

Activity	FY08 CPP \$	Description
CPP Management Support	\$1,090,378	Program management support to include day-to-day support, implementation and execution of program, reporting and documentation.
TPOC Reimbursement	\$281,853	TPOC technical oversight is required for post -Phase II CPP projects that have a SBIR funded component requiring either a modification to an existing SBIR contract or a new SBIR contract.
Contract Reimbursement	\$240,000	CPP contracts have required additional contracting support.
IT/Database Support	\$295,309	Information Technology support to modify/improve the existing Navy Program Manager’s SBIR database to incorporate CPP data collection and reporting. Implementation of web-based tools to facilitate CPP project selection and transition planning/management.
Transition Plan Assistance	\$350,230	Activities to assist SBIR companies selected for CPP in transition planning and other business areas to insure SBIR companies are capable of meeting PMO transition requirements. Also includes direct support to PMO and PEOs in the evaluation, selection and transition management of CPP projects.
Risk/Manufacturing Assess	\$350,230	Direct assistance to CPP companies involved in manufacturing and and/or considered high risk by selecting PMOs. Includes site visits, expert manufacturing planning, risk identification and risk mitigation planning.
Incentive Awards	\$29,000	Pilot program to reward TPOC performance in transitioning SBIR technologies.
Conferences/Outreach	\$30,000	Workshops and conferences held to support CPP and enhance SBIR transitions. Includes topic generation training, technology showcases and meetings.
Total Navy CPP Admin Funds	\$2,667,000	

3.4.6 Navy CPP Funding Narrative

During FY08, the Navy has utilized CPP funds to implement strategic process changes via a wide range of activities to enhance technology transition through continuous process improvement to the SBIR process, improved training and the implementation of innovative pilot programs. Of the \$2.67 million FY08 Navy CPP funding, \$500,000 went to Dawnbreaker, Inc for risk and manufacturing assessment, and technology transition planning assistance; \$300,461 went to WILLCOR, Inc. for risk and manufacturing assessment, and program management; \$121,309 went to QinetiQ North America for information technology and database support; \$110,000 went to the EG&G Division of URS Corporation for management and information technology support; and, \$33,757 went to Computer Sciences Corporation for information technology support. The remaining \$1,601,243 was used directly by participating Navy activities to fund program management and administration, technical oversight and management, contracting support, conference planning and support, and information technology support.

As a result of the Navy's shared SBIR technology transition investment strategy between the SBIR Program and Navy Acquisition Programs, during FY08 the Navy invested \$47.2 million in 48 Phase II CPP projects to mature technologies and pursue technology transition strategies by leveraging a \$19.5 million investment of non-SBIR funding with \$27.7 million of matching SBIR funds.

3.4.7 Navy CPP Results and Achievements

The Navy has implemented a robust and aggressive CPP to improve the transition of SBIR technologies into Naval Weapon Systems and to the warfighter. Noteworthy achievements for FY08 include the following:

1. To date, 19 of the 48 FY 06/07 CPP projects (40%) have received Phase III transition awards valued at \$43.8 million on a total SBIR matching investment of \$36.3 million. This is a Return-On- Investment (ROI) on SBIR matching funds of 1.21:1. The Platforms supported by the 19 transitioned CPP projects include:
 - Virginia Class Submarine
 - E2-C Aircraft
 - AV-8B Aircraft
 - CH-53 Helicopter
 - Tomahawk Weapons System
 - V-22 Osprey
 - Mk-54 Torpedo
 - Unmanned Aerial Vehicle (UAV) Programs
 - Navy Shipbuilding and Repair Programs
 - Navy Ship Electric Power Systems
 - Navy Logistics Productivity Program

2. There have been 39 projects approved and selected in FY2008 for CPP transition assistance.

3. Of the 51 CPP projects reported during FY2006 and FY2007, 48 of those projects have significant transition potential, and ultimately received additional transition support under the Navy's CPP program.
4. Review of on-going FY06/07 CPP projects by Navy SBIR and acquisition personnel, resulted in recommendations to continue 47 of the 48 supported projects.
5. Technology Transition Agreements were signed for 39 of the 48 FY06/07 CPP projects.
6. Of the 24 Tiger Team recommendations made, 17 were selected for implementation by the Navy SBIR Program.

3.5 Other DoD Components

As noted earlier, in 12 July 2007 USD (AT&L) issued a memorandum to the heads of the remaining DoD Components participating in the SBIR Program encouraging implementation of CPP. However, to date, no DoD Component beyond the Army, Navy and Air Force has utilized the authority. Some have decided to defer participation pending reauthorization of the SBIR program, other are waiting to gain a better understanding of the Army, Navy and Air Force CPP approaches, and others are simply too small in terms of budget to fund meaningful activities. However, all of these programs encourage commercialization and some have ongoing commercialization assistance efforts similar to CPP.

4.0 SUPPLEMENTAL EVALUATION

DoD-wide SBIR Program measures are collected through the DoD SBIR/STTR Submission System, the central repository for all DoD SBIR/STTR-related data. In January 2007, a CPP data collection module was added to this system to supplement commercialization data which has been collected since 2000. The data elements of the new CPP module are listed in Appendix D. A few modifications were made in FY08 and are highlighted. This additional collection of data is an attempt to understand the nuances of technology transition and identify early indicators to guide future selections and processes in CPP. It also will help to plan for needs of small businesses. Currently the data entry is lagging while the MILDEPs have focused on implementation and administration. The table below in Figure 4 illustrates the CPP database status:

Figure 4: DoD SBIR CPP Database Status

FY06 – FY08 CPP Data Status					
DoD MILDEPs	FY06	FY07	FY08	FY08	Data Integrity
	Number of Selected Projects	Number of Selected Projects	Number of Selected Projects	Number of projects in the CPP Database	
Air Force	0	10	69	21	>95%*
Army	0	25	0	18	<25%
Navy	5	46	39	94**	~50%**

*AF project data is the most complete. Data integrity refers to the approximate percentage of total fields containing valid data.

** 94 Navy companies have been pulled into the CPP database, but only 50% have additional data entered.

Starting in January 2009, reporting will be required quarterly, to emphasize the need to review processes and support CPP investment decision making. Until a more complete evaluative data set is obtained, it is difficult to develop a balanced investment portfolio, both within each participating component and throughout the broader DoD program, and to strategize future investment plans.

4.1 Preliminary Commercialization Rates

As shown in Figure 5, Army, Air Force and Navy CPP projects all reflect initial defense and total commercialization rates and average defense and total commercialization are in excess of the broader pool of Phase II projects of similar duration.¹ The average time elapsed from Phase II award to the end of 2008 for each pool of CPP candidates was 3.1 years for the Air

¹ Commercialization reflects all derivative market activity and includes any sales, additional research, development test and evaluation funding, and any other source of revenue or capital investment that derives from, extends or logically concludes work begun under SBIR efforts selected for CPP support.

Force, 3.0 years for the Army, and 2.6 years for the Navy, indicating that Air Force and Army projects had somewhat more time to mature before receiving CPP support than Navy projects. SBIR Phase II groups were established to match the CPP project pool as closely as possible by award year. These Phase II award year groups provide peer group baselines of projects that have *not* received CPP assistance and thus can serve as control groups. Comparison of the CPP project pool to these control groups shows that the CPP is associated with higher rates and magnitude of total and defense-oriented commercialization in all DoD Components. Comparison among DoD Components is not appropriate due to the variation among average CPP project durations and in the composition of control groups.

Figure 5: DoD Component Commercialization Rates

DoD Component	% Projects with any Commercialization	Average Total Commercialization	% of Projects with Defense Commercialization	Average Defense Commercialization	Comparable Phase II Award Year Group(s)	Years Represent % of CPP Projects
Air Force-CPP	43%	\$640,187	39%	\$356,581		
Air Force-Total	30%	\$304,504	17%	\$144,709	2004-2007	86%
Army-CPP	52%	\$1,010,215	44%	\$722,455		
Army-Total	32%	\$536,379	17%	\$362,057	2005-2007	90%
Navy-CPP	38%	\$653,497	33%	\$402,763		
Navy-Total	35%	\$442,228	22%	\$316,860	2006	72%

4.2 The Phase II Enhancement Program as a Source of CPP Candidates

Through the Phase II Enhancement Program, the Components offer SBIR projects the opportunity to obtain additional SBIR funding beyond Phase II for projects that attract qualifying funds from outside sources, such as system program offices. Many of the FY07 projects and some of the FY08 CPP projects reporting in the CPP Database within the DoD SBIR/STTR Submission System were also Phase II Enhancement projects. This shows that risk-sharing in the technology development and transition process is associated with identified transition opportunities. Additionally, CPP approaches more or less model the Phase II Enhancement Program which has been previously shown to correlate with higher commercialization rates and magnitudes.

5.0 CONCLUSIONS

The Department of Defense is undertaking a wide range of activities to address the requirements and intent of the CPP and to improve the broader SBIR Program, both across DoD and within the Military Departments. The CPP implementation approaches among the Military Departments vary with regard to how SBIR projects with rapid transition potential are identified and selected, and what type of assistance is provided to accelerate commercialization. Component CPP implementation is driven by the unique requirements of each MILDEP, which are in large part a product of how the SBIR Program is institutionalized.

In FY06, Components developed CPP models and processes. In FY07, effort focused on implementation. During FY08, with MILDEP initiatives fully operational, numerous CPP projects commercialized, attracting additional non-SBIR funding. To summarize overall CPP activity, 133 small business firms were selected in FY08 and an additional 33 firms selected in previous years received support, with many CPP firms developing “transitional” products within a finished product or service.

Firm-reported SBIR Program data indicates that Army, Navy and Air Force CPP initiatives are associated with higher commercialization among selected projects, both in rate and magnitude, when compared to groupings of similar SBIR projects that did not receive CPP support. While we cannot prove that CPP caused this commercialization to occur (there may, for example, be a high degree of self-selection among successful firms and projects), it is clear that the authority has been used to bring a great deal of attention to the challenge of identifying and commercializing promising SBIR technologies.

More robust data collection is required to better understand these preliminary but promising findings and to provide greater insight into each initiative, as well as the broader challenge of SBIR technology commercialization. FY09 will be a critical year for the CPP in this regard as the CPP database is fully developed and populated. FY09 should also move focus from implementation and administration to using the CPP as a tool to strategically and rapidly place innovation into DoD products to increase capability or reduced costs to ultimately provide our warfighter technological advantage.

APPENDIX A: AIR FORCE SBIR CPP PROJECTS

FY 2007

Topic #	Project Title	Company Name	PEO ²
AF02-160	Cost Effective Composite Wings for Range Extension Kits	TRITON SYSTEMS, INC.	AAC
AF03-094	B-2 1553 Avionics Bus Characterization and Integrity Toolset (BCIT) Test Equipment	ITCN, Inc.	ASC
AF04-029	Novel Cover glass System with Enhanced Radiation Resistance	Infoscitex Corporation	SMC
AF04-032	Programmable Satellite Transceiver	RT Logic	
AF04-163	Legacy Platform Weapons Integration	WINTEC, Incorporated	AAC
AF05-OSP (AF05-029)	Monolithic Infrared Arrays	ODIS, Opel Defense Integrated Systems	SMC
AF165 (AF05-165)	Autonomous Aerial Refueling System for Powered Munitions	StarVision Technologies, Inc.	AAC
MDA05-029	Radiation Hardened by Design Structured ASICs for Reliable Digital Components	Microelectronics Research Development Corporation	SMC
AF063C-011	Terminally Guided Robots and Robotic Applications in Confined Spaces	Variation Reduction Solutions, Inc.	JSF
N03-007	Improved Propeller De-Icing System	Defense Holdings, Inc.	WR-ALC

FY 2008

Topic #	Project Title	Company Name	PEO
AF06-051	Preemptive Actions with Dynamic Anticipatory Targeting (PREDATAR)	Charles River Analytics, Inc	ESC
AF04-209	Combat Identification for Difficult Targets	Toyon Research Corp	ESC
AF04-126	Development of On-line Fuel Tank Oxygen Sensor for Aircraft	Interspace, Inc.	ASC
AF05-126	Quality Assurance of Composite Bonding Processes	Brighton Technologies Group, Inc	JSF
AF03-122	Lightweight Foam Composites with Superior Flame and Impact Resistant Properties	Wright Materials Research Co	ASC
AF04-143	Shape Recovery Polymer Nano composites	Innovative Composite Technology Development, Inc.	SMC
AF05-131	Robust Solid Lubricating Coating	Tribologix LLC	ASC
AF04-127	Development of High-Temperature Aircraft Camouflage Coatings	Texas Research Institute Austin, Inc.	ASC

² Participating Air Force PEOs and logistics centers include the: Air Armaments Center (AAC), Aeronautical Systems Center (ASC), Electronic Systems Center (ESC), Space and Missile Systems Center (SMC), Joint Strike Fighter (JSF), Warner-Robins Air Logistics Center (WR-ALC), the Arnold Engineering Development Center (AEDC) and Air Force Flight Test Center (AFFTC).

Topic #	Project Title	Company Name	PEO
BMDO02-012	Novel and Cost Effective Rain Erosion Tests at Supersonic Speeds	Continuum Dynamics, Inc.	ASC
AF06-106	Lightweight Conformal Electromagnetic Interference (EMI) Shielding	Metal Matrix Composites Company	ASC
AF04-246	Run Time Verification and Validation for Safety-Critical Flight Control Systems	Barron Associates, Inc.	ASC
AF01-126	Development of On-line Fuel Tank Oxygen Sensor for Aircraft	Interspace, Inc.	JSF
AF04-134	Nondestructive Inspection (NDI) of Fastener Holes in Thick Multi-Layer Structure (BOEING)	Innovative Materials Testing Technologies	JSF
AF04-134	Nondestructive Inspection (NDI) of Fastener Holes in Thick Multi-Layer Structure (LOCKHEED)	Innovative Materials Testing Technologies	JSF
AF04-139	Fatigue Life Enhancement of Fastener Holes Manufactured from High-Strength Aluminum Alloys (LOCKHEED)	StressWave	JSF
AF04-153	Wiring System In-Situ Health Monitoring Diagnostics	LiveWire Test Labs, Inc.	ASC
AF05-125	Advanced Laser Technology for Composite Bond Evaluation	LSP Technologies, Inc.	JSF
N1998-161	Air Mobility Command Auto Router System (AMARS)	Scientific Systems Company, Inc.	ESC
AF05-069	Simulation of Cultural Identities for Prediction of Reactions (SCIPR)	Aptima, Inc	ASC
OSD02-CR12	Organizational and Cultural Criteria for Adversary Modeling (OCCAM)	Charles River Analytics, Inc	ASC
AF05-061	Hands Free Data Collection for Aircraft Maintainers	Total Quality Systems, Inc.	ASC
AF05-041	Electronic Protection for Space-borne Phased Array Antennas (EP-SPAA)	The Haleakala Research & Development Inc.	JSF
AF05-140	Replicated Hybrid/Composite Mirror Technologies	Xinetics Inc.	SMC
AF04-151	Light Weight/High Performance ALON Transparency for Ballistic Protection	Surmet Corporation	ASC
AF02-129	Advanced Lightweight Hybrid Mirror for Spaced Based Applications	Xinetics Inc.	SMC
AF071-146	Optical Void Sensing for Deeply Buried Hardened Target Penetrators	Aerius Photonics, LLC.	AAC
AF06-142	Advanced LADAR Research for Munition Seekers	Aerius Photonics, LLC.	AAC
AF01-134	Improved Titanium Machining Process	Third Wave Systems, Inc	JSF
AF04-156	Vertical Cavity Surface Emitting Lasers (VCSEL)	Aerius Photonics, LLC.	AAC
AF04-156	Coherent Eye-safe High-power Surface-emitting Laser Arrays	Photodigm	AAC

Topic #	Project Title	Company Name	PEO
MDA04-140	Enhanced Real-Time Components for HWIL Ladar Scene Generation	Euvis, Inc.	AAC
MDA03-061	3-D Modeling of Rocket Motor Plumes	Combustion Research and Flow Technology, Inc	SMC
OSD03-012	A Parallel PIC-DSMC Code for Modeling Complex Plasmas	Tech-X Corporation	ASC
AF03-173	Aero Propulsion and Power Technology	P.C. Krause & Associates, Inc.	ASC
AF02-185	Composite Bearing Cage for Advanced Turbine Engine Applications	Allcomp Inc.	ASC
AF04-189	Generic Propulsion Health Management/ Controller System	Intelligent Automation Corporation	ASC
OSD04-EP9	High Power Density Regenerative SOFCs	NexTech Materials, Ltd	ASC
AF01-178	High Power Generators for Optimized Integrated DEW Power Systems	Electrodynamics Associates, Inc.	JSF
AF04-188	UAV Propulsion	TK Engineering Assoc., Inc.	ASC
AF04-226	Integration of GMTI Tracking with Cultural Intelligence and Other Sensors	LongShortWay Inc	ESC
A04-165	Service Life Prediction of Rocket Motors	CogniTech Corp	AAC
AF06-298	Non-Invasive Model Attitude and Deformation Measurement	PhaseSpace Inc	AEDC
AF04-104	Rad-Hard Very High Data Rate Forward Error Correction Codec	Space Micro, Inc	SMC
AF03-133	Extendable Loitering Wing	KaZaK Composites	AAC
TBD	Micro-Plasma Oxidation to Extend Life of Missile Rails	IBC Materials and Coatings	WR-ALC
OSD04-C17	Novel CORIN Materials and Advanced Coating Processes	GATR Technologies	ASC
AF081-095	Reverse Brayton Cryogenic Refrigeration for the 3rd Generation Infra Red System (3GIRS)	Creare, Inc.	SMC
AF06-091	Corrosion Modeling and Life Prediction Supporting Structural Prognostic Health Management	APES, Inc.	ASC
AF05-192	Integration of High Speed, Compact, Efficient Generator for DEW Applications	Electrodynamic Associates, Inc	JSF
AF04-218	Efficient High Frequency Electromagnetic Source for Communication Devices	Cap Wireless Inc.	
AF04-158	Minimum RF Bandwidth Approaches to Human Interaction with Weapon Terminal Attack	UtopiaCompression, Corp	AAC
AF03-235	Fly-By-Light (FBL) Technologies for Directed Energy Weapons Systems	Wavefront Research, Inc.	ASC

Topic #	Project Title	Company Name	PEO
AF06-130	Highly Efficient Wideband Antenna for Small Diameter Munitions	Pharad	AAC
A2004-119	Passivation of Dislocation Defects by Hydrogenation for High Performance Long Wave Infrared (LWIR) HgCdTe on Silicon	Amethyst Research, Inc.	SMC
N2005-082	Secure Legacy Application Integration with NCES (SLAIN)	NuParadigm Government Systems, Inc.	SMC
MDA2004-130	Auto-Correcting Inertial Measurement Unit	Applied Technology Associates	SMC
AF2006-002	Radiation Hard High Precision Agile Star Tracker	Space Micro, Inc	SMC
AF2006-002	High Slew Rate Radiation Hardened Star Tracker	Optical Physics Co.	SMC
AF2005-033	Plug-and-Play Inertial Measurement Unit	Microcosm	SMC
AF05-041	Electronic Protection for Space-borne Phased Array Antennas (EP-SPAA)	The Haleakala Research & Development Inc.	
AF04-024	Multi-beam Phased-array Antenna Beam formers	SA Photonics	SMC
N2004-024	Multi-Path Encryption and Authentication System	Intelligent Automation Corporation	ESC
A2004-024	Processing Smart Engine for Remote Sensing (PSERS)	Coherent Logix	ESC
A2004-132	Scalable Multi-Paradigm Modeling Framework for Accurate Analysis of Large, Next Generation Networks	Scalable Networks	ESC
AF2004-105	Dynamically Sensing and Adapting Wireless Network	Toyon Research Corp	ESC
AF2005-090	Enabling Visualization of Event Information From Unstructured Text	Janya, Inc	ESC
AF1999-325	Onboard Smart Sensors	NVE Corp.	AFFTC
AF2005-056	Network-Centric Communications Distributed Real-Time UAV Access	Kutta Consulting	ESC
MDA2005-008	Low Defect LWIR Substrates by Detached Growth Method	CapeSym, Inc.	SMC

APPENDIX B: ARMY SBIR CPP PROJECTS

FY 2007

Company Name	Project Title	Investor, Customer or Fielded System	SBIR Investment Extended Support Participants
Advanced Technologies Group, Inc.	A Non-Contacting Compliant Seal for Improved Turbine Engine Performance	Pratt & Whitney /Honeywell - Versatile Affordable Advanced Turbine Engines Initiative; AATD/OEM General Electric for T700 Engine	\$596,574.99
Agile RF	Reduced Size, Weight and Power Consumption for SATCOM Antennas	PM WIN-T	\$699,606
Chatten Associates	Soldier Universal Robot Controller	ARDEC-EOD; NAVEOD	\$663,800
Chesapeake PERL, Inc.	Improved Protein Manufacturing in Insect Expression Systems	Walter Reed; Army Medical Research Institute of Chemical Defense	\$600,000
Cleveland Medical Devices, Inc	Ambulatory, Miniaturized, Automatic EEG Seizure Detector	JPEO-CBD for Army Force Health Protection Initiative	\$549,999
Coherent Logix, Incorporated	Multi-Chip Modules for Hyperspectral Image Processing (MCM-HIP)	PEO Soldier	\$748,119
Datatek Applications, Inc.	Mobile IPv6 in a Low Bandwidth Tactical Environment	PM CHS	\$548,622.10
Fairchild Imaging	Solid State Camera for Low Light Night Vision	NVESD; Long Range Army Scout; Common Sensor Payload; Monitoring towers in theater for Force Protection	\$750,000
Forterra Systems, Inc.	Medical Simulation Training for First Response to Chemical, Biological, Radiological, Nuclear Events	MEDCOM; PEO STRI	\$600,000
Greenlees Filter, LLC	Active Acoustic Cleaning System for Engine Air Intake Filters	PM HMMWV; AM General	Contract Being Finalized
Hi-Z Technology, Inc.	Development of An Underarmor 10 Kilowatt Thermoelectric Generator Waste Heat Recovery System for Military Vehicles	Bradley and Stryker Fighting Vehicles	\$550,000
Infinia Corporation	Lightweight Stirling Power System for Mobile Tactical Power CERDEC Def Challenge Program, PM MEP	Sponsored AMMPS (Advanced Medium Mobile Power Souses), STEP (Small Tactical Electrical Power System)	\$599,674.73

Company Name	Project Title	Investor, Customer or Fielded System	SBIR Investment Extended Support Participants
Innosys	Solid State Vacuum Device for W-band Power Amplification	AMCOM/Sierra Nevada Corp. for Army Helicopter Autonomous Landing System (HALS)	\$600,000
Innovative Power Solutions, LLC	High Power Density Electric Generator for Army Rotorcraft	PEO Aviation; Boeing/PMO Apache	\$599,038.85
Innovative Wireless Technologies (IWT)	Innovative Methods for Geolocation and Communication with Ultra-Wideband Mobile Radio Networks	ARDEC; Special Operations & Logistics Center Intelligence & Information Systems; CERDEC; DOE; DHS	\$699,850.42
Intelligent Automation Corporation	Regime Recognition System	US Army 160th Special Ops Aviation Regiment; MH-47 Chinook; MH-60 BlackHawk; MH-6J Little Bird	\$599,815
Kutta Consulting, Inc.	Bi-Directional Remote Video Terminal for Unmanned Air Vehicle	PM UAS	\$595,011
L-3 Communications Nova Engineering, Inc.	Handheld Emission Detector (HED)	Natick; PEO Soldier	\$542,947
M Cubed Technologies, Inc	Next Generation Body Armor Plates	Armor Holdings, Inc./BAE Systems; PEO Soldier	\$299,814
Microchip Biotechnologies Inc.	Microfluidic Chip for Identification of Biological Agents	CERDEC; PM-MEP (AMMPS); PM-MEP (STEP)	\$625,000
San Diego Research Center, Inc.	Self-Organizing, Energy Efficient, Scalable and Cost-Effective Wireless Backbone to Monitor and Administer Large Remote DoD Acreage	PM Military Ranges and Lands; Army Environmental Center, Integrated Training Area Management	\$480,000
Scalable Network Technologies, Inc.	Scalable, Multi-Paradigm Modeling Framework for Accurate Analysis of Large, Next Generation Networks	PM FCS BCT M&S	\$550,000
Sound Innovations Incorporated	Active Noise Reduction Earplug	Modular Aircrew Common Helmet	\$600,000
Systems & Processes Engineering Corporation	Wideband High Fidelity DRFM (HIFID)	ARL	\$549,999.93
Think-A-Move, Ltd.	Earpiece-Sensor Voice Recognition Technology	iRobot - FCS SUGV Program	\$599,982

APPENDIX C: NAVY SBIR CPP PROJECTS

FY 2008

Company Name	ARMY CPP 2007 Project Title	Transition Target	Year
3 Phoenix Inc	Improved Clutter Management Techniques for High Resolution Radars	AN/SPS-74(V) High Resolution Radar Sensor	2008
Adaptive Methods Inc	USW Intelligent Controller	USW-DSS, AN/SQQ-89A(V)15 Sonar, LCS Decision Support System	2008
Adaptive Technologies	Maintainer Head and Hearing Protection	Aircrew Systems JSF	2008
Agiltron Corp	High Reliability Mechanical Fiber Optic Splice	F/A-18 Hornet	2008
Applied Physical Science	Shock and Vibration Mounting System	PMS500/DDG1000 Surface Ship	2008
APS Inc.	Free Layer Blade Damper by a Thin-Layer Magneto-mechanical Coating	Joint Strike Fighter (JSF) F-35	2008
ASSETT	Combat System of the Future	Virginia Block III & IV, and Ohio Submarine Replacement Program	2008
Beacon Interactive Systems	Integrated Maintenance Decision Support Tool	PMS 500/DDG 1000 Surface Ship	2008
Benthos Inc	Communications Links for Spatially Distributed ASW	ARIES, REMUS, SAUV Deep Water Autonomous Vehicles	2008
Charles River Analytics	Plan Understanding for Mixed-initiative control of Autonomous Systems (PUMA) Phase II	Autonomous Vehicle control systems including multiple or mixed manned and unmanned surface, air, and underwater vehicles	2008
Chesapeake Sciences Corp	Compact Towed Sonar Array	USV Towed Array, UUV/UUG Towed Arrays, Twinline Thinline Capable Array, LCS	2008
Chesapeake Sciences Corp.	Electro-Optic Lightweight Tow Cable	Vector Sensor Array, Twin Line Towed Array, TB-33 Towed Array Programs	2008
Continuum Dynamics Inc	Advanced Rotorcraft Aerodynamic Modules for Flight Testing Support, Simulation and Analysis	VH-71 Presidential Helicopter Replacement	2008
Cornerstone Research Group	Environmental Exposure Tracking System	Advanced Gun System, Conventional Ammunition	2008

Company Name	NAVY CPP 2008 Project Title	Transition Target	Year
Creare Inc	Advanced Helmet for Maintainer Head and Hearing Protection	JSF	2008
Creare Inc	High-Speed Machining of Titanium Alloys Using Indirect Cutting Tool Cooling	JSF	2008
Daniel H Wagner Assoc	Multi-Sensor Data Fusion System	USW-DSS, Surface Ship Torpedo Defense, Submarine APB/TCS, SQQ-89 Data Fusion, LCS ASW Mission Module	2008
DE Technologies	Utilizing Reactive Fragments in an Active Protection System	USMC Light Armored Vehicle (LAV)	2008
Galois Inc	Cross-Domain Document-Based Collaboration in a Multi-Level Secure Environment	Multi-level Security Cross Domain System (MLS-CDS)	2008
Herman Advanced Engineering, Inc.	Free Layer Blade Damper by a Thin-Layer Magneto-mechanical Coating	JSF	2008
IAVO Research and Scientific Inc	Multi-Sensor Terrain Fusion	Cruise Missile Command	2008
Jentek Sensors, Inc	Wireless Communications with Electromagnetic Sensor Networks for Nondestructive Evaluation	AV-8B Harrier	2008
Lambda Technologies	Design Tools for Fatigue Life Prediction in Surface Treated Aerospace Components	JSF	2008
Mayflower Communications	Hardware Technology Enhancements to NavAssure & Micro-SAASM GPS Receiver	Army Joint Tactical Radio System HMS Radio and Air Force BATMAV Platform	2008
Mechanical Solutions	Shotscreen™ RPG Defeat System	USMC LAV	2008
Ocellus Inc	Aerogel Spray Thermal Barrier	Electro-Magnetic Rail Gun, Hypersonic Missile	2008
Progeny Systems	Compact Towed Sonar Array	TB-16 Vector Sensor, Twinline/Thinline Arrays	2008
Red Tail Hawk Corp	Talk Through Audio Technologies for Navy Hearing Protection Devices	JSF	2008

Company Name	NAVY CPP 2008 Project Title	Transition Target	Year
Rite-Solutions	Combat System of the Future	Virginia submarines Block III & IV	2008
Rite-Solutions	Marine Mammal Mitigation Mission Planning Tool	DDG-51 IPS/SIPS Sonar	2008
Safety Dynamics	Acoustic Recognition/Alert System for Security Breaching Noise Detection	JFPASS	2008
Scientific Toolworks Inc	Automated Software Architecture Analysis and Visualization of Advanced, Large, Mixed-Language Systems	Tomahawk	2008
Sedna Digital Solutions	High Fidelity Front End Simulation for Complex Physics-Based Processing System	Sonar Systems AN/SQQ-89A(V)15, AN/SQQ-89 SIPS	2008
SKC Powertech Inc	Low Magnetic Signature Rechargeable Battery	Diver Hand-held Units, Underwater Imaging System, Long Baseline Beacon, Hydrographic Mapping Unit	2008
Systems and Materials Research Corporation	Fasteners/Rivets for Watertight Integrity and Corrosion Prevention in Permanent Application	Joint Strike Fighter (JSF) F-35	2008
Technology Systems Inc	Modular Mission Planning Toolkit (MMPT)	DIOPS, JAUS	2008
TICOM Geomatics Inc	Placement of Sensing and Communications Platforms	DIO-S, ISR	2008
TKC International LLC	Innovative Modeling & Gaming Approaches for Submarine Battle Space Components	PEO Submarines Acquisition Planning/ Strategic Support Tool	2008
Veritay Technology	Kinetic Energy Penetrate Payload for EX 172 Cargo Round	AGS, Mk 182	2008

**PREVIOUSLY REPORTED NAVY CPP PROJECTS
With Transition Status Changes**

Company Name	NAVY CPP Project Title	Transition Target	Year
3 Phoenix, Inc.*	Real Time Data Fusion	VA Class Subs and CVN	2007
Achelon Technology*	Modeling and Simulation Technology for Night Vision Goggle Mission Rehearsal	V-22	2007
Aculight*	Compact High Efficiency, Eye-Safe, Fiber Laser for LADAR Applications	Tomahawk All-Up-Round	2007
Binghamton Simulator Company, Inc.*	Virtual Aircrew Training	Aviation Training Systems MH-60	2007
Communication & Ear Protection, Inc.*	Passive Noise Reduction for Pilot and Deck Crew Helmet Mounted Systems	Aircrew Systems JSF	2007
Geneva Aerospace, Inc.*	Advanced Ship/Fixed-Wing UAV Recovery Interface	UAVs	2006
Harmonia, Inc.*	Using UIML to Automate Generation of Usability Prototypes and Tactical Software	Tomahawk Weapons System	2006
Hontek Corporation*	Innovative Erosion Resistant Coating for Leading Edges of V-22 Rotor Blades	V-22	2006
Innovative Defense Technology*	Automated Test and Re-Test (ATRT)	Single Integrated Air Picture Program	2007
Management Sciences, Inc.*	Digital Data Download with Crash Survivable Memory	AV-8B Weapons Systems	2007
Materials Systems, Inc.*	Low Cost Broadband MK54 Torpedo Array	MK54 Torpedo	2007
Mathtech*	Digital Wireless/Copper Data Bus Combination for E-2C Intercommunications System Applications	E-2/ATDS	2007
Physical Optics Corporation*	Flight Autonomous Event Recorder Information Technology Digital Data Download	Naval Undergraduate Jet Flight Training Systems	2007
Physical Sciences***	Stern Recovery System	LCS, DD(X), CG(X)	2007
Plasma Sciences**	Electromagnetic Pulse Protection for Distributed Shipboard Transducer-Bus Networks	All new and legacy ships	2007

Company Name	NAVY CPP Project Title	Transition Target	Year
Precision Combustion Inc*	High Density Modular Fuel Cell Reformer	Integrated Power System and All-Electric Ship Programs	2007
Progeny Systems*	Reduced Manning Support	VA Class Submarines	2007
RLW*	Machinery Health Monitoring for Shipyard Productivity	Navy Shipbuilding and Repair Programs	2006
Scientific Systems**	Application of Genetic Algorithm Technology to Route Planning	Tomahawk Weapons Systems	2007
Sensing Systems*	A Software Tool for Improved Digital MI Handling	UAVs	2007
Speech Gear, Inc.**	Pocketable Language Translation System for Use in Noisy Environments	SEQUOYAH-Handheld Language Translation	2007
The Consulting Network, Inc.*	Open Architecture Concepts	Navy Logistics Productivity Program	2007
Weidlinger Associates*	Non-Explosive Ship Shock Test	All surface ships	2007

* Company received a Phase III award

** Company never received CPP assistance due to lack of transition target support or already in transition status

*** CPP project to be terminated due to program restructuring/lack of funds

PREVIOUSLY REPORTED NAVY CPP PROJECTS
No Status Change

Company Name	NAVY CPP Project Title	Program	Year
Adaptive Technologies	Advanced Hearing Protection	Aircrew Systems JSF	2007
Advanced Ceramics Research	IED Wire Detection from UAV Mounted Gradiometer	UAV, Counter-IED	2007
ASSETT, LLC	Velocity Sensing Sonar (VSS)	Advanced Seal Delivery System	2007
Btech Acoustics, LLC	Acoustic Modem with Broadband Single Crystal Transducer and Directional Capabilities	Unmanned Undersea Vehicle Programs	2007
Coherent Logix Inc.	Parallel Processing Chip for Reduced Power Requirements	Joint Tactical Radio System	2007
Dynamet Technology, Inc.	Development of Low Cost Titanium Alloy Feedstock for Casting of Net Shape Combat Vehicle Components	Expeditionary Fighting Vehicle	2007
Eddy Company	An Affordable Silicon Based Visible/Near Infrared Missile Warning System	Various low altitude air platforms	2007
Equinox Corporation	Sensor for Simultaneous Movement and Directed Weapons Fire in all Light Conditions	Helmet Mounted Display	2007
Fluorochem, Inc.	Synthesis of Energetic Prepolymers of carrying BAMO and NMMO or PGN Content and Structure	Zuni Rocket Motor Program	2007
H.C. Materials Corporation	Accelerated Transition of Single Crystal Projectors	ADC Mk2/Next Generation Torpedo Countermeasure	2007
Impact Technologies, LLC	Incipient Fault-to-Failure Progression Models and Software for Drive Train Clutch Systems	JSF	2007
InterScience, Inc.	The CRISSTL Ball – Handheld Periscope	Special Operations - Situational Awareness	2007
MagCanica, Inc	Innovative Gas Turbine Propulsion	V-22	2007
Materials Sciences Corporation	Low Cost Sonar Window Materials	SQS-53C Sonar Dome	2007
Menon and Associates, Inc	Detection of Foreign Materials in Uncured Hand Lay-up Composites	V-22, JSF	2006

Company Name	NAVY CPP Project Title	Program	Year
Michigan Aerospace	LCS Launch & Recovery System	LCS	2007
Mide Technology	Smart Hydrogel Shaft Seal	LCS	2007
Nanosyntex	Non-Woven Textile Technologies	Combat Utility Uniforms	2007
Out of the Fog Research	Advanced Wide-Band RF Distribution System	SPS-49 Radar	2007
Pathfinder Systems, Inc.	Prototype Aircrew Virtual Environment Trainer	Aviation Training Systems MH-60	2007
Real-Time Analyzers	Portable Raman Instrument for Fuel Characterization	Unit Level Fieldable Device (especially USMC and SPECOPS)	2007
Reliable System Services Corp.	UAV Based Network-Centric Communications for Sensors	LCS	2007
Scientific Solutions, Inc.	Swimmer Detection Sonar Network	Port and Ship Self-Defense	2007
Sensis Corporation	Multi-Band Air Defense/Air Search Radar	Highly Expeditionary Long Range Air Surveillance Radar	2007
Solid State Scientific Corporation	Spectral Temporal Sensor for Point Target Identification of Hostile Fire	Advanced Tactical Aircraft Electronic Warfare JSF	2007
Triverus, LLC	Flight Hangar / Deck Cleaner	Mobile Cleaning, Recovery, and Recycle System	2007
TRS Ceramics, Inc.	Single Crystal Piezoelectric Tonpiz Elements for Small Footprint, High Power Acoustic Sensors	Common Very Lightweight Torpedo	2007
WaveBand Corporation	Electronically Controlled Beamformer Based on Reconfigurable Hologram Aperture	Longbow Hellfire Missile, Precision Guided Mortar Munitions, Patriot PAC-3	2007