REPORT TO CONGRESS

on the activities of the

DoD Office of Technology Transition

January 1998

This report responds to 10 USC 2515

Prepared by:
The Office of the Secretary of Defense
Deputy Director, Defense Research and Engineering
(Laboratory Management and Technology Transition)

EXECUTIVE SUMMARY

MEMORANDUM FOR DIRECTOR, DEFENSE RESEARCH AND ENGINEERING

THRU: DEPUTY DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
(LABORATORY MANAGEMENT AND TECHNOLOGY TRANSITION)

FROM: DIRECTOR, TECHNOLOGY TRANSFER
Prepared by: Cynthia Gonsalves/LM&TT/681-5459/Feb. 11, 1998

SUBJECT: Office of Technology Transition Annual Report to Congress—ACTION MEMORANDUM

PURPOSE: To respond to the Congressional reporting requirements on the activities of the Office of Technology Transition (OTT).

DISCUSSION: 10 USC 2515 requires an annual report on the activities of the Department of Defense Office of Technology Transition. This is the fifth annual report. It highlights activities accomplished during FY 97 and previews ongoing activities for FY 98. This report is due coincident with submission of the President's budget.

Office of General Counsel coordination advised this report should be forwarded by the Under Secretary of Defense (Acquisition and Technology) (USD(A&T)) unless a delegation had been made to Director, Defense Research and Engineering. The forwarding letters have been prepared for USD(A&T) signature.

COORDINATION: OGC, LA, CAIR, and SADBU concur at Tab B.

RECOMMENDATION: Sign the Executive Summary to USD(A&T) next under.

EXECUTIVE SUMMARY

MEMORANDUM FOR THE UNDERSECRETARY OF DEFENSE (ACQUISITION AND TECHNOLOGY)

FROM: DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
Prepared by: Cynthia Gonsalves/ODDR&E(LM&TT)/681-5459/Feb. 11, 1998

SUBJECT: Office of Technology Transition Annual Report to Congress—ACTION MEMORANDUM

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RECOMMENDATION: Sign the letters at Tab A.

Honorable Strom Thurmond
Chairman, Committee on Armed Services
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Enclosed is a report required by 10 U.S.C. §2515 on the Office of Technology Transition (OTT) covering the activities in FY 1997.

Sincerely,

Enclosure

cc:
Honorable Carl Levin
Ranking Minority

Honorable Floyd D. Spence
Chairman, Committee on National Security
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Enclosed is a report required by 10 U.S.C. §2515 on the Office of Technology Transition (OTT) covering the activities in FY 1997.

Sincerely,

Enclosure

cc:
Honorable Ike Skelton
Ranking Minority

Honorable Ted Stevens
Chairman, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Enclosed is a report required by 10 U.S.C. §2515 on the Office of Technology Transition (OTT) covering the activities in FY 1997.

Sincerely,

Enclosure

cc:
Honorable Robert Byrd
Ranking Minority

Honorable Robert L. Livingston
Chairman, Committee on Appropriations
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Enclosed is a report required by 10 U.S.C. §2515 on the Office of Technology Transition (OTT) covering the activities in FY 1997.

Sincerely,

Enclosure

cc:
Honorable David R. Obey
Ranking Minority

Tab B

Please coordinate on the attached Report to Congress required by 10 USC 2515. A copy of the legislation is at Appendix A of the Report. Coordination not received by Friday, January 30, 1998, will be assumed to be concurrence in the Report. Please call Cynthia Gonsalves at 681-5459 if you have questions or for pickup.

OGC_____

LA_____

CAIR_____

SADBU_____

EXECUTIVE SUMMARY

The Office of Technology Transition (OTT) was created by the Secretary of Defense in response to 10 U.S.C. §2515, to serve as a focal point for the domestic technology transfer activities of the Department of Defense. This report, required by the law, summarizes OTT accomplishments for FY 1997.

OTT has played an active role in development and/or execution of technology transfer programs; in development of technology transfer/dual use technology policy; and in coordination of the collection and dissemination of scientific and technical information in support of technology transfer. Specifically OTT has:

- Provided leadership and focus for the DoD Technology Transfer Program
- Managed the DoD Dual Use Science and Technology Program
- Prepared a solicitation for a Small Business Innovation Research (SBIR) Program focused on technology transfer
- Provided oversight for the DoD Manufacturing Technology Program
- Directed the collection and dissemination of scientific and technical information by the Defense Technical Information Center
- Coordinated the Independent Research and Development Program

These activities are discussed in the following pages.

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I. BACKGROUND

Section 2515 of title 10, United States Code (Appendix A) - directs that "The Secretary of Defense shall establish within the Office of the Secretary of Defense an Office of Technology Transition." It further directs that the head of the office will ensure that the office will monitor research and development (R&D) activities of the Department of Defense, identify R&D activities that result in technological advances that have potential for nondefense commercial applications, serve as a clearinghouse for, coordinate, and actively facilitate the transfer of such technological advances to the private sector, coordinate its activities with the Department of Energy and the Department of Commerce, and provide private firms with assistance in resolving legal issues related to technology transfer. It also directs the Secretary of Defense to submit to the Committees on Armed Services, National Security and Appropriations of the Senate and the House of Representatives an annual report on the activities of the Office at the same time the budget is submitted to Congress by the President. This report responds to that requirement and is the fifth annual report.

In 1995, the OTT was combined with the Laboratory Management oversight function within the Office of the Director for Defense Research and Engineering. The present Deputy Director for Defense Research and Engineering (Laboratory Management/Technology Transition) is Dr. Lance A. Davis. Dr. Davis reports to the Director, Defense Research and Engineering. In keeping with the integrated planning and process team concept throughout the Department, the activities of the Office are conducted with the consultation and support of personnel in the Military Departments and Defense Agencies.

II. INTRODUCTION

The Congress required establishment of the Office of Technology Transition with, we believe, the underlying assumption that the Defense Laboratories and Defense Agencies are technological powerhouses whose efforts can be brought to bear on commercial technology opportunities at one and the same time that defense critical needs are being addressed. By any objective measure, the technological investments made by the DoD to develop agile, smart weapon systems, training systems, trauma care, etc, have had, in many cases, gigantic impacts in commercial markets.

DoD is working to develop a broad Technology Transfer Program which encompasses the Department as a whole. We are trying to use a common sense approach to this program to break down barriers preventing us from commercializing appropriate technology. We are also trying to expand our horizons to use what is readily available from the commercial sector. By leveraging available resources, we can expand and enhance our capabilities both within our weapons systems and within our processes for making the transfer of technology possible. In doing so, it is recognized that the Nation will achieve an improved return on its national security technology investment and the Nation's industrial competitiveness will be improved. In every case, however, the essential goal is to achieve technically superior, affordable defense systems; those technology efforts which contribute to international competitiveness, but have no defense relevance, are the proper province of other Federal agencies and/or private industry.

The DoD Technology Transfer Program is a dynamic program which we anticipate will contribute to more affordable systems in the future.

III. OFFICE OF TECHNOLOGY TRANSITION ACTIVITIES

The charter of OTT has been interpreted by the Director, Defense Research and Engineering, to include management of, coordination of, and/or oversight for a variety of activities related to execution of programs substantially related to technology transfer/dual use technology, to development of technology transfer/dual use technology policy, and to scientific and technical information collection and dissemination. These activities will be considered below under the following headings:

- Defense Technology Transfer Management & Oversight
- Dual Use Science and Technology Program
- Small Business Innovation Research
- Manufacturing Technology Program
- Defense Technical Information Center
- Independent Research and Development

A. Defense Technology Transfer Management and Oversight

The Defense Department operates a decentralized technology transfer program. The Military Departments are recognized as separate agencies for program implementation. This has made it a challenge to provide management oversight and coordination within the Defense Department as a whole. However, it has provided an opportunity to learn about some of the best practices in the various Components and disseminate these throughout the Department.

We have over 100 Office of Research and Technology Applications (ORTAs) and other technology transfer focal points. Additionally, we have about half that many legal staff throughout DoD supporting the technology transfer functions. We have found that communication is essential in the technology transfer effort. Communication is necessary within and between the Defense Department activities as well as with potential and existing partners in the private sector. The Defense Technology Transfer Working Group (DTTWG) is a key element in communication within the DoD. Other tools we are using are the Federal Laboratory Consortium for Technology Transfer (FLC), DoD Workshops, Defense Technology Transfer Information System (DTTIS), Websites, DoD Collaboratorium, and other meetings and activities.

Defense Technology Transfer Working Group (DTTWG)

The DTTWG was established in 1994 and is composed of representatives from each of the Military Departments and most of the Defense Agencies. This group meets monthly to review technology transfer issues requiring either consistent policy or approach from a joint Department of Defense perspective. Issues for FY 97 review:

- Review of proposed DoD technology transfer policy document
- Establish and support DoD Workshops on technology transfer
- Operational capability within DoD for a Defense Technology Transfer Information System
- Involvement of the Department's Technology Transfer Senior Managers
- Review of proposed legislative changes for transferring technology to the private sector

DoD Technology Transfer Policy

The Secretary of Defense issued a policy memorandum in June 1995 on technology transfer. We have used this policy for over 2 years and found that, in general, provisions are being followed. We also found procedures supporting this policy established within the Military Departments. In FY 1997, we began developing a DoD Directive and Instruction to institutionalize the policy and procedures for technology transfer implementation. This draft Directive is in the staffing process. It is

intended to provide increased emphasis and stress the importance of technology transfer as a key activity within DoD.

One of the key elements of these documents is the requirement for technology transfer business plans from each DoD activity. The intent is not to cause additional burdens, but to focus on what we are doing, how we are doing it, and who is responsible for accomplishment. While the policy documents were in draft format this year, each Military Department provided a business plan for their Department. Next year the requirement will be for each individual activity (laboratory; research, development, and engineering center; etc.) to provide its own plan. Because DoD operates in a decentralized manner, we need to remain focused on our technology transfer mission and what it takes to accomplish it at the local level.

Federal Laboratory Consortium for Technology Transfer

The Military Departments have been participating in the Federal Laboratory Consortium for Technology Transfer (FLC) through financial support and participation in meetings by their technology transfer focal points. The FLC has transitioned from two meetings per year to one. The FY 97 FLC meeting, held in the spring, provided an opportunity for DoD to hold its third joint session bringing the Military Department and Defense Agency representatives together for an information sharing session.

Based on feedback evaluations, these joint sessions have proven beneficial to the Department as a whole. Therefore, we are planning to include joint DoD sessions at future FLC meetings.

In addition to holding DoD sessions during the FLC meetings, DoD representatives serve in both elected and nonelected positions with the FLC. These leadership functions facilitate sharing of information with other federal departments and agencies and contributes to specific DoD technology transfer activities.

DoD Workshops

Separate from the FLC, we held joint DoD workshops in 1997. In the spring, our first workshop, hosted by the Air Force, established a DoD Technology Transfer Integrated Planning Team focusing on how to best accomplish technology transfer within the DoD. Our second workshop was held in November 1997 and, although not in FY 97, it was prior to this report and contributed to the activities we are presently pursuing. The workshops allow sharing of best practices/lessons learned among the DoD technology transfer focal points, provide an opportunity for training, and enhance communication among the ORTAs and focal points.

These workshops were deemed important to improve the DoD technology transfer program, therefore, we plan to hold annual workshops in the fall of the year. The FLC annual meetings will be in the spring. This will allow DoD technology

transfer focal points to meet in both the spring and fall to discuss best practices, policy implementation, and lessons learned.

DoD Collaboratorium

During the spring DoD TTIPT workshop, internal communication/coordination was discussed. There are many times when a new idea would prove useful to the Department as a whole or when someone has worked through an issue that could benefit others. Rather than wait for the next workshop, FLC meeting, or just passing the information to one person via telephone or e-mail, it was decided to set up an internet site available for internal DoD discussions.

The Air Force took the lead and established a DoD Collaboratorium. This collaboratorium is an informal meeting place where ideas and comments can be shared. Each participant can read what others have to say and can reply. One of the positive features of using a collaboratorium is that people can use it at convenient times so elaborate schedules don't have to be set up to participate in discussions.

Websites

The importance of making information available within the Department as well as to external activities has been recognized through establishment of a websites. Through these linked websites, one can find the latest DoD policy documents on technology transfer; a listing of Office of Research and Technology Applications (ORTAs) focal points with addresses and telephone numbers; information on Independent Research and Development, Small Business Innovation Research, Manufacturing Technology; and legislation guiding DoD's technology transfer program.

Activity	**Website**
Office of the Secretary of Defense	http://www.dtic.mil/techtransit
Army	http://w3.arl.mil/tto/ArmyDTT/adtthp.html
Navy	http://www.onr.navy.mil/sci_tech/industrial/tt.htm
Air Force	http://tto.wpafb.af.mil/TTO/techtran/index.htm
BMDO	http://www.acq.osd.mil/bmdo/bmdolink/html/transfer.html

Defense Technology Transfer Information System (DTTIS)

DTTIS became available for internal DoD use in July 1997. It contains data on technology transfer mechanisms, points of contact within the DoD and at the private

sector partner, goals, objectives, and the status of the activity. Queries to the system can be made on both demographic as well as subject areas.

The DTTIS is used to respond to requests for technology transfer data from the Office of Management and Budget as well as other inquiries for information. Appendix B is a report showing DoD laboratories and centers and the number of reported active technology transfer mechanisms in place during FY 95 - FY 97. There is a significant increase in the number of reported active technology transfer mechanisms since this Report was forwarded in FY 97. This is due to several reasons: 1) our technology transfer activities are increasing, 2) more DoD activities are submitting information to DTTIS, and 3) we have automated the system for collecting this information. Some of these reporting laboratories/centers will change over the years as reorganizations and functional realignments take place. For example, the Naval Undersea Warfare Center in New London, Connecticut, was closed October 1, 1997. We have identified active technology transfer mechanisms there; however, no activities will be reported for FY 98.

Department Technology Transfer Senior Managers

In April 1997, a meeting, chaired by Dr. Lance Davis, was held with the Technology Transfer Senior Managers from the Military Departments and Defense Agencies. These senior managers are from the Senior Executive Service and manage the technology transfer program within their respective Military Department/Defense Agency. The purpose of the meeting was to review and approve the DTTIS changes and consult on how technology transfer could be better implemented throughout the Department. The Senior Managers discussed specific applications and processes and gave support for a DoD Directive on the Technology Transfer Program.

Highlights

The decentralized approach to managing the technology transfer program in DoD enables each activity to accomplish what best meets their mission requirements. Some highlights of these activities which also benefit the commercial sector, broken out by Military Department, are:

Army

Testing Capability at the Medical Research Institute of Chemical Defense (MRICD): CRADAs for Material Transfer, a shortened version of a full research effort, are used at MRICD. Through them, a company can provide the Institute with a sample of their experimental or off-the-shelf compound that may be of interest to MRICD research and receive a testing report that would be costly if obtained through a private source. The test results may provide the company with valuable information that could be used to market their product. This is especially appealing to small businesses that cannot afford expensive laboratory resources.

Standardization of helicopter maintenance practices at Aviation Applied Technology Directorate (AATD): The Infrastructure Definition for Digitally Enhanced Aviation Logistics (IDDEAL) program is a cooperative agreement between AATD and the Rotorcraft Industry Technology Association, Inc. (RITA), a nonprofit corporate entity made up of the 4 major US helicopter manufacturers: Bell, Boeing, and Sikorsky. With this teaming arrangement, IDDEAL hopes to facilitate the standardization of helicopter maintenance practices within the US military and domestic commercial fleets.

Business incubator at Armament Research, Development & Engineering Center: The Picatinny Innovation Center (incubator) is designed to help start-up companies create employment opportunities and act as a technology transfer mechanism to share ARDEC resources with the private sector.

Navy

Since 1980, the Navy has been among the top Federal Agencies reporting patents. Since 1990, the Navy has led the Federal Agencies in patents received. In 1995, the Navy received 330 patents. In 1997, there were 556 inventions by Navy inventors (including joint Navy employee-contractor/grantee/CRADA collaborator employee) and 431 patent applications.

Entrepreneurial Technology Apprenticeship Program (ETAP): In FY 97, 5 students from Historically Black Colleges or Universities/Minority Institutions were placed in Navy laboratories for nine months. These students are learning practical skills about technology management and contributing their knowledge and skills to the success of the offices to which they are assigned.

1-800-NAVYTEC: The Navy maintains this 1-800 line at the National Technology Transfer Center to attempt matching of technology needs of civilian firms with the technologies and technological expertise of the Navy laboratories.

Seven Navy activities completed their first-ever CRADA in FY 97:

- Navy Clothing and Textile Research Facility
- United States Marine Corps
- United States Atlantic Command, Joint Training, Analysis & Simulation Center
- Navy Experimental Diving Unit
- Navy Disease Vector Ecology and Control Center
- Naval Surface Warfare Center, Port Hueneme Division
- Naval Medical Center San Diego

Air Force

Use of Air Force Institute of Technology (AFIT) Master's Degree Students: The Air Force Technology Transfer Office (TTO) sponsored two AFIT student master degree theses in the area of transfer process management. Through this project, Master Degree Students become aware of the technology transfer function and know their

theses will be used rather than put on a shelf and the TTO obtains valuable analysis on technology transfer processes and procedures at minimal cost.

1-800-203-6451: Tech Connect is a gateway to provide information on a particular technology, search for technologies, and accelerate the transition of technologies. It receives telephone and e-mail inquiries from potential outside partners and searches for technical experts in the laboratories and centers who can best answer the customer's technical questions.

DoD Technology Transfer Integrated Planning Team (DoD TTIPT): The Air Force has been holding Air Force TTIPT meetings semiannual for several years. In early FY 97, they proposed a DoD TTIPT workshop which they hosted and managed in May 1997. This first-ever DoD TTIPT workshop accomplished several things: gathered together most of the people in DoD involved with technology transfer functions, shared best practices, discussed legislative impacts to the program and how they are implemented within the separate Departments, and identified the need for continued communication.

Success Stories

DoD and the private sector have experienced numerous successes in working together through partnership agreements, CRADAs, and other technology transfer mechanisms. Two specific examples of successes are:

1. CELLMAX Artificial Capillary System: Grow your own bone marrow or other blood cells for compatible, non-rejection therapy. The objective was to combine Cellco's devices and patents for blood treatment with the Navy Medical Research Institute's (NMRI) patented methods for blood cell therapy, thus producing more healthy cells for therapy. Blood cells are removed from the patient's system, passed into Cellco's Artificial Capillary System, enriched with media and growth factors using NMRI's stem cell culture methods and restored to the patient with many times the number of (now healthy) cells. The commercial payoff is efficient, inexpensive, healthy cell production to treat disease or trauma where blood is deficient or damaged in critical cell components or in bone marrow injury.

2. An Air Force technology used to locate tanks on the ground has been used to refine a computer assisted minimally invasive surgery (CAMIS) system capable of improving treatment of brain, prostate, and breast cancer. Use of this technology to treat brain cancer will reduce post-operative complications, shorten hospital stays and lower surgical cost by at least 30 percent. The CAMIS system uses an electronic wand that senses internal anatomical information that is forwarded to a computer where image data are converted to a 3-dimensional representation for the surgeon. The accuracy and speed of locating tumors has been improved by the addition of an optical digitizer used by the Air Force to develop geometric models for radar target recognition. This new digitizer, along with software modifications, enables real-time 3-D screen updates before an incision is made.

B. Dual Use Science and Technology Program

Dual use technology remains a key component of the Department's investment strategy in technology and progress continues to be made in the establishment of an effective program that will foster the joint development of dual use technologies with industry. The Technology Reinvestment Program (TRP) was instrumental in guiding our efforts to increase the use of dual use technologies. A key to the success of the program was the development of partnerships with industry, universities, and state and local governments. The TRP provided many valuable lessons we are using to develop our current dual use policies and programs. The lessons learned from TRP include:

1. Dual use products must be tested in their military context - In the absence of military specifications, it is vital to demonstrate the military utility of dual use "products" through selective laboratory and troop testing.

2. The commercial marketplace is a principal motivation for participating industries. Industry involvement and investment is driven principally by the commercial marketplace and the industrial partner must be allowed to pursue opportunities in the commercial marketplace.

3. Military needs must dictate program choices and optimization. It is important for dual use efforts, which are often struggling to meet commercial as well as military goals, to establish early and close relationships with the military user, integrator, or developer of the product. This will assure that military needs dictate the program's choices and that a clearly enunciated insertion strategy is developed early and updated as needed.

4. Innovative agreements are crucially important. Non-procurement agreements, such as Cooperative Agreements and "Other Transactions" are a necessary tool when seeking flexible negotiations, particularly concerning issues of intellectual property rights and foreign participation. These vehicles can offer a much less burdensome and more creative arrangement between the government and the performing consortium than can conventional contracts.

5. Consortia should be encouraged, but not mandated. While consortia and partnerships were found to work well, they should not be mandated, but their formation should be left to the discretion of the proposers -- the government should not dictate to business how to form and structure their teams.

6. Cost sharing should be demanded for technology development programs. Cost sharing is necessary for a technology development effort like the TRP. The benefits of cost share for a developmental program are a reduction of program cost to the government and an assertion by the participating company that the end product will be competitive in the commercial marketplace. A fifty percent cost share is an appropriate level for industry contribution.

The TRP made significant progress in establishing a new way of doing business in DoD and led to the establishment of the Dual Use Applications Program (DUAP) in Fiscal Year 1997. A primary component of the DUAP was the Dual Use Science & Technology Initiative which was led by the Office of Technology Transition. This initiative had two primary purposes. The first was the development, with industry, of dual use technologies, and the second was the transition to the Services of the techniques developed and the knowledge gained by DARPA during the execution of earlier dual use programs. In Fiscal Year 1997 this initiative resulted in the approval and initiation of 69 projects that are jointly funded with industry and will result in the development of dual use technologies that are needed to meet future defense needs and have sufficient commercial applications to support a viable production base. Funds provided by DUAP for these projects are matched by the Services, and industry then matches the combined DUAP and Service funds. Through this cost sharing formula a $67 million investment by DUAP has resulted in $275 million being invested by DoD and industry in the development of dual use technology with industry. Congress' continued support of the S&T Initiative in FY98 resulted in the authorization of an additional $75M which is being used to launch a second wave of solicitations to industry through the Dual Use Science and Technology Program. Project selection for this second round is expected in June 1998 with project awards by the end of December. The program is again being executed by the Office of Technology Transition; however, in Fiscal Year 1999, it is planned to transition the execution of the program to the Services.

A list of the DUAP projects by Service, title, and costs begins on the next page. A more detailed report on this program is being submitted separately.

C. SMALL BUSINESS INNOVATION RESEARCH (SBIR)

OSD OFFICE OF TECHNOLOGY TRANSFER SBIR FY 1997-1998 PROGRAM

The SBIR program operates by setting aside 2.5% of extramural Research, Development, Test and Evaluation (RDT&E) funds in FY 1997 to support dual use R&D activities by small businesses (less than 500 employees). In order to emphasize the importance of the OTT technology transfer mission and to encourage the defense labs to play an active role, the OSD SBIR Program funds the Technology Transfer section of the DoD SBIR solicitation. The OSD SBIR program has commercialization as a goal, therefore, projects are primarily later stage, applied research, which appear to offer the greatest possibility for near-term technology transfer "spin on" or "spin off" commercialization.

Candidate topics were solicited from Army, Navy and Air Force labs, and the OTT staff selected the most promising of the topics, based upon commercialization potential. The OSD Office of Small and Disadvantaged Business Utilization (SADBU) issued a DoD-wide SBIR solicitation 97.2, in July 1997, with a total of twenty topics in three technology focus areas. The Army Simulation, Training and Instrumentation Command is managing seven topics in the technology area of High Level Architecture for Simulation; the Naval Undersea Warfare Center is managing six topics in the technology area of Sensors; and the Air Force Wright Laboratory is managing seven topics in the technology area of Materials and Materials Manufacturing. This year 53 Phase I contracts were selected and funded at $5 million. A technical review of the progress of each Phase I contract will be conducted by Service representatives, lab personnel and the OTT staff, in order to select those contracts with the highest potential for success under a Phase II contract. Approximately $21 million will fund OTT SBIR Phase II contracts.

A brief description of the FY 1997 OTT SBIR topics follow, with the Service and defense laboratory identified:

Army Laboratory Topics (OSD97-001 THRU OSD97-007) Simulation Training and Instrumentation Command (STRICOM)
Technology Focus Area: High Level Architecture and Data Representation for Simulation

Training

OSD97-001 Title: HLA Federation Implementation Tools
Technology Area: The Commercialization of High Level Architecture (HLA) and Data Representation
OBJECTIVE: To develop new and innovative technological solutions to support the development and implementation of High Level Architecture (HLA) federation. These tools target the planning or design phase prior to any Federation operation/interactions.
DESCRIPTION: The need exists to design and develop infrastructure tools to aid in the implementation and use of the HLA to develop, implement and use HLA federations. These tools are desired to provide developers of simulation systems an implementation method for functionality, high fidelity, interoperability, and compliance at a low cost. These tools should address the establishment of the federation object model and the determination of the ~~a~~ level of

interoperation for a group of simulation applications to operate in a federation. DoD has established the process in the HLA Federation Development and Execution Process Model which lays out a general view of this process. However, objective is the development of a commercial applications, an open tool architecture is planned, with published data interchange to allow open use of DoD data resources and equivalent commercial information the use of information from a Modeling and Simulation Resource Repository is optional. The projects will establish the commercial equivalent of these data requirements or identify that they are not required for commercial applications. These tools help to establish a baseline for federation development and integration.
DUAL USE COMMERCIALIZATION: DoD believes that HLA is the technology thrust for interoperability. Commercial applications which desire to interoperate could use the same paradigm. The process of facilitating a federate and federation is labor intensive. The use of sophisticated tool sets which alleviate tasks and enable more efficient implementations for commercial developers are desired. Candidates for dual use include information systems management, manufacturing control, and distributed games.

OSD97-002 Title: HLA Runtime Analysis and Monitoring Tools

TECHNOLOGY: Modeling and Simulation
OBJECTIVE: Provide realistic real-time monitoring for the federation, or any federate, during the federation's operation. These tools support activities during federate operation and can provide feedback in after action review.
DESCRIPTION: This type of analysis and monitoring tool ensures proper/legitimate operation of a federation interacting over a network. This includes but, is not limited to, (two Dimensional Plan View Display, a Stealth viewer including attachment to an operating simulation) a recorder and playback capability, a federation controller, a network performance monitor and data visualization techniques eg.,. Portions of the stored data may be at different physical sites, therefore, effects of distributed recording must be addressed and supported. There have been solutions to the visualization of the simulated battlefield which partially answer the questions of the operation and health of a distributed network implementation. However, a low cost modular approach is needed for use with DoD's HLA and its commercial equivalent. The projects will review the current capabilities and evolve a flexible HLA compliant implementation which uses the federation object model, and initialization data of a protofederation or a potential commercial application.
DUAL USE COMMERCIALIZATION: Candidates for dual use include information systems management, manufacturing control, and distributed games.

OSD97-003 Title: HLA Commercial Applications in Simulation

TECHNOLOGY: Modeling and Simulation
OBJECTIVE: Demonstrate that HLA provides a commercially viable real-time simulation approach. (An HLA instantiation)
DESCRIPTION: Based on the constructs of HLA, establish a federation object model for a specific objective, design and integrate a commercial group of federates to perform this specific commercial implementation. The offeror should discuss the federation object model, environmental representation, and either the use of a special purpose run time infrastructure (RTI) or request the Government's RTI. The projects will use the DoD prototype developments, or can suggest alternative solutions. The use of either a commercial variant or a commercial application will help verify the validity of the HLA, and provide opportunities for novel design. This commercial application of a federation could be a real-time interactive game, a real-time management and oversight of a manufacturing facility or another commercial application.
DUAL USE COMMERCIALIZATION: Candidates for dual use include information systems management, manufacturing control, and distributed games in a virtual environment.

OSD97-004 Title: Visual Representation within the HLA
TECHNOLOGY: High Performance Computing and Simulation
OBJECTIVE: Demonstrate realistic dynamic images for a distributed virtual gaming environment operating in an HLA environment.
DESCRIPTION: Using the HLA and Run Time Infrastructure (RTI) constructs and the Synthetic Environment Data Representation Interface Specification (SEDRIS) demonstrate commercial applications for high resolution displays.
DUAL USE COMMERCIALIZATION: Candidates for dual use include information systems management, manufacturing control, and distributed games in a virtual environment.

OSD97-005 Title: Stimuli (non-visual) Representation within the HLA
TECHNOLOGY: Modeling and Simulation
OBJECTIVE: Demonstrate that HLA supports the implementation of different sensory stimuli (other than visual) in the virtual environment. This topic addresses the potential of haptic, audio, olfactory and other stimuli into the virtual reality within the HLA paradigm.
DESCRIPTION: Provide a novel approach which supports sensory stimulation using the HLA constructs and its environmental data. This topic provides the avenue to ensure that alternate sensory data and its representation can be supported within a federated object model, the RTI and its environmental representation.
DUAL USE COMMERCIALIZATION: Candidates for dual use include information systems management, manufacturing control, and distributed games in a virtual environment.

OSD973-006 Title: Commercialization of Components C4I Interface to Simulation using HLA
TECHNOLOGY: Modeling and Simulation
OBJECTIVE: Many simulations require tactical intelligence information and audio communication. This topic's thrust is to develop commercial applications which use the current C4I HLA constructs.
DESCRIPTION: The need exists to accommodate a wide variety of real-world command, control, communications, computers, and intelligence (C4I) equipment into the synthetic environment. A primary DoD thrust for this effort is the Modular Reconfigurable C4I Interface (MRCI).
DUAL USE COMMERCIALIZATION: The ability to inject audio communications and intelligence is applicable to the information technology management, telemedicine applications and distributed game market, which use integrate analogue and digital signals.

OSD97-007 Title: Data Management/ Analysis Tools
TECHNOLOGY: Modeling and Simulation
OBJECTIVE: Rapid reduction and analysis of federate and federation data is required. This analysis spans from an attribute level comparison through the sophisticated analysis on a simulation effect. The ability to parse data including audio and video data in a near real time analysis capability is required.
DESCRIPTION: There are large volumes of data used in federate and federation initialization and operation. The federation performance cannot be efficiently reviewed without automated data management tools. Analyze the effect of an additional passive federate on an exercise. These tools will allow the reconstruction of an entire federation exercise. This topic requires the synthesis of distributed recorded data, and the decomposition of the data into significant activities for replay and analysis.
DUAL USE COMMERCIALIZATION: There is a large community who desire rapid access and analysis of data. Techniques should support commercial information technology data management.

Navy Laboratory Topics (OSD97-008 THRU OSD97-013) Naval Undersea Warfare Center, Newport
Technology Focus Area: Sensors

OSD97-008 Title: Underwater Acoustic/Optical Imaging

OBJECTIVE: Develop an underwater acoustic/optical imaging system or innovative sensors
DESCRIPTION: Combining the complementary strengths of acoustic and optical imaging technologies offers the potential to enhance the quality of underwater images required in a variety of military and civilian applications. Such combinations have been demonstrated with, for instance, ultrasonic sonar and laser line scan. This topic requests the development of innovative acoustic/optical technologies to be combined in an affordable imaging system suitable, depending on design, to such applications as hand held devices for divers, systems for unmanned underwater vehicles or stations, larger subsurface or surface craft. Projects will demonstrate the intention to develop a dual use product and an understanding of what such development entails. The objective of the topic is the development of an innovative imaging system based on innovative acoustic/optical sensors.
DUAL USE COMMERCIALIZATION: The system will have similar civilian and military applications such identifying underwater objects, finding environmental hazards, imaging for underwater construction or structural inspection, conducting research.

OSD97-009 Title: High Efficiency, Broadband, Acoustic Transducers/Arrays for Various Underwater Applications

OBJECTIVE: Develop reliable, simple affordable, highly efficient, broadband acoustic transducers/arrays for a variety of underwater applications.
DESCRIPTION: Recent developments in materials suitable for transduction and the design of multi-layer active drivers provide the potential for transducers which can satisfy military and nonmilitary applications with more versatility and more simply, reliably, and affordably than previously possible. Such materials include piezoelectric and electrostrictive ceramics, magnetostrictive alloys, electroactive polymers, and electrostrictive urethanes. This topic contains two subtopics.

Subtopic 1. Multi-purpose Conformal arrays. Under this subtopic, offerors should propose arrays which serve more than one function and which, if used at deep depths, are operable without a pressure compensation system. Applications (depending on frequency): close in imaging, for instance in the near surf; generation of high intensity ultrasound to effect sonochemical reactions or generate cavitation to break up and neutralize oil globules or hazardous biological waste; underwater acoustic communications; passive detection and localization of other platforms or marine mammals; acoustic communications; reduction of radiated vehicle noise and/or vibration for military or nonmilitary vehicles and vessels to increase detection ability and to provide greater passenger comfort. In the high frequency (above 20 kHz) regime, very broadband highly efficient arrays capable of handling very high power densities and suitable for versatile use in shallow water; lightweight, less powerful imaging arrays suitable for diver use. In the lower frequency regime (below 4 kHz): reversible underwater arrays for radially compact conformal mounting on the outer surface of a submersible hull, such as a Unmanned Underwater Vehicle (UUV); capable of wide bandwidth transmit, receive, and beamforming and of functioning as an actively controllable surface for radiated noise reduction below 2 kHz.

Subtopic 2. Low frequency projector for deep depths. Applications: acoustic tomography studies; oceanographic experiments; undersea warfare. Underwater acoustic projector capable of acoustic power output of 500 watts from 50 Hz through 100 Hz with an electroacoustic efficiency greater than 50%. Operable at depths up to 1000 meters without an active compensation system. Must be environmentally suitable to be used as an expendable source.

OSD97-010 Title: Affordable Underwater Sensing Technology for Autonomous Underwater Vehicles

OBJECTIVE: Develop affordable sensing technology on a scale suitable for integration on AUVs.
DESCRIPTION: Physical, fluorescence and other optical sensing technologies can now be configured for integration onto AUVs for shallow and very shallow water applications. Several sensor technologies are on the threshold of achieving the affordability, low-power, robustness, and

miniaturization needed for such applications. For Navy applications, the sensors would be housed on a 7" internal diameter autonomous swimming vehicle or on a 9" x 13.5" x 5" bottom crawler. for undersea warfare and dual use applications.
DUAL-USE COMMERCIALIZATION: Applications of this technology include: Tactical Oceanography for shallow and very shallow water operations; small object search and detection; environmental monitoring; mapping of sewage plumes, oil spills, hazardous waste and nuclear disaster sites; humanitarian de-mining; waste dump management.

OSD97-011 Title: Small, Low Power, Low Cost Beamformer for Portable Imaging Sonar
TECHNOLOGY: High Resolution Beamformer Technology, Sonar Signal Processing Technology.
OBJECTIVE: Develop small, low power, low cost beamformer suitable for use in small high frequency imaging sonars.
DESCRIPTION: Advances in chip technology provide the potential for high resolution two-dimensional beamforming in a package suitable for use, for example, in a diver's hand held imaging array, in a remote imaging sonar on an unmanned undersea vehicle, or with a small surface craft sonar for obstacle avoidance. An innovative approach in beamformer technology is required to meet the size, power and cost objectives. Innovation is also required in system design to reduce high data rates generated at the array to a level compatible with a high performance signal processing which would form the images. The two-dimensional beamformer could be tested on a Government owned high resolution planar sonar array at a Government test facility. Such an array would have on the order of 100 transducer elements and thus allowing an equal number of beams to be formed. The elements would spaced at one-half wavelengths for the center frequency. The center frequency of an array of small enough size can range from 50 kHz to 500 kHz.
DUAL-USE COMMERCIALIZATION: Current or potential applications include use with sonar arrays for: hand held imaging systems; remotely piloted or autonomous undersea vehicles in support of cable-laying, pipe-following, and salvage; surface or underwater obstacle avoidance; oceanographic research.

OSD97-012 Title: Piezoelectric Ceramics for High Performance Acoustic Transducers
OBJECTIVE: Develop innovative piezoelectric ceramic formulations or materials processing methods that lead to enhanced performance acoustic transducers.
DESCRIPTION: At the heart of an acoustic transducer lies a material that performs the essential role of electromechanical energy conversion, converting and electrical signal into an interrogating acoustic pulse on transmission, and converting the weak acoustic echoes into an electrical signal on reception. Innovations are sought in the composition of, or processing methods used to make, piezoelectric ceramics for this essential transduction task. The focus of the work lies on the materials processing, but the goal is property improvements that lead to enhanced acoustic transducers for applications ranging from Navy sonar systems to civilian underwater imaging for the detection and clearance of environmental hazards in coastal waters.
DUAL USE COMMERCIALIZATION: In addition to their vital role in most Navy sonar transducers, piezoelectric ceramics play a critical role in a wide range of civilian acoustic transducer applications: ultrasonic transducers for medical diagnostic imaging, vibration sensors and actuators in active noise suppression system for air conditioners and the like, and underwater imaging devices for detecting and clearing environmental hazards from coastal waters.

OSD97-013 Title: Automated Sound Velocity Profiler
OBJECTIVE: Develop innovative, affordable, automated system, including launch and handling, for sampling the sound velocity profile in the water column.
DESCRIPTION: Hand launched expendable devices, such as expendable bathythermographs (XBTs) or sound velocimeters (XSVs) are currently used to sample water column properties. Recent work at the Naval Undersea Warfare Center Division, Newport (NUWCDIVNPT) has focused on possible alternative devices for obtaining the sound velocity profile (SVP). This topic seeks to explore alternative approaches. The SVP is used as input for sonar performance prediction calculations. Launching expendable devices adds to work assignments. In addition, the

environmental variability of littoral waters increases the necessity for sampling more frequently and, therefore, increases workload. Developing the technology for an automated or partially automated method for sampling the sound velocity profile without expendable devices would provide increased reliability and maintainability and decrease workload.
DUAL-USE COMMERCIALIZATION: This technology is applicable to the next generation Navy surface combatant and as retrofits to current surface combatants, especially in light of the Navy's goal of reduced manning. The technology can benefit commercial activities that require environmental data acquisition such as oil exploration, environmental monitoring, and power plant discharge monitoring.

Air Force Laboratory Topics (OSD97-014 THRU OSD97-020) Wright Laboratory Topics

Technology Focus Area: Materials and Materials Manufacturing Technology

OSD97-014 TITLE: Applications of High Temperature Organic Matrix Composites
TECHNOLOGY: Investigate potential high temperature organic resins that can produced organic matrix composite components by resin transfer molding (RTM) at an operating environment of 700°F.
DESCRIPTION: RTM is rapidly maturing as a processing method of choice to produce affordable, high quality composite components for a number of applications. Currently, the RTM resins with the highest temperature capability are bismaleimides. However, new applications require an RTM resin capable of service at higher temperatures than current resins allow. Examples of possible resin which approach an operating environment of 700°F, and also have properties amenable to RTM processing include, but are not limited to, polyimides, and phthalonitriles.
DUAL-USE COMMERCIALIZATITON: High temperature composite materials produced by RTM are excellent candidates for turbine engine components for military and commercial aircraft. These materials may also find application as brake parts, and there are numerous potential applications for high quality, high temperature composites throughout the DoD and commercial sectors.

OSD97-015 TITLE: Solvent-Free, High Tg Polymer Processing Techniques For Aircraft Canopies
TECHNOLOGY: Materials, Processes and Structures
OBJECTIVE: Investigate, design and develop viable processing techniques which retain or improve optical transparency and impact properties for high glass transition polymers.
DESCRIPTION: New high use temperature polymeric materials shall be required for use in future airframes to enable the full performance characteristics of the weapon systems. Some new high temperature transparent thermoplastics have been prepared in recent years which possess glass transition temperatures (Tg's) up to 250-350 degrees C and minimum room temperature tensile mechanical values of 0.45 Msi modulus, 11 Ksi strength and 4.7% elongation to break. New manufacturing technology in non-solvent based processing techniques which retain or improve the inherent optical and mechanical properties at room temperature as well as maintain reasonable processing temperatures is sought. Typical melt consolidation above Tg and pressures of up to 100 Ksi may make for unrealistic fabrication for large commercial scale sheets compared to the state-of-the-art injection molding and extrusion devices. A model forming technique and device design is sought for proof of concept using such high Tg materials.
DUAL USE COMMERCIALIZATION POTENTIAL: Dual use potential exists for the successful process that optimizes low operating cost and rapid cycle with high use temperature amorphous or semi-crystalline thermoplastics. Commercial applications would include high impact resistant, high use temperature personal protective goggles and face shields, and lenses for elevated temperature environments, and flame resistant commercial aircraft windows.

OSD97-016 TITLE: Materials for Rocket Propulsion
OBJECTIVE: Develop advanced rocket propulsion materials and cost effective techniques for their fabrication.

DESCRIPTION: There is a critical need for novel, innovative approaches in the development and processing of materials which can aid the advancement of rocket propulsion technologies. For example, the year 2010 goals of the DoD/NASA Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Initiative cannot be met without new materials and manufacturing processes that increase performance, reduce weight, and decrease hardware and support costs of rocket propulsion systems. Specifically, goals for booster systems include: 1) increasing liquid rocket engine thrust-to-weight by 100%; 2) increasing mass fraction of solid motors by 35%; and 3) decreasing cost and time of manufacturing by 25%. New approaches will develop and characterize: (a) advanced materials that can meet these goals; and/or (b) innovative, cost effective processing techniques for these materials. Candidate materials include, but are not limited to, polymers, polymer matrix composites, metals and intermetallics, metal matrix composites, ceramics, ceramic matrix composites, carbon-carbon composites, thermal barrier coatings, and functionally graded materials. Research in this Topic is anticipated to provide a maximum of innovative flexibility while yielding promising commercial application/dual use technologies to prospective investigators.
POTENTIAL COMMERCIAL MARKET: Materials for rocket propulsion will transition into the US commercial space launch industry, thus enabling the US industry to more favorably compete with foreign sources for space launch opportunities through reducing the life cycle cost of inserting payloads to space obit. Materials for rocket propulsion technologies also serve the commercial sector by enhancing our ability in remanufacture and maintenance of the US ballistic missile fleet.

OSD97-017 TITLE: Breathable Release Coating Development to Use on Ceramic Tooling
OBJECTIVE: Develop or modify a release coating for use with ceramic tooling capable of withstanding cure temperatures in excess of 700°F. This release coating must be capable of providing both release and volatile removal for solvent based composite materials which process at temperatures up to 750°F.
DESCRIPTION: : The use of castable ceramic tooling for fabrication of solvent-based composite parts requiring two-sided tooling has significant cost advantages if acceptable release materials are available. Solvent based composite materials systems require manufacturing methods which allow in-situ removal of solvents. For parts which require tooling to one surface only, porous materials may be utilized on the non-tooled surface to allow permeation of the volatiles from the part. In the case of parts which require tooling on both surfaces, the tooling material itself must be sufficiently permeable to allow volatile removal and must be finished with an appropriate release coat or be inherently adhesion resistant to the composite material. For tooling materials which are not inherently adhesion resistant, the release coat must not only provide a mechanism for release of the composite part from the tool, but also a mechanism for permeation of the volatiles from the part and through the tooling material.
DUAL USE COMMERCIALIZATION POTENTIAL: Composite materials have already found widespread application in the commercial market. Improved quality and lower part cost are desired features whether the market is military or commercial. The concept developed herein will be applicable and beneficial to industries ranging from aerospace to automotive to medical.

OSD97-018 TITLE: Advanced Fasteners for Low Cost Airframe Assembly and Repair
OBJECTIVE: Develop and demonstrate advanced fastener technology that will significantly reduce the cost of airframe assembly. Evaluate the feasibility of using advanced fasteners to relax dimensional tolerance requirements and substantially reduce or eliminate associated tooling cost.
DESCRIPTION: All future DOD weapons systems are being developed with major emphasis on achieving maximum performance at an acceptable cost. The airframe assembly operation represents a major portion of the overall manufacturing cost. Significant potential exists for lowering the cost of assembly by eliminating or reducing the need for drill tooling and pre-assembly fixtures. the development of advanced fasteners that relax hole tolerance requirements could substantially reduce cost associated with the fabrication, certification, and maintenance of high tolerance interchangeable / replaceable drill tooling.

Advanced fasteners are required that allow for loose tolerance holes and provide adequate interface for high load transfer effectively. The new fastener technology should be applicable to both permanent and replaceable fasteners. Tensile strength, shear strength, weight and configuration of the

advanced fasteners should satisfy the requirements of advanced fighters such as the F-22 or Joint Strike Fighter (JSF).
DUAL USE COMMERCIALIZATION POTENTIAL: This advanced fastener technology could be used to reduce the cost of commercial products such as airliners, business jets, high speed boats, etc. This technology would have wide commercial application and could be used to further reduce the cost of commercial products with mechanically fastened joints.

OSD97-019 TITLE: Detection of Hidden Substructure Edges and Holes
OBJECTIVE: Reduce assembly cost and time by developing equipment and techniques for locating edges and holes in substructure that are hidden under exterior panels and skins.
DESCRIPTION: The assembly of aircraft structure involves precision alignment of skins to substructure (i.e. bulkheads, frames, spars/ribs, etc.) prior to the drilling and filling of fastener holes. All hole locations and edge distances are constrained to tight tolerances to achieve the lightest structural weight, highest structural integrity, and the lowest radar signature. Closely matched holes that fit snugly to the fasteners at the minimum allowable distanced from the panel's and substructure's edge are desired. The current methods for locating holes and edges requires the assembly technician to use hard templates or to view the assembly from the underside to mark the outer skin with edge and hole location markings. Often excess material and edge distances are required to compensate for alignment inaccuracies. Low cost innovative equipment and techniques are needed that provide the assembly technician with accurate and timely information on the edge and hole locations of hidden substructure relative to mating outer skins. This information should include a visual display or markings to assist the aircraft assembly technician in drilling properly aligned holes and verifying edge distance requirements. Technologies that may apply include compact directional ultrasonics, eddy current measurements, induced thermal or magnetic imagery, laser induced acoustic emissions, etc.
DUAL USE COMMERCIALIZATION POTENTIAL: The ability to sense and display hidden structure would have a profound impact on both commercial and military markets. Significant cost reductions could be realized in assembly operations; which is the largest single cost area associated with the manufacture of commercial and military aircraft.

OSD97-020 TITLE: Hybrid Composites Manufacturing Technology - Braiding/Filament Winding
OBJECTIVE: Capture the technology developed for braiding / filament winding of organic matrix composites in the Design and Manufacture of Low Cost Composites (DMLCC), Engine program (Contract F33615-91-C-5719) and integrate into a hybrid manufacturing process.
DESCRIPTION: Under the Air Force ManTech program DMLCC, Engine, a hybrid composite manufacturing technology has been developed involving braided and filament wound preform fabrication. The braided/filament wound hybrid composites are proving to be an effective means for fabricating critical, primary load bearing jet engine structures such as a center bypass duct. This is a straight axis part involving both braiding and filament winding with multiple features. Similar work has been done demonstrating the viability of braiding for low cost composite structures in the DMLCC, Wing program as well as in wing and fuselage structures in the NASA ACT program. Currently, the braiding and filament winding processes are done on separate machines, necessitating two machines, removal from one machine to the next, shipment to separate facilities, etc. By combining or hybridizing the two processes into a single machine, significant process improvements and cost savings can be realized.
DUAL USE COMMERCIALIZATION POTENTIAL: The fully integrated multi-axis hybrid preforming system would have application in a myriad of industries. In the aerospace industry, it would be ideal for the production of the center bypass duct that has been the focus of the DMLCC,E program, as well as for the manufacture of non-linear parts such as ducts and fuselage ribs. This technology would also be applicable to a variety of commercial industries such as automotive, medical (prosthetics), sports (hockey sticks, and racket sports) and recreation equipment (bicycle components).

D. Manufacturing Technology (ManTech)

Background

Advanced manufacturing technologies are vital to affordable defense systems and economic security. The maturity level of processes employed to produce defense weapon systems has a telling effect on the ability of those systems to meet schedule and cost targets as they transition through development into production. Immature manufacturing processes represent a major source of risk and uncertainty that is often translated into system cost growth and schedule slippage. The DoD Manufacturing Technology (ManTech) Program's work in maturing factory processes as well as promoting integrated product and process development (IPPD) is a critical element in understanding and resolving risk early in the system development cycle.

ManTech investments made by the Military Services, Defense Advanced Research Projects Agency (DARPA), and the Defense Logistics Agency (DLA) are grouped into three technology areas - Processing and Fabrication projects mature factory floor processes and improve yields through variability reduction for electrical, mechanical, and composite products; Manufacturing and Engineering Systems projects improve the support functions associated with planning, scheduling, and controlling manufacturing and enterprise-level activities, including customer and supplier interfaces; and Advanced Industrial Practices projects leverage manufacturing process developments with advanced business practices to demonstrate new industrial base capabilities.

The congressional funding level for ManTech programs (Service//DLA) in FY97 was $189 million.

Technology Transfer & Dual Use

The ManTech program is driven by defense needs for technologies and systems that provide a superiority edge to the warfighters. In today's environment, DoD is involving the commercial industrial base as soon as possible, by either adopting its best practices or transferring results of military processes to the commercial arena. For example:

- The Air Force Lean Aerospace Initiative (LAI) is a collaborative multi-million-dollar ManTech effort that receives funding from all of the Services, several other government agencies (e.g., NASA and the Coast Guard) and approximately 20 aerospace companies. It has been underway for more than four years. LAI's objective is to foster the identification and implementation of the most efficient known practices in product development, factory operations, supplier relationships, and other areas that can sharply (on the order of 50 percent) reduce cost and cycle time for the production and sustainment of aerospace products. Lean concepts present the US military aircraft industry with an opportunity to address the challenges presented by both reductions in DoD procurements and worldwide competition.

- The Defense Logistics Agency, working with Rutgers University, developed an alternative process for manufacturing sterilized food pouches for combat rations. The program leveraged best commercial practices in the food industry to modify equipment, develop a suitable packaging film, and produce test articles to demonstrate the results. The production rate for 8 ounce pouches was 102 per minute, compared to the usual 60 pouches per minute per line for traditional equipment. The US Army Natick Labs subjected the pouches to rough handling and cold weather test, and reported that the results were two to four times better than test results of legacy pouches.

Recent Management Initiatives & Accomplishments

- Science & Technology (S&T) Affordability Task Force. In May, 1995, the Director for Defense Research and Engineering chartered the S&T Affordability Task Force to address the issue of assessing and strengthening the affordability content of the DoD's S&T programs. The intent was to identify mechanisms for focusing the DoD's technology programs on obtaining manufacturing process maturity as early as possible in the acquisition cycle. Over the past year the Affordability Task Force has sponsored a workshop with S&T managers and industry to share affordability best practices and lessons learned; reviewed pilot programs for attention to IPPD and Integrated Product Teams (IPTs); and conducted a pilot training course to improve affordability awareness. 1998 activities will focus on developing an action plan for transitioning the results of 6.3 advanced technology development efforts into acquisition and assembling an Affordability Handbook, or toolkit, for S&T managers to use during program formulation.

- Interagency Collaboration. Over the past year, the Joint Defense Manufacturing Technology and the Manufacturing Technology Information Analysis Center (MTIAC) worked with representatives of the Department of Commerce and Department of Energy to explore synergy with the Partnership for a New Generation of Vehicles (PNGV) consortium. Both programs are working through the MTIAC to exchange technical data and research agendas for metal casting projects.

- Manufacturing Technology Information and Analysis Center (MTIAC). MTIAC is a DoD-supported center that provides Manufacturing Technology Information to government agencies and qualified government contractors. They publish a *Current Awareness Bulletin* that alerts subscribers to the latest developments in DoD ManTech and they perform a wide variety of technical search and analysis services for which they charge a fee. They have access to the technical documents that result from ManTech projects and make them available to qualified requesters. MTIAC also operates an extensive Internet web site, accessible at http://mtiac.iitri.com, through which most of their services can be obtained.

- Internet Web Sites. In addition to the MTIAC web site, there are several other ManTech-related web sites that provide Program information and facilitate technology transfer and transition. The DoD ManTech web site, sponsored by ODDR&E, is located at http://mantech.iitri.com. This site provides information on DoD ManTech Program-related publications, meetings, budgets, technology transfer, and a variety of other related topics to an unrestricted audience. It also offers a password-protected area that the DoD ManTech community uses to coordinate and share information internally. The Services' ManTech Programs also operate their own web sites that contain information about their specific programs and organizations:

Website	Military Service
http://ippd.redstone.army.mil/mst_army/mantech_97	Army
http://mantech_nt.bmpcoe.org	Navy
http://www.wl.wpafb.af.mil/mtx/index-n.html	Air Force

- Technology Transfer. Each year, the Joint Defense Manufacturing Technology Panel sponsors the Defense Manufacturing Conference (DMC). The DMC is a major technical conference at which the latest developments in DoD manufacturing technology are briefed to an audience made up of representatives of industry, government and academia. DMC '97, held on 1-4 December 1997, drew more than 800 attendees. The conferences feature mini-symposia in which program plans and the results of specific projects are briefed, as well as an exhibit area where industry and government exhibits provide details of ManTech-related projects, products, and services. The plenary sessions of the conferences provide insight into the needs of DoD customers, as well as policy issues and other topics of general interest. Other significant technical meetings are held throughout the year for specialized purposes. The Air Force, for example, holds a Roadmap Review each year to explain their detailed program plans to an industry and government audience, as well as an Industry Days meeting to review the results of their efforts to reduce the risk of implementing advanced business practices.

Recommendations for Program Improvements

Cost Sharing. Subsection 2525(d) of Title 10 of the United States Code requires two types of cost sharing for ManTech. The first provision requires cost sharing for all ManTech programs, unless waived by the USD(A&T). The amount of sharing is not prescribed. The second provision requires 2-to-1 recipient to government cost sharing for 25 percent of the available funds each year. ManTech primarily addresses high risk, defense-unique, military defense technologies. There is little industry incentive to provide such a high level of cost sharing when there is limited or no commercial applicability. Further, the 2-to-1 cost share requirement disincentivizes small and medium suppliers from responding to ManTech solicitations since they do not have the corporate resources to participate in cost sharing. The DoD will provide a recommendation for revising the ManTech cost sharing provisions for Congressional consideration in future legislative proposals.

E. Defense Technical Information Center (DTIC)

The foundation for any technology transfer effort, whether for transfer of technology into or out of the DoD or, indeed, for transfer between and among various DoD organizations, is a sound information collection and dissemination capability. DTIC provides that function for the DoD S&T community. Highlights of DTIC activities in FY96 are presented below.

Defense Technology Transfer Information System (DTTIS)

DTIC has developed the DTTIS in cooperation with the Services and Defense Agencies to facilitate the collection, analysis, and dissemination of project information about Technology Transfer activities, such as Cooperative Research and Development Agreements and Patent License Agreements. The database continues to grow and is being modified to meet evolving information needs.

Internet/World Wide Web (WWW)

The DoD has assumed a leadership position within the Federal Government in information delivery via the Internet. Using the power of the WWW to incorporate the entire range of Internet information transfer capabilities into a single package, DoD is creating a wide variety of products and services to deliver information to the public and also to facilitate management of agency programs and functions. These applications of the latest information technologies increase the public's awareness of the various technologies DoD is developing and enhance the transfer of information concerning these technologies. The DTIC has developed and manages over 80 WWW information resources used by the Office of the Secretary of Defense and its component organizations to provide information to both internal and external users. The Government Information Locator Service is fully integrated into DoD WWW services and provides indices, pointers, and searching capabilities into DoD technology assets.

One of the many DoD WWW implementations is TechTRANSIT, which provides single-entry electronic linkage to information on all DoD technology transfer activities. These programs include: the Small Business Innovation Research Program (SBIR); Cooperative Research and Development Agreements; Dual-Use Programs; and DoD Information Analysis Centers. TechTRANSIT also contains information on partnering opportunities and success stories for spin-on and spin-off technology transfer and defense conversion with dual-use applications. In addition, links are provided to the technology transfer activities of other Federal organizations, as well as state and international organizations.

Registration for Access to DoD Technical Information

DTIC operates a registration system for access to Defense technical information. Through the registration system, DoD organizations and DoD contractors and potential contractors can access the DTIC databases to ascertain ongoing and

completed R&D relevant to their work and interests. This facilitates and increases awareness of technology that is relevant to both Defense and commercial applications. Of the 3,921 organizational registrations active in FY97, 1,885 were associated with private sector organizations. In addition, during the period that the DoD SBIR solicitations are active, DTIC registered an additional 935 small businesses to assist them in participating in this major Defense acquisition program.

DoD Technical Reports

DTIC is the central DoD repository for the collection and secondary dissemination of DoD technical reports. The reports are abstracted, indexed and cataloged, as part of DTIC's on-line searchable database. During FY96 the Defense industry conducted over 52,406 searches of DTIC databases and they received 223,657 output products from DTIC.

In addition, DoD pursues a policy of public release of Defense scientific and technical information whenever possible. This information is centrally collected, announced, and released for public purchase through the National Technical Information Service (NTIS) as part of their statutory mandate to supply Federal R&D information to the general public from the Federal Agencies. In FY97, 15,875 technical reports were provided by DTIC to NTIS for public release and purchase. DoD provides over 30 percent of the annual submissions to NTIS that document the results of both in-house and Government contract sponsored efforts. These documented, completed results of Defense R&D contribute to technology transfer by helping private sector organizations identify DoD work in their fields of interest.

Work Unit Information System (WUIS)

The DTIC operated WUIS database contains brief descriptions of ongoing Defense R&D efforts as well as the identity of the sponsoring and performing organizations, project duration, and level of resources invested in the effort. This information can provide the basis for identifying opportunities for collaboration between DoD organizations as well as between DoD organizations and the private sector for the purpose of technology transfer.

DoD Information Analysis Centers (DoD IACs)

The DoD IAC Program provides access via the World Wide Web (WWW) to 13 DTIC sponsored centers and one Army sponsored center for the analysis of scientific and technical information. Each IAC Home Page continues to experience a steadily increasing volume of inquiry traffic from the public sector. WWW access provides significant opportunity for technology transfer of publicly accessible defense technical information plus a channel for two-way electronic communication with technology experts.

F. Independent Research And Development (IR&D)

In FY 97, the DoD continued to make progress in improving the management of IR&D and improving technical communications with industry. Communications with industry was done in conformity with Section 2372(c)(3) of Title 10 USC. This Section allows for the reasonable and timely communications of (1) DoD's planned or expected future needs to contractors, and (2) contractor's progress on IR&D programs to the DoD.

Policy and Management

The Military Departments have always had vigorous IR&D programs. To provide coordinated leadership for IR&D activities, in 1996, DoD established a senior executive Technical Coordination Group (TCG) consisting of representatives from OSD and the Military Departments. In 1997 the TCG has continued to provide the leadership required to maintain an effective IR&D program. For example, defense technology planning and requirements information is used by industry for IR&D planning to support defense needs. The leadership provided by the senior management team continues to enhances DoD's responsiveness in meeting industry's need for such timely information. The TCG meets periodically (sometimes including industry representatives) to find ways to foster improvements in communications both within DoD and between DoD and industry.

DoD IR&D policy is promulgated in DoD Instruction 3204.1, "Independent Research and Development (IR&D) and Bid and Proposal (B&P) Program." In 1997, DoD staffed a proposed revision to the DoDI to bring its policy guidance in line with current law and program administration. Once approved, the new document will update DoD policy and practices regarding management of IR&D, providing guidance to the Military Departments. In addition, the DoDI will also formally charter the TCG. Target date for promulgation is the spring of 1998.

During 1997, OSD completed an evaluation of the IR&D program. The evaluation was conducted to see what impact changes in regulations and policy have had on the IR&D program. Results from this evaluation are being used to further improve both oversight of the program and to improve communications with industry. For example industry IR&D projects are reported to the Defense Technical Information Center (DTIC) using technical codes that identify the pertinent areas of research. Currently an effort is underway to cross link these codes with DoD's technology areas to be able to have a better understanding of how industry research supports DoD priorities. In addition, a disturbing trend away from long term research by industry was identified. A follow-up study is underway to both verify this initial observation and to identify opportunities to reverse this trend if necessary. These actions, to be completed in 1998, will result in improvements in the administration of DoD's IR&D program.

Technical Communications from Industry

Until FY 93, IR&D project descriptions from contractors were available only in hard copy with summary descriptions in an on-line database maintained on a mainframe computer at the DTIC. In FY 93, DTIC began to distribute a streamlined electronic version of the IR&D project descriptions on CD-ROM media for the Microsoft Windows platform. Each year, the process has been further streamlined and contractors now prepare the project descriptions on personal computers. As a result, costs to contractors have been significantly reduced as the project descriptions are easier to prepare and are no longer needed in hard copy.

In 1997, the CD-ROM contained more than 4,000 technical project summaries representing incurred costs of approximately $2.4 Billion. Company submissions to the DTIC data base are voluntary. Efforts to increase the number of companies that submit data continued in Fiscal Year 1997. Nine letter were sent out to the larger companies that were not submitting data and of those companies five have now agreed to submit the results of their IR&D to DTIC. Approximately 250 copies of the proprietary CD-ROM are distributed each year within DoD to Defense laboratories, systems commands and program offices. To foster communications between DoD and industry engineers, DTIC provides the distribution list to industry. Enhancements to the CD-ROM in 1997 continue to make the IR&D data easier for DoD specialists to access and use. DTIC has begun to investigate to use of the World Wide Web to distribute the industry data. Industry concerns over the security of priority data is the primary hurdle that has to be overcome. Once these concerns can be alleviated use of the Web will greatly enhance the distribution of industry data to interested DoD components.

Defense Planning Documentation for Industry

The Department makes many technology planning documents available to Defense contractors. The information is valuable to contractors both for business decisions and for planning contractor IR&D programs. The Air Force and DTIC, in a joint venture, developed electronic home page libraries for access to documents through the world wide web. The home pages contain unclassified documents which can be searched, viewed and downloaded. Key OSD and Air Force technology planning documents and Air Force requirements information are available through the home pages. The use of electronic home pages continue to expand to include unclassified but controlled information to be encrypted and password protected, available to Government activities and DoD contractors only. Registered users, both DoD staff and contractors, are accessing the controlled files at a rate of more than 14,000 times per month. DTIC is maintaining an umbrella home page which provides a means to access OSD and Service home pages, giving central access for easy use.

The Navy continues to expand its electronic home page to include unclassified documents currently available at the Navy Acquisition Research Information Center (NARDIC). Navy is incorporating state-of-the-art encryption technology for its home page which became operational in FY 1997.

Matching Defense Requirements to IR&D Technologies

Technologies developed through industry's IR&D efforts represent a part of the future health of U.S. industry. In addition, emerging IR&D technologies may satisfy current and near term defense requirements. To that end, various DoD organizations continuously foster personal communications in an effort to match their requirements to industry's IR&D efforts.

As an example, the Air Force documents infrastructure requirements that need to be solved, and personnel at the Air Force Material Command actively search the IR&D CD-ROM database to match industry research efforts against those infrastructure requirements. Each manager for each industry research effort identified by the search is contacted and notified of the Air Force requirement their research effort potentially supports. The identities of the Air Force need submitter and an Air Force technical point of contact are provided to the manager. The Air Force need submitter and Air Force technical point of contact are similarly informed of the industry research effort that might solve their requirement.

In 1996, the Air Force reviewed 103 requirements and found potential matches for 99 of those requirements. Costs incurred by industry for the matching research totaled $523 million. This effort has been very well received in both industry and government and is being continued in 1997.

The Army's strategy for matching its requirements to emerging IR&D technologies includes extensive use of executive conferences and technical interchange meetings with industry. In addition, the Army widely distributes the CD-ROM database to its scientists and engineers, and Army Research Laboratory managers who support acquisition systematically compare their technology needs to the CD-ROM.

The Navy seeks to leverage IR&D investments by a process in which acquisition program managers are directly involved in searches of the IR&D CD-ROM to match industry research efforts against their S&T requirements. The Navy believes these program managers are in the best position to determine relevance of the reported IR&D to their needs.

[extracted from GPO US Code on CD ROM]
10 USC Sec. 2515

TITLE 10
Subtitle A
PART IV
CHAPTER 148
SUBCHAPTER III
Sec. 2515. Office of Technology Transition
STATUTE-
(a) Establishment. - The Secretary of Defense shall establish within the Office of the Secretary of Defense an Office of Technology Transition.
(b) Purpose. - The purpose of the office shall be to ensure, to the maximum extent practicable, that technology developed for national security purposes is integrated into the private sector of the United States in order to enhance national technology andindustrial base, reinvestment and conversion activities consistent with the objectives set forth in section 2501(a) of this title.

(c) Duties. - The head of the office shall ensure that the office-

(1) monitors all research and development activities that are carried out by or for the military departments and Defense Agencies;

(2) identifies all such research and development activities that use technologies, or result in technological advancements, having potential nondefense commercial applications;

(3) serves as a clearinghouse for, coordinates, and otherwise actively facilitates the transition of such technologies and technological advancements from the Department of Defenseto the private sector;

(4) conducts its activities in consultation and coordination with the Department of Energy and the Department of Commerce; and

(5) provides private firms with assistance to resolve problems associated with security clearances, proprietary rights, and other legal considerations involved in such a transition of technology

(d) Reporting Requirement. - The Secretary of Defense shall submit to the Committees on Armed Services and on Appropriations of the Senate and the House of Representatives an annual report on the activities of the Office at the same time that the budget is submitted to Congress by the President pursuant to section 1105 of title 31. The report shall contain a discussion of the accomplishments of the Office during the fiscal year preceding the fiscal year in which the report is submitted.

(Added Pub. L. 102-484, div. D, title XLII, Sec. 4225(a), Oct. 23, 1992, 106 Stat. 2683.)

PRIOR PROVISIONS

A prior section 2515, added Pub. L. 101-510, div. A, title VIII, Sec.

823(a)(3), Nov. 5, 1990, 104 Stat. 1602, which related to computer-integrated manufacturing technology, was repealed by Pub. L. 102-484, div. D, title XLII, Sec. 4202(a), Oct. 23, 1992, 106 Stat. 2659.

SCHEDULE FOR ESTABLISHMENT OF OFFICE OF TECHNOLOGY TRANSITION

Section 4225(b) of Pub. L. 102-484 provided that: 'The Office of Technology Transition shall commence operations within 120 days after the date of the enactment of this Act (Oct. 23, 1992).'

SUBMISSION OF ANNUAL REPORT

Section 4225(c)(2) of Pub. L. 102-484 provided that:

'Notwithstanding section 2515(d) of title 10, United States Code (as added by subsection (a)) -

'(A) the first report under that section shall be submitted not later than one year after the date of the enactment of this Act (Oct. 23, 1992); and

'(B) no additional report is necessary under that section in the fiscal year in which such first report is submitted.'

Number of Reported Active Technology Transfer Mechanisms by Laboratory/Center
FY 1995 through FY 1997

Laboratory/Center	FY95	FY96	FY97
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY	2	2	19
ABERDEEN TEST CENTER			3
AERONAUTICAL SYSTEMS CENTER, WRIGHT-PATTERSON AFB			6
AIR FORCE DEVELOPMENT TEST CENTER	1	2	8
AIR FORCE FLIGHT TEST CENTER	5	6	8
AIR FORCE MEDICAL CENTER, WRIGHT-PATTERSON AFB			2
AIR FORCE MATERIEL COMMAND	17	24	87
ARMSTRONG LAB	1	1	49
ARMY AEROMEDICAL RESEARCH LAB	9	17	17
ARMY ARMAMENT RESEARCH DEVELOPMENT AND ENGINEERING CENTER	10	20	27
ARMY AVIATION RESEARCH AND TECHNOLOGY ACTIVITY	31	38	7
ARMY AVIATION RESEARCH DEVELOPMENT AND ENGINEERING CENT	2	2	2
ARMY CECOM INTELLIGENCE AND ELECTRONIC WARFARE DIRECTOR	6	7	10
ARMY CECOM RESEARCH DEVELOPMENT AND ENGINEERING CENTER	22	29	30
ARMY COMMUNICATIONS-ELECTRONICS COMMAND	4	6	12
ARMY ELECTRONIC PROVING GROUND	1	1	1
ARMY ENGINEER WATERWAYS EXPERIMENT STATION	22	27	43
ARMY INSTITUTE FOR SURGICAL RESEARCH	1	1	
ARMY MEDICAL RESEARCH AND MATERIEL COMMAND (PROVISIONAL)	8	6	5
ARMY MEDICAL RESEARCH INSTITUTE OF CHEMICAL DEFENSE	1	2	1
ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES	57	66	66
ARMY MISSILE RESEARCH DEVELOPMENT AND ENGINEERING CENTER	6	10	11
ARMY NATICK RESEARCH DEVELOPMENT AND ENGINEERING CENTER	18	20	31
ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES	1	5	5
ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE	8	11	11
ARMY RESEARCH LAB	109	117	151

Laboratory/Center	FY95	FY96	FY97
ARMY RESEARCH OFFICE, RESEARCH TRIANGLE PARK			1
ARMY SPACE AND STRATEGIC DEFENSE COMMAND	3	4	2
ARMY TEST AND EVALUATION COMMAND, ABERDEEN PROVING GROUND			1
ARMY TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT ACTIVITY	1		
ARMY TOPOGRAPHIC ENGINEERING CENTER	3	2	2
ARNOLD ENGINEERING DEVELOPMENT CENTER	0	1	2
CENTER FOR HEALTHCARE EDUCATION AND STUDIES	2	1	1
CLINICAL INVESTIGATION REGULATORY OFFICE	30	38	34
COASTAL SYSTEMS STATION	2	2	
COLD REGIONS RESEARCH AND ENGINEERING LAB	28	28	25
CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY)	33	34	39
DEFENSE LANGUAGE INST	4	5	4
EDGEWOOD RESEARCH DEVELOPMENT AND ENGINEERING CENTER	2	5	11
ELECTRONIC SYSTEMS CENTER	15	12	8
JOINT TRAINING ANALYSIS & SIMULATION CENTER, SUFFOLK			1
NAVAL AIR WARFARE CENTER AIRCRAFT DIV	10	10	14
NAVAL AIR WARFARE CENTER TRAINING SYSTEMS DIVISION, ORLANDO			2
NAVAL AIR WARFARE CENTER, WEAPONS DIVISION, CHINA LAKE	13	12	34
NAVAL AIR WARFARE CENTER, WEAPONS DIVISION, PT MUGU			6
NAVAL COMMAND CONTROL AND OCEAN SURVEILLANCE CENTER	2	2	18
NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND	33	32	39
NAVAL METEROLOGY & OCEANOGRAPHY COMMAND, STENNIS SPACE CTR			2
NAVAL POSTGRADUATE SCHOOL	8	7	6
NAVAL RESEARCH LAB	44	36	64
NAVAL SURFACE WARFARE CENTER, CARDEROCK			14
NAVAL SURFACE WARFARE CENTER, CRANE, IN			8
NAVAL SURFACE WARFARE CENTER DAHLGREN DIV	9	10	14
NAVAL SURFACE WARFARE CENTER INDIAN HEAD DIVISION	8	8	9
NAVAL UNDERSEA WARFARE CENTER KEYPORT DIVISION	2	3	4

Laboratory/Center	FY95	FY96	FY97
NAVAL UNDERSEA WARFARE CENTER, NEW LONDON			21
NAVAL UNDERSEA WARFARE CENTER NEWPORT DIV	17	17	
NAVY CLOTHING & TEXTILE RESEARCH FACILITY, NATICK			2
OFFICE OF NAVAL RESEARCH, ARLINGTON			39
OGDEN AIR LOGISTICS CENTER	2	4	24
OKLAHOMA CITY AIR LOGISTICS CENTER	0	1	1
PHILLIPS LAB	9	9	52
ROME LAB	1	1	11
SAN ANTONIO AIR LOGISTICS CENTER, KELLY AFB			3
TACOM RESEARCH DEVELOPMENT AND ENGINEERING CENTER	31	33	28
TRADOC ANALYSIS CENTER	1	1	1
UNIFORMED SERVICES UNIV OF THE HEALTH SCIENCES	1	1	2
WALTER REED ARMY INST OF RESEARCH	83	84	89
WARNER ROBINS AIR LOGISTICS CENTER	4	4	8
WATERVLIET ARSENAL	11	15	8
WRIGHT LAB	6	10	73
YUMA PROVING GROUND	1	3	3