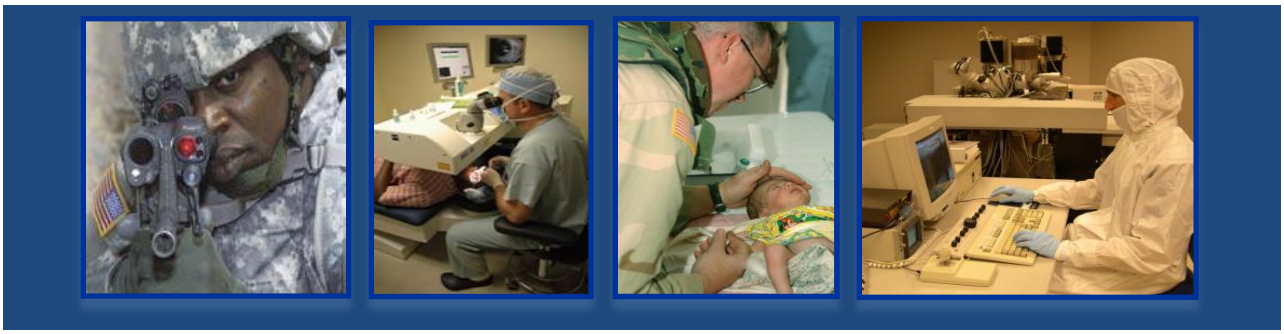
Value Proposition of Department of Defense Domestic Technology Transfer



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Under Sub-Award Agreement No. G151-09-W-1436 from Montana State University

15 January 2010

TABLE OF CONTENTS

Introduction 1
Background 2
Methodology 2
Results 3
Conclusion 4

TABLES

TABLE I. LIST OF T2 VALUE CANDIDATES 5
TABLE II. T2 PARTNERSHIPS THAT PROVIDE ACCESS TO FEDERAL RESEARCH TO CREATE NEW MILITARY/COMMERCIAL PRODUCTS 9
TABLE III. T2 PARTNERSHIPS THAT PROVIDE CREATIVE PRIVATE SECTOR SOLUTIONS TO FEDERAL TECHNOLOGY NEEDS 10
TABLE IV. T2 PARTNERSHIPS THAT PROVIDE INCENTIVES TO FEDERAL INVENTORS AND LABORATORIES TO WORK WITH PRIVATE SECTOR ORGANIZATIONS TO COMMERCIALIZE TECHNOLOGY 11
TABLE V. T2 PARTNERSHIPS THAT FACILITATE USAGE OF DOD EQUIPMENT AND FACILITIES 12

APPENDICES

APPENDIX A - Examples of T2 Partnerships that Provide Access to Federal Research to create new Military and Commercial Products A-1
APPENDIX B - Examples of T2 Partnerships that Provide Creative Private Sector Solutions to Federal Technology Needs B-1
APPENDIX C - Examples of T2 Partnerships that Provide Incentives to Federal Inventors and Laboratories to Work with Private Sector Organizations to Commercialize Technology C-1
APPENDIX D - Examples of T2 Partnerships that Facilitate Usage of DoD Equipment and Facilities D-1

Value Proposition of DoD Domestic Technology Transfer

Introduction

Since 1980, Congress has enacted a series of 15 laws that promote and facilitate the transfer of technology among the Federal government, private industry and higher education institutions. The primary purpose of this legislation is to "…improve the economic, environmental, and social well-being of the United States by ensuring the full use of the Nation's Federal investment in research and development." The specific goals that Congress had in mind were to:

- Buttress U.S. competitiveness in world markets
- Stimulate small businesses by incentivizing their involvement with Federal laboratories
- Provide the tools and legal instruments necessary to stimulate such activity while protecting intellectual property rights
- Permit access to available government facilities engaged in such activities

While the basic emphasis of technology transfer (T2) has tended to focus on what flows out from the Federal sector into academia and industry, recent activity has created the intriguing possibility of a "two-way street," resulting in expanded opportunities to all. Advances beneficial to the Department of Defense (DoD) and the needs of the warfighter have shown that research and development (R&D) originating in the private sector can be successfully transferred into the Federal government (known as "technology transition" in DoD parlance).

Through the years, there has been anecdotal and other piecemeal information about how T2 brings value to the DoD and the warfighter; however, to date there has been no study that collected all such information in one place. In September 2008, the Office of Technology Transition tasked L-3 Communications and SAIC to conduct a study of how T2 benefits the DoD and its private-sector partners. Benefits to be identified and quantified where possible included:

- Did the technology transition to a DoD platform or product line? Is it being used by the warfighter?
- Has the technology enhanced capability; reduced labor hours, acquisition or maintenance costs; improved reliability, availability, and maintainability, etc.?
- Has a new product been developed?
- How did participation in the DoD's T2 program help the private sector partner?
- Is the CRADA partner or licensee continuing to work with the DoD?
- To what extent did the CRADA/PLA help the companies to become/remain economically viable?
- What is the financial return on investment, if any? Did the CRADA or PLA generate income for the DoD laboratory and how is this income being used?

This report, and the effort behind it, demonstrates that Federal T2 legislation not only allows private industry and academia to benefit from Federal R&D but also acts as a valuable tool for the DoD in solving mission-related problems and creating a significant revenue pool for the Government in an era of tightening budgets.

Background

Domestic T2 legislation was initiated in 1980 with passage of the Stevenson-Wydler Innovation Act. This Act made it easier for Federal laboratories to transfer technology to nonfederal parties and provided outside organizations with a means to access Federal laboratory developments. The legislation requires each Federal laboratory with at least 200 full-time-equivalent scientific, engineering, and related technical positions to establish and fund an Office of Research and Technology Applications (ORTA) to perform T2 functions. It also provides legislative authority for each laboratory director to enter into cooperative research and development agreements (CRADAs) and negotiate patent licensing agreements (PLAs) for inventions made at the Federal laboratory.

As our study found, the commercialization of technology originating in some 250 Federal laboratories nationwide has produced substantial economic development benefits for both companies and communities. This stems mostly from developing new products for the marketplace and creating new jobs to manufacture, distribute and maintain these products. For the Government, CRADA fees and PLA revenue has amounted to millions per year in additional operating funds and increased use of underutilized laboratory equipment and expertise. In turn, the transition and application of private R&D has been of invaluable benefit to Federal agencies, saving both time and money in developing, testing and fielding needed solutions for the warfighter.

This study demonstrates the key to achieving the benefits from this two-way transfer of technology is careful, deliberate partnering between the Federal laboratory and the private sector.

Methodology

The L-3/SAIC study team used the following methodology to collect and analyze data from ORTAs, PIAs and private sector firms:

- Requested DoD partnership intermediaries including TechLink, FirstLink, and Springboard to provide a list of all PLAs and CRADAs that have been successfully facilitated between 1999 and 2005.
- Asked each of the Services (Army, Navy, Air Force, and DoD Agencies) to nominate up to five additional PLAs or CRADAs
- Reviewed and ranked all PLAs and CRADAs in accordance with their potential for success using such criteria as dollar amount of royalty or CRADA income, clear indication that the technology is being used on a DoD program or platform, cost savings, etc. and review rankings with the DoD Office of Technology Transition. Table I lists 51 potential examples of T2 value organized by Agency/Service.
- Developed a format for success stories and developed success stories in accordance with the rankings described above.
- Prepared initial draft success story based on information provided by TechLink/lab
- Interviewed the CRADA/PLA partner

- Interviewed the ORTA/principal investigator. Questions to be covered during the interviews (if not already in the file) include:
  - What is the nature of the business (SIC) or other designation?
  - Where is the company located?
  - How many jobs were created as a result of the PLA or CRADA?
  - What funds (if any) were paid to the DoD?
  - What non-monetary benefits (if any) were provided to the DoD?
  - Did the partner make a product or provide a service involving the technology?
  - Is the partner continuing to sell this product now? Is he selling to the DoD?
  - What is the product or service?
  - How did the business identify the DoD market?
  - Does the company need help reaching a DoD market?

Results

As shown in Table I, we identified 51 T2 value candidates for further study. After further discussions with the ORTA, PIA, or company point of contact, 24 value candidates were put on hold and four were cancelled. In most cases, value candidates were placed in the "on-hold" status for one of two reasons:

- The technology needed more time to mature and there were no reportable results at this time
- The company point of contact was unwilling at this time to provide any information

Value candidates were placed in the "cancelled" category because it was clear that no military or commercial benefit could be expected from the CRADA or PLA for one of the following reasons:

- Lack of interest by the commercial partner
- License not renewed and no other potential licensees
- Technology did not prove to be commercially viable
- There was no clear indication that T2 was a factor

Attached to this report are descriptions of 23 T2 partnerships, in the form of quad charts, which demonstrate the successful harvest of technology development at DoD laboratories and private companies nationwide. These 23 projects are representative of the kind of return DoD's investment in T2 yields: increased number of jobs, company revenues, and expanded marketplace of DoD suppliers, an overall elevation in commercial enterprise, and strengthening of our manufacturing base.
Evidence of all of these observations is documented in the responses to a comprehensive data call sent to ORTAs, partnership intermediaries (PIAs), and others with first-hand knowledge of the process and its products. Other positive, non-revenue benefits of the Government's T2 effort are:

- Partnerships with defense companies and DoD labs which speed development and the resulting fielding to the warfighter (see Table II)
- DoD labs using private sector solutions to meet identified Federal needs (see Table III)
- The use of technology transfer principles to create incentives for DoD labs to work with private organizations to develop commercial products (see Table IV)
- The use of technology transfer tools to facilitate usage of DoD equipment and facilities and generate revenue for DoD laboratories (Table V).

Conclusion

The materials gathered and described in this report make clear the benefits of DoD's T2 Program to Federal, private and academic partners. Given the budget constraints on the Federal side of the equation and the job-creating prospect for the private sector, it seems obvious that the use of this program should expand dramatically in the coming years. Specifically, our findings demonstrate that:

- Millions of private sector dollars can be leveraged to develop and field products used by the warfighter
- T2 can reduce the cost of DoD research laboratory operation and supplement DoD research funds
- The T2 Program can save years in the development and fielding of systems for the warfighter

The 24 T2 value technologies that were identified as "on-hold" due to lack of maturity make clear that this is an ongoing process with more benefits to all partners to be expected. It is also clear that the benefits to all parties will continue and, with experience and the broadcast of lessons learned, the delivery of those benefits will become even more efficient. However, without leadership emphasis, it is easy for all concerned to miss these kinds of opportunities and lose the successes that have been illustrated in this report.

The raw materials needed to accomplish these successes exist within the DoD system and are renewed every day. The contractual tools used exist and, with rare exception, need no change. The benefits to DoD in both time and dollars saved in moving from inventions to warfighter tools is clear and especially needed as budgets are pressured. The opportunity for laboratories to share remarkably expensive and specialized equipment to reduce costs is likewise needed now and in the foreseeable future. Last, the potential for high technology job creation is clear.

Best of all, the cost of expanding this "program" is tiny. All it takes is education. Laboratory leadership, from branch chiefs to laboratory directors, need to know that the tools and the personnel needed to make these stories repeat throughout the DoD exist and only leadership is needed to repeat each of these successes.

TABLE I. LIST OF T2 VALUE CANDIDATES

Technology	Government Partner	Industry Partner(s)	Mechanism	Status
ARDEC CRADA Process	Army Armament Research, Development, and Engineering Center	Various	CRADA	Complete
Armed Forces Health Longitudinal Technology Application-Mobile or AHLTA-Mobile	Army Telemedicine and Advanced Technologies Research Center	Vista Partners LLC, Denver, CO	PLA	Complete
Array Biosensor	Navy Research Laboratory	Hanson Technologies Inc., Carlisle, PA	PLA	On-Hold
Automated Resource Management System	Army Engineer Research and Development Center, Construction Engineering Research Laboratory	Compass Systems, Inc., Lexington Park, MD	CRADA/PLA	On-Hold
Blue Rose Fiber Optic Perimeter Security and Detection System	Naval Undersea Warfare Center, Newport	TerraEchos, Inc., Missoula, MT	CRADA/PLA	On-Hold
Buttstock Assembly with Removable and Sealable Storage Tubes	Naval Surface Warfare Center, Crane	Lewis Machine & Tool Company, Milan, IL	PLA	Complete
Cascade Laser Technology	Army Research Laboratory	Maxion Technologies, Inc., College Park, MD	CRADA/PLA	On-Hold
Combined Agent Fire Fighting System	Fire Research Group, Tyndall Air Force Base	United First Responders LLC, Lemont Furnace, PA	CRADA	On-Hold
Computer Robotics Platform Upgrade	Space and Naval Warfare Systems Center, Pacific	Aplus Mobile, Inc., Oregon City, OR	CRADA	On-Hold
Demonstration of Low-Cost Expendable Bottom Crawling Vehicles	Naval Undersea Warfare Center, Newport	Foster Miller, Waltham, MA	CRADA	Cancelled
Electro-Osmotic Pulse Technology	Army Engineer Research and Development Center, Construction Engineering Research Laboratory	Structural Group, Inc., Tequesta, FL	CRADA/PLA	On-Hold
Enhanced Quality of Vision	Naval Medical Research Center, San Diego	Carl Zeiss Meditec, Dublin, CA	CRADA	Complete

TABLE I. LIST OF T2 VALUE CANDIDATES

Technology	Government Partner	Industry Partner(s)	Mechanism	Status
Expeditionary Fire Support System	Naval Surface Warfare Center, Indian Head	General Dynamics Ordnance and Tactical Systems, St. Petersburg, FL	CRADA	Complete
Explosive Payload Testing	Naval Surface Warfare Center, Indian Head	Battelle Memorial Institute, Columbus, OH	CRADA	Complete
F/A 22 Raptor Power Supply Module	Defense Microelectronics Activity	Boeing	CRADA	Complete
Field Emission Cold Cathode Technology	Air Force Research Laboratory-Directed Energy	Fiore Industries, Albuquerque, NM	PLA	On-Hold
Field-Expedient Bleeding Simulation System	Army Medical Research and Materiel Command	Skedko, Inc., Tualatin, OR	CRADA/PLA	Complete
Fluorescence Polarization Device	Naval Institute for Dental and Biomedical Research	Cape Cod Biosystems, Inc., East Falmouth, MA	CRADA	On-Hold
Hand-Held Microbial Vacuum	Army Natick Soldier Research, Development, and Engineering Center	Rocky Mountain Resource Laboratories, Jerome, ID	PLA	Cancelled
Immunotherapy – Treating Autoimmune Diseases	Naval Medical Research Center	Bristol-Myers Squibb, New York, NY	CRADA/PLA	Complete
Improved Hearing Protection	Air Force Research Laboratory-Human Effectiveness	Westone Laboratories, Inc., Colorado Springs, CO	CRADA/PLA	Complete
Improved Network-Centric Information Services	U.S. Transportation Command	Lockheed-Martin	CRADA	On-Hold
Improved Ultrasound Image Resolution	Space and Naval Warfare Systems Center, Pacific	SSC Development, New York, NY	PLA	Cancelled
Innovative Methods for Food Pathogen Sampling, Identification, and Quantification	Naval Medical Research Center	Rocky Mountain Resource Laboratories, Jerome, ID	CRADA	On-Hold
Manikin Integration Research Laboratory	Air Force Research Laboratory-Human Effectiveness	General Dynamics	CRADA	Complete
MEMS and Nanotechnology Exchange	Army Research Laboratory	Various	CRADA	Complete
Modular Mission Payload Control Software	Naval Surface Warfare Center, Crane	Next Wave Systems LLC, Pekin, IN	CRADA/PLA	On-Hold

TABLE I. LIST OF T2 VALUE CANDIDATES

Technology	Government Partner	Industry Partner(s)	Mechanism	Status
Monoblock Laser Technology	Army Night Vision Laboratory	Scientific Materials (now owned by FLIR Systems), Bozeman, MT	PLA	Complete
Omni-Directional Inspection System	Army Tank and Automotive Research, Development, and Engineering Center	Kuchera Defense Systems, Windbern, PA	CRADA	On-Hold
Paraelectric Materials	Army Research Laboratory	Paratek Microwave, Nashua, NH	PLA	On-Hold
Portable Hand Pump for Evacuation of Hemothorax	Uniformed Services University of the Health Sciences	Bard Access Systems, Lake City, UT	PLA	Complete
Power Management Integrated Circuits	Defense Microelectronics Activity	Packet Digital Corporation, Fargo, ND	CRADA	On-Hold
Preventing Severe Infections in Infants and Children	Uniformed Services University of the Health Sciences	Medimmune, Inc., Gaithersburg, MD	CRADA/PLA	Complete
ProjNet(TM) Web-Based Management Software	Army Engineer Research and Development Center, Construction Engineering Research Laboratory	National Institute of Building Sciences, Washington, DC	PLA	Complete
Qwiklite	Space and Naval Warfare Systems Center, Pacific	Assure Bioassay Controls, Inc., Carlsbad, CA	PLA	On-Hold
Radiation Countermeasure	Uniformed Services University of the Health Sciences	Humanetics Corporation, Eden Prairie, MN	CRADA	On-Hold
Radio Frequency Diathermy	Naval Medical Research Center	ReGear Life Sciences, Inc., Pittsburgh, PA	CRADA/PLA	Complete
Replacement Chassis Stock System for Firearms	Naval Surface Warfare Center, Crane	Sage International, Ltd., Oscoda, MI	PLA	Complete
Retractable Grappling Hook	Army Natick Soldier Research, Development, and Engineering Center	Capewell Components Company LLC, South Windsor, CT	PLA	Cancelled
Robots for First Responders	Space and Naval Warfare Systems Center, Pacific	Various	CRADA	On-Hold
Safety Welding Cart	Air Force Training Device Design and Engineering Center	Spika Welding & Manufacturing, Inc., Lewistown, MT	PLA	Complete

TABLE I. LIST OF T2 VALUE CANDIDATES

Technology	Government Partner	Industry Partner(s)	Mechanism	Status
Shelf-Stable Sandwich Technology (a component of First Strike Rations)	Army Natick Soldier Research, Development, and Engineering Center	Bridgford Foods Corporation, Anaheim, CA	CRADA	Complete
Special Medical Emergency Evacuation Device	Army Institute of Surgical Research	Impact Instrumentation, Inc., West Caldwell, NJ	PLA	Complete
Stream Bank Stabilization Techniques	Army Waterways Experiment Station	Trout Headwaters, Inc., Corvallis, MT	CRADA	On-Hold
Suite of Patents on MEMS Displacement Sensors	Space and Naval Warfare Systems Center, Pacific	Omega Sensors, Inc., San Diego, CA	PLA	On-Hold
Tailboom Strake Technology	Army Aeroflight Dynamics Directorate	NASA Langley Research Center and Boundary Layer Research, Inc., Everett, WA	CRADA/PLA	Complete
Trivalent Chromium Pretreatment	Naval Air Warfare Center Aircraft Division	Luster-On Products, Inc.; Henkel Surface Technologies Corp.; Metalast International, Inc.; SurTec International	PLA	Complete
Vehicle Barrier and Sign Kit	Air Force Research Laboratory	United Safety Response	CRADA	On-Hold
Vein Viewer	Air Force Research Laboratory-Human Effectiveness	InfrarRed Imaging Systems, Inc., Columbus, OH	PLA	On-Hold
Versatile Robotic Vehicle	Space and Naval Warfare Systems Center, Pacific	Mesa Robotics, Inc., Madison, AL	CRADA	On-Hold
Wire Chafing	Air Force Research Laboratory-Information Directorate	Killdeer Mountain Engineering, Kildeer, ND	PLA	On-Hold

TABLE II. T2 PARTNERSHIPS THAT PROVIDE ACCESS TO FEDERAL RESEARCH TO CREATE NEW MILITARY/COMMERCIAL PRODUCTS

Technology	Government Partner	Industry Partner(s)	Mechanism
Armed Forces Health Longitudinal Technology Application-Mobile or AHLTA-Mobile	Army Telemedicine and Advanced Technologies Research Center	Vista Partners LLC, Denver, CO	PLA
Buttstock Assembly with Removable and Sealable Storage Tubes	Naval Surface Warfare Center, Crane	Lewis Machine & Tool Company, Milan, IL	PLA
Improved Hearing Protection	Air Force Research Laboratory-Human Effectiveness	Westone Laboratories, Inc., Colorado Springs, CO	CRADA/PLA
Monoblock Laser Technology	Army Night Vision Laboratory	Scientific Materials (now owned by FLIR Systems), Bozeman, MT	PLA
Replacement Chassis Stock System for Firearms	Naval Surface Warfare Center, Crane	Sage International, Ltd., Oscoda, MI	PLA
Safety Welding Cart	Air Force Training Device Design and Engineering Center	Spika Welding & Manufacturing, Inc., Lewistown, MT	PLA
Shelf-Stable Sandwich Technology (a component of First Strike Rations)	Army Natick Soldier Research, Development, and Engineering Center	Bridgford Foods Corporation, Anaheim, CA	CRADA
Special Medical Emergency Evacuation Device	Army Institute of Surgical Research	Impact Instrumentation, Inc., West Caldwell, NJ	PLA
Tailboom Strake Technology	Army Aeroflight Dynamics Directorate	NASA Langley Research Center and Boundary Layer Research, Inc., Everett, WA	CRADA/PLA
Trivalent Chromium Processes	Naval Air Warfare Center Aircraft Division	Luster-On Products, Inc.; Henkel Surface Technologies Corp.; Metalast International, Inc.; SurTec International	PLA

TABLE III. T2 PARTNERSHIPS THAT PROVIDE CREATIVE PRIVATE SECTOR SOLUTIONS TO FEDERAL TECHNOLOGY NEEDS

Technology	Government Partner	Industry Partner(s)	Mechanism
Enhanced Quality of Vision	Naval Medical Research Center San Diego	Carl Zeiss Meditec, Inc., Dublin, CA	CRADA
Field-Expedient Bleeding Simulation System	Army Medical Research and Materiel Command	Skedco, Inc., Tualatin, OR	CRADA/PLA
ProjNet(TM) Web-Based Management Software	Army Engineer Research and Development Center, Construction Engineering Research Laboratory	National Institute of Building Sciences, Washington, DC	CRADA/PLA

TABLE IV. T2 PARTNERSHIPS THAT PROVIDE INCENTIVES TO FEDERAL INVENTORS AND LABORATORIES TO WORK WITH PRIVATE SECTOR ORGANIZATIONS TO COMMERCIALIZE TECHNOLOGY

Technology	Government Partner	Industry Partner(s)	Mechanism
Immunotherapy -- Treating Autoimmune Diseases	Naval Medical Research Center	Bristol-Myers Squibb, New York, NY	CRADA/PLA
Portable Hand Pump for Evacuation of Hemothorax	Uniformed Services University of the Health Sciences	Bard Access Systems, Lake City, UT	PLA
Preventing Severe Infections in Infants and Children	Uniformed Services University of the Health Sciences	Medimmune, Inc., Gaithersburg, MD	PLA
Radio Frequency Diathermy	Naval Medical Research Center	ReGear Life Sciences, Inc., Pittsburgh, PA	CRADA/PLA

TABLE V. T2 PARTNERSHIPS THAT FACILITATE USAGE OF DOD EQUIPMENT AND FACILITIES

Technology	Government Partner	Industry Partner(s)	Mechanism
ARDEC CRADA Process	Army Armament Research, Development, and Engineering Center	Various	CRADA
Expeditionary Fire Support System	Naval Surface Warfare Center, Indian Head	General Dynamics Ordnance and Tactical Systems, St. Petersburg, FL	CRADA
Explosive Payload Testing	Naval Surface Warfare Center, Indian Head	Battelle Memorial Institute, Columbus, OH	CRADA
F/A 22 Raptor Power Supply Module	Defense Microelectronics Activity	Boeing	CRADA
Manikin Integration Research Laboratory	Air Force Research Laboratory-Human Effectiveness	General Dynamics	CRADA
MEMS & Nanotechnology Exchange	Army Research Laboratory	Various	CRADA

APPENDIX A

Examples of T2 Partnerships that Provide Access to Federal Research to Create New Military and Commercial Products

Armed Forces Health Longitudinal Technology Application–Mobile

U.S. Army Telemedicine and Advanced Technologies Research Center (TATRC)

Background

- ✓ Mobile medical software information suite (AHLTA-Mobile, formerly known as BMIST)
- ✓ Currently licensed by Vista Partners LLC; other licensees in past years
- ✓ Provides clinical information for medical surveillance in forward areas

DoD/Warfighter Benefit

- ✓ Used throughout the DoD and in Iraq
- ✓ Point-of-care electronic medical records in battlefield increases responsiveness in critical situations
- ✓ Part of DoD solution migrating toward standardized, all-electronic health records
- ✓ Goal is compatibility with Veteran Administration's (VA) record system resulting in no lapses in information as medical data follows patients from DoD to VA
- ✓ Lowers battlefield mortality rate

Economic Impact

- ✓ 20,000 government-related sales units sold from FY03 to FY05
- ✓ Vista Partners commercializing technology for use in public/private medicine, emergency management, and international markets
- ✓ Vista is currently modifying software for specialized uses, adding capabilities not present in DoD version
- ✓ Civilian market estimated in the millions of dollars
- ✓ TATRC received $150,000 in up-front fees from licensees
- ✓ AHLTA-Mobile for DoD was developed and is maintained in-house.

Buttstock Assembly with Removable Storage Tubes

Naval Surface Warfare Center–Crane

Background

- ✓ Innovative firearm buttstock design that incorporates two watertight removable storage tubes
- ✓ Partially exclusive license to Lewis Machine & Tool, Company

DoD/Warfighter Benefit

- ✓ Ergonomic enhancements improve performance for the warfighter and provide extra storage space for small items
- ✓ Patent royalties in excess of $67,000

Economic Impact

- ✓ Being marketed and sold directly to commercial and military customers
- ✓ Over 30,000 units have been sold to the military and 10,000 have been sold commercially

Improved Hearing Protection

Air Force Research Laboratory – Human Effectiveness

Background

- ✓ Attenuating Custom Communication Earpiece System (ACCES®) uses custom molded silicon earplugs with integrated electronics to improve communication between air and ground crews
- ✓ CRADA partner, Westone supplied prototypes for testing and collaboration on product ruggedization
- ✓ Patented jointly by AFRL and Westone; patent pending

DoD/Warfighter Benefit

- ✓ Reduces exposure to intermittent high noise levels experienced by aircrew
- ✓ Reduces noise by approximately 30 dB
- ✓ Speech intelligibility using ACCES® was 94% correct versus 80% using legacy systems
- ✓ Will help reduce Veterans Administration costs associated with noise induced hearing loss; since 1977, VA has spent more than $6.7B treating injuries related to hearing loss
- ✓ Handles rapid pressure changes resulting from high-performance maneuvers

Economic Impact

- ✓ Several thousand sets are in use on the F-22, F-15, F-16, A-10, B-52, and C-17 aircraft
- ✓ Royalty income to date: $814
- ✓ ACCES® is generating both military and commercial sales
- ✓ Westone is working with the Navy to adapt the technology to Navy shipboard/carrier environments
- ✓ Available on GSA website

Monoblock Laser Technology

U.S. Army Night Vision Laboratory (NVL)

Background

- ✓ Developed and patented by the Army Night Vision Laboratory
- ✓ PLA between NVL and Scientific Materials
- ✓ Zero moving parts laser which significantly reduces size, weight and energy consumption of laser sighting and rangefinding systems

DoD/Warfighter Benefit

- ✓ Scientific Materials licensed from US Army in 2003
- ✓ Small size enables laser rangefinders to be mounted on individual soldier rifles.
- ✓ Integrated into the Small Tactical Optical Rifle (STORM), an integration of the monoblock laser into the rangefinder, digital compass, visible and infrared aiming lasers and infrared illuminator, deployed on M16 rifles
- ✓ System rugged enough to withstand prolonged use on an M16 battle rifle
- ✓ Also implemented on Stryker vehicles and Apache Attack helicopters

Economic Impact

- ✓ Sales now about 100 units per year which translates to several million dollars in revenue
- ✓ Employee growth from a single employee to 9 involved with monoblock laser; employee count increases considering separate rangefinder integrator firm and defense supply chain
- ✓ Current development underway for laser implementation in commercial systems
- ✓ Scientific Materials now owned by FLIR Systems FLIR has been an established DoD vendor for over 20 years

Replacement Chassis Stock System for Firearms

Naval Surface Warfare Center–Crane

Background

- ✓ Modular replacement chassis type stock for M14 battle rifle
- ✓ Upgrades 50-year-old rifle design for modern warfare
- ✓ Exclusive license to Sage International
- ✓ Sage adapted the stock design for use on M1 and Mini-14 rifles.

DoD/Warfighter Benefit

- ✓ When used with M14, stock improves accuracy, ergonomics and versatility
- ✓ Modern accessories such as day/night optics, lasers, lights, bipods, and grips can be readily mounted to platform.
- ✓ Currently in use in Afghanistan and Iraq

Economic Impact

- ✓ Over 2,000 units have been procured directly from Sage by soldiers and units in the field.
- ✓ Approximately 5,600 units have been procured for Army, Navy, Air Force, Marine, and Coast Guard use.
- ✓ Sage is marketing the product to civilians and law enforcement personnel.
- ✓ Naval Surface Warfare Center – Crane has received $22,000 in royalty payments to date
- ✓ Company efforts expanding into other areas of rifle system support such as improved lethality.

Safety Welding Cart

Air Force Training Device Design and Engineering Center (TDDEC)

Background

- License between USAF TDDEC-Vandenberg AFB and Spika Welding & Manufacturing, Inc. MT, signed in 2007
- Spika Gas Guardian™ Oxy-Acetylene Cart is the only welding cart that complies with Occupational Safety and Health Administration (OSHA) 1926.350 standard.
- Robust, stabilized design reduces potential for injury from welding cart accidents

DoD/Warfighter Benefit

- Prevents back injuries as a result of moving tanks that weigh in excess of 200 lbs
- Prevents "tip-back" accidents
- Cart design prevents accidents involving oxy-acetylene gas welding and cutting processes
- Significant reduction in injuries – over 15,000 related medical claims and accidents annually
- Four-wheel design improves stability over traditional two-wheel design
- Tanks stay in place after use, which enhances convenience
- MilTech™ assisting to reduce production costs

Economic Impact

- Previous sales total $100K; improved cart design now available to both military and commercial markets with sales estimated at $250 to $500K during next two years
- Employee growth expected to increase from 20 to 30
- American-made cutting/welding kit, regulators, hose, hose reel and high pressure supply lines
- Military safety officers and maintenance personnel across DoD plan to replace existing carts with improved cart design
- Spika Welding has been an established DoD vendor since 2001

Shelf-Stable Sandwich Technology

U.S. Army Natick Soldier Research, Development And Engineering Center (NSRDEC)

Background

- ✓ Shelf-stable, ready-to-eat pocket sandwich
- ✓ Early CRADAs with GoodMark Foods and Sara Lee Corp to develop food stability parameters
- ✓ Subsequent Technology Transition Initiative (TTI) funding to Bridgford Foods Corp for advanced development, demonstration and scale-up to full production
- ✓ New military emphasis on mobility, agility and sustainability under any climate or environmental condition requires a reliable eat-out-of-hand, eat-on-the-move capability.

DoD/Warfighter Benefit

- ✓ DoD partners include the Defense Supply Center, Philadelphia (DSCP), Army Center of Excellence and Subsistence (ACES), and Joint Services Operational Rations Forum (JSORF)
- ✓ Key component of First Strike Ration™ (FSR™), a new assault ration designed to sustain warfighters during high-mobility, high-intensity operations
- ✓ Lightens the load of warfighters on 2-3 missions outside the wire
- ✓ Shelf stability up to 2 years equals lower inventory loss due to spoilage
- ✓ Increased battlefield nutrition and mobility

Economic Impact

- ✓ Bridgford Foods is currently the supplier of shelf-stable sandwiches for SOPAKCO, the current Defense Logistics Agency (DLA) contracted assembler of the FSR™.
- ✓ Twelve new production employees as well as one salesman to facilitate sales have been hired by Bridgford Foods to fulfill contracts on the shelf-stable pockets sandwiches.
- ✓ Bridgford Foods received European Union approval designation to provide shelf-stable sandwiches to foreign customers that include Norway, Sweden, Denmark, Britain, and Germany.
- ✓ This is Bridgford's first DoD-targeted product.

Special Medical Emergency Evacuation Device

U.S. Army Institute of Surgical Research (USAISR)

Background

- ✓ Lightweight adjustable mount for medical equipment (SMEED™)
- ✓ License between U.S. Army Institute of Surgical Research and Impact Instrumentation, Inc.
- ✓ Meets the need to attach multiple medical devices to evacuation litters with the stability needed to transport patients safely

DoD/Warfighter Benefit

- ✓ Air Force/Army Rangers using devices in Iraq
- ✓ Eliminates need to fasten uncomfortable equipment to patients during transport
- ✓ First-of-its kind military platform reduces setup time to stabilize medical instrumentation and facilitates equipment change-out and monitoring
- ✓ Commercial manufacture lowers cost and improves availability
- ✓ Adaptable to any DoD/NATO medical litter
- ✓ Warfighter survivability improved by providing improved medical monitoring in field

Economic Impact

- ✓ U.S. military has purchased nearly 1,200 SMEED™ units since it was licensed in 2002 with a value of approximately $2.6M
- ✓ Addition of SMEED™ to Impact Instrumentation product line more fully utilizes existing personnel
- ✓ Potential business growth in supplying combat support hospitals and current testing of variant for oversized litters
- ✓ Investment for product development brought by SBIR contract and licensee
- ✓ Impact Instrumentation, Inc. has been a DoD vendor since the early 1980s

Tailboom Strake Technology

U.S. Army Aeroflightdynamics Directorate
NASA Langley Research Center

Background

- ✓ Minimizes unwanted effects on tailboom from helicopter rotor wake (tailboom strake)
- ✓ Disrupts smooth airflow from main rotor downwash, which creates sideways lift and turbulence on tailboom and robs power from the aircraft
- ✓ PLA (1998) between NASA Langley Research Center and Boundary Layer Research, Inc. (now BLR Aerospace)

DoD/Warfighter Benefit

- ✓ DoD partners include U.S. Navy and Coast Guard
- ✓ Improves climb and cruise flight, hover-hold, and yaw control on single rotor helicopters
- ✓ Reduces maintenance costs by reducing stress on major flight components
- ✓ NAVAIR study concluded BLR Aerospace strakes would result in 215 percent return on investment for its H-1 fleet over 13 years.
- ✓ Kit installation can be performed in one day
- ✓ Improves helicopter readiness

Economic Impact

- ✓ BLR Aerospace now markets tailboom kits for a wide range of civilian and military single-rotor helicopters internationally
- ✓ Annual sales about $4.5M with royalties totaling $180K to NASA
- ✓ U.S. sales, manufacturing and testing staff has grown to 10; 20 international sales representatives are selling in 110 countries
- ✓ BLR Aerospace is developing and marketing FastFin, a tail rotor add-on kit that reduces drag and improves cruise stability
- ✓ BLR Aerospace has been an established DoD vendor for over 15 years

Trivalent Chromium Processes (TCP)

Naval Air Warfare Center Aircraft Division (NAWCAD)

Background

- ✓ Traditional conversion coating methods use a toxic carcinogen, hexavalent chromium. TCP uses a new corrosion protection process that addresses EPA and OSHA concerns.
- ✓ TCP now being used throughout the military and commercial industry, world-wide.
- ✓ Has been patented by the Navy, with six issued patents in the United States and five pending, numerous pending in foreign countries

DoD/Warfighter Benefit

- ✓ TCP also used for aluminum anodize sealing, zinc coating post-treatment, among others.
- ✓ Drop-in replacement for chromated materials - removes extraneous facility costs or change in work methods for aircraft maintainers -can be applied by current methods using equipment on hand.
- ✓ Promotes bonding of the primer coating to the bare surfaces on which TCP is used
- ✓ Conversion to spray process saves about 200 man-hours per year compared to old "wipe-on" process.
- ✓ Eliminates about 300 gallons of chromate conversion coating annually (avoids ~$4,500 purchase/disposal) at Cherry Point - hazardous material handling & personal protective costs less than hexavalent chromium processes
- ✓ Reduction in worker exposure to carcinogenic materials
- ✓ Reduction in production of hazardous waste

Economic Impact

- ✓ Non-exclusive North American licenses to Luster-On Products, Inc; Henkel Surface Technologies Corp, Metalast International Inc, and SurTec International. Foreign exclusive license to SurTec.
- ✓ Sales over $9M to users such as General Dynamics, BAE Systems, Northrup Grumman, Lockheed, and Boeing
- ✓ DoD equipment applications include the Marine Corps H-53, H-1, AV-8B, H-46 and Expeditionary Fighting Vehicle; Army Bradley Fighting Vehicle, H-60, H-47, H-58, H-64; and Future Combat Systems
- ✓ Boeing, United Technologies, Lockheed-Martin and others are evaluating TCP for possible use on new naval aircraft and many other (DoD) systems.

Trivalent Chromium Processes (TCP)

Naval Air Warfare Center Aircraft Division

Kiowa

Hornet

Chinook

Hawkeye

Huey

Trivalent Chromium Processes (TCP)

Naval Air Warfare Center Aircraft Division

Expeditionary Fighting Vehicle

Paladin

Joint Strike Fighter

Harrier

Apache

Trivalent Chromium Processes (TCP)

Naval Air Warfare Center Aircraft Division

Fire Scout

Hornet being processed with TCP

Sea Knight

Humvee

Trivalent Chromium Processes (TCP)

Naval Air Warfare Center Aircraft Division

Today, there are hundreds of TCP users world-wide, from small parts job shops to large original equipment manufacturers (OEMs). The images below capture just some of the myriad of other TCP applications, which include telecom, electronic components, automotive, commercial aerospace and construction.

Automotive

Construction Products

Recreational Equipment

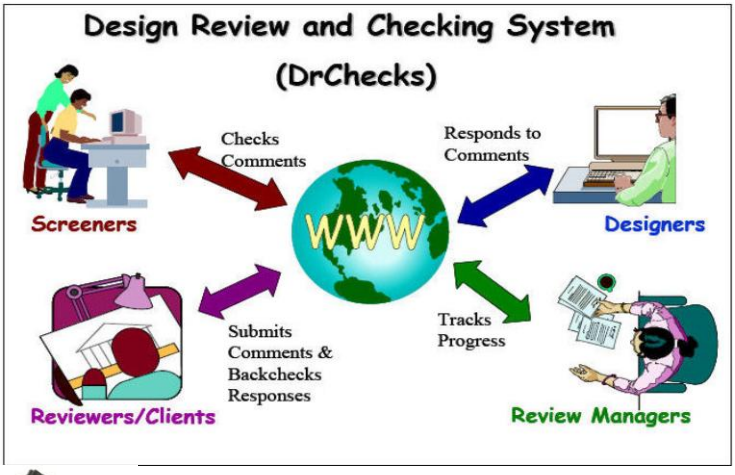
Commercial Aerospace

Municipal Lighting

Electronics

APPENDIX B

Examples of T2 Partnerships that Provide Creative Private Sector Solutions to Federal Technology Needs



Enhanced Quality of Vision

Naval Medical Center San Diego (NMCSD)

Background

- ✓ CRADA between Carl Zeiss Meditec (CZM), Inc. and NMCSD to evaluate latest technological advances for LASIK treatments of myopia and hyperopia
- ✓ State-of-the-art refractive surgery for warfighters provided by Navy Refractive Surgery Center, San Diego

DoD/Warfighter Benefit

- ✓ Offers superior visual capabilities by maximizing uncorrected visual acuity; decreasing reliance on glasses and contact lenses; and enhancing the functionality of night vision goggles, laser eye protection, and head/helmet displays
- ✓ Allows DoD to remain on the cutting edge of vision science and the latest surgical advancements

Economic Impact

- ✓ No DoD expenditures for the DoD since procedural costs were covered under the CRADA
- ✓ FDA approval for specific refractive surgery techniques and procedures were obtained by CZM, Inc., assisted by NMCSD

Field-Expedient Bleeding Simulation System™

U.S. Army Medical Research and Materiel Command

Background

- ✓ A remote operated bladder system that simulates realistic bleeding wounds while providing the illusion of treatment (FEBSS™)
- ✓ Provides improved medic training for soldier and civilian responders for traumatic, bleeding wound treatment in the field
- ✓ CRADA and PLA 2007 with SKEDCO, Inc, Tualatin, OR

DoD/Warfighter Benefit

- ✓ Designed to retrofit existing training mannequins
- ✓ Simple and inexpensive to operate
- ✓ Compared to existing alternatives, the design offers greater realism, ease of operation and portability.
- ✓ Improved treatment outcomes of combat and accident wounds by increasing medic preparedness and confidence

Economic Impact

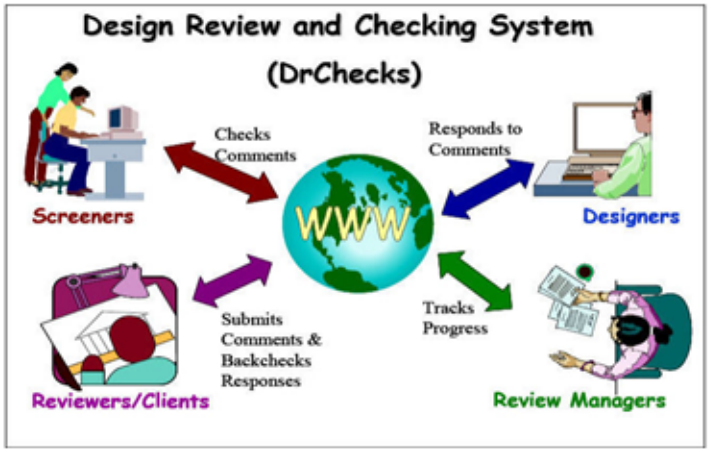
- ✓ 61 systems have been sold to 32 different organizations in the U.S. Army, Navy and Air Force in 18 states. Organizations include AMEDD Center and School, Naval Special Warfare Center, San Diego, CA and Training Support Center, Fort Carson, CO
- ✓ 30 systems have been sold to academia and industry both in the U.S. and abroad
- ✓ SKEDCO, Inc is a DoD vendor

ProjNet℠ Management Software

U.S. Army Engineer Research and Development Center
Construction Engineering Research Laboratory (ERDC-CERL)

Background

- ✓ Web-based business process software system for facility design, bid, and build lifecycle (ProjNet℠)
- ✓ CRADA and PLA (both 2007) with National Institute of Building Standards (NIBS)
- ✓ Prior to ProjNet℠, there was no method to exchange Sensitive But Unclassified information over the internet that satisfies DoD and Office of Personnel Manangement security regulations



DoD/Warfighter Benefit

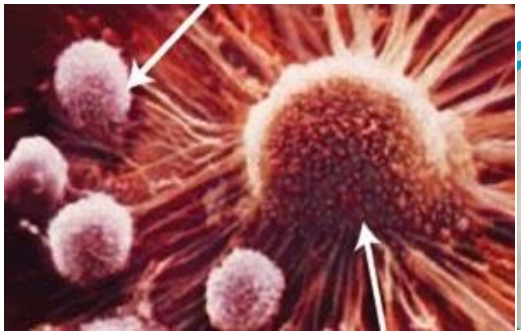
- ✓ Users include GSA, NASA, NAVFAC, USACE, DOE, U.S. State Department, and Veterans Affairs
- ✓ ProjNet℠ tools, which include DrChecks℠ and several related modules, promote exchange of team inputs to track and resolve project issues
- ✓ Automated document audit trail ensures users have the latest version; archives information transactions for later review
- ✓ Retains "lessons learned" for use during future building projects
- ✓ Millions of dollars saved by ProjNet℠ users during design and build lifecycle.

Economic Impact

- ✓ NIBS operates ProjNet℠ as a fee-based system. In 2007 there were more than 30,000 users and NIBS received $2M in revenue
- ✓ CERL receives $1M per year in royalties
- ✓ The use of ProjNet℠ is mandated by USACE, NAVFAC, State Department Overseas Building Operations office and a growing number of Federal, State and academic organizations.
- ✓ NIBS continues to work with CERL to develop future enhancements for ProjNet℠ by marketing system to local and state governments.

APPENDIX C

Examples of T2 Partnerships that Provide Incentives to Federal Inventors and Laboratories to Work with Private Sector Organizations to Commercialize Technology

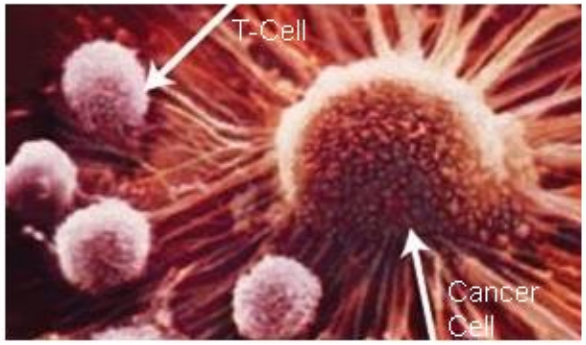


Immunotherapy – Treating Autoimmune Diseases

Naval Medical Research Center

Background

- ✓ Method developed for activating T-cells to treat autoimmune diseases such as rheumatoid arthritis, lupus and multiple sclerosis
- ✓ Navy CRADA initiated with Repligen Corp.
- ✓ Method of treatment patent was licensed to Repligen and the University of Michigan
- ✓ Patent subsequently licensed to Bristol-Myers Squibb, the discoverer and developer of Orencia (abatacept), for use in autoimmune diseases



DoD/Warfighter Benefit

- ✓ Broader treatment of rheumatoid arthritis, other autoimmune diseases, and cancer
- ✓ Patent royalties to Navy from license exceed $506K through first half of 2009

Economic Impact

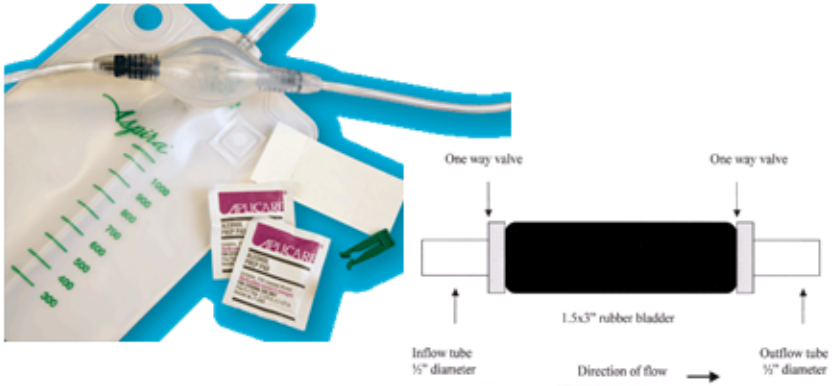
- ✓ Being marketed and sold directly to commercial and military customers

Portable Hand Pump for Evacuation of Hemothorax

Uniformed Services University of the Health Sciences (USUHS)

Background

- ✓ Portable pump to drain blood and air from the chest cavity (pleural drainage pump)
- ✓ PLA (2006) between USUHS and Bard Access Systems, Inc.
- ✓ Designed out of need for a small, portable, lightweight pump that requires no electricity for use in combat situations and during transfer of injured patients.



DoD/Warfighter Benefit

- ✓ Office of Naval Research is a development partner.
- ✓ Provides relief from symptoms associated with fluid build-up in the chest cavity
- ✓ Does not require electricity to operate
- ✓ Major logistical advantage over other drainage systems for operations in remote locations
- ✓ Easy to use and can be operated by a layperson or even the wounded individual, if stable
- ✓ Faster response to chest cavity wounds in the field

Economic Impact

- ✓ Hand pump is a component of Aspira® Pleural Drainage System launched in 2007 for use in civilian sector
- ✓ Addition of this product line better utilizes existing workforce
- ✓ Bard Access Systems developing chest drainage product for military use
- ✓ Sales/License Royalties - $2.8M (2008 sales), royalty bearing portion $750K, royalty $15K
- ✓ Bard Access Systems is an established DoD vendor.

Preventing Severe Infections in Infants and Children

Uniformed Services University of the Health Sciences (USUHS)

Background

- Pharmaceuticals (Synagis® and RespiGam®) prevent severe infection from respiratory syncitial virus (RSV).
- PLA (1989) between USUHS and Medimmune, Inc.
- Each year, RSV causes epidemics of severe bronchiolitis and pneumonia in premature infants and fragile young children.
- R&D partners included National Institutes of Health, National Institute of Allergy and Infectious Diseases, and Virion Systems, Inc.
- RespiGam® gained FDA approval in 1995 as first preventative measure against RSV
- In 1998, FDA approved Synagis®, which is easier to manufacture and administer

DoD/Warfighter Benefit

- Reduces need for hospitalization by reducing possibility/severity of RSV infections
- Hundreds of thousands at risk for RSV infections treated successfully each year
- Provides improved health care for civilian and military children

Economic Impact

- Sales of Synagis® over $1.3B annually generates $9M in yearly license fees to USUHS
- Medimmune began operations in 1988 to develop RespiGam®; sales of RespiGam® and Synagis® key factor in Medimmune growth to approximately 3,000 employees worldwide
- AstraZeneca acquired Medimmune in 2007 and is an established DoD vendor.

Radio Frequency Diathermy

Naval Medical Research Center

Background

- ✓ Heat therapy system to treat pain and speed healing of injured deep tissue originally based on need to quickly and safely warm Navy divers after exposure to cold environments
- ✓ Initial Navy CRADA with EHTI Medical
- ✓ Navy exclusive license to ReGear Life Sciences

DoD/Warfighter Benefit

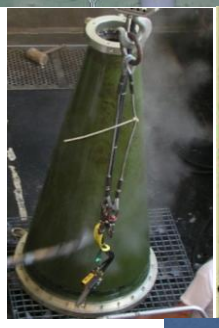
- ✓ Used to treat soft tissue and repetitive stress injuries, muscle spasms, osteoarthritis, joint contractures, chronic pain, back injuries,and carpal tunnel syndrome
- ✓ Unit sold to Naval Special Warfare Group 3
- ✓ Market discussions with Veterans Administration hospitals and other military groups

Economic Impact

- ✓ Revenue in 2009 expected to be nearly $1 million, with over 125 units sold; 2010 revenue expected to be over $6M
- ✓ Focus on sports medicine, physical therapy and long term care markets
- ✓ Technology initially licensed to Selicor, a two-person company that grew to 29 people before it was bought out by Coventina Health Care (now ReGear)
- ✓ ReGear has six employees and plans to grow in 2010.

APPENDIX D

Examples of T2 Partnerships that Facilitate Usage of DoD Equipment and Facilities



ARDEC CRADA Process

U.S. Army Armament Research, Development and Engineering Center (ARDEC)

2007 Malcolm Baldrige Award Winner

Background

- ✓ Uses multi-statement-of-work "Master CRADAs"
- ✓ Teaming with defense industry partners to access ARDEC's technology expertise and unique capabilities to support military systems development
- ✓ Lowers cost and speeds up development of Army technology
- ✓ Expanded use by industry partners since 2002

M777 Lightweight 155mm Howitzer

Non-Line-of-Sight Cannon

DoD/Warfighter Benefit

- ✓ DoD partners include the U.S. Marine Corps, DARPA, Navy, other Army Labs, PEOs/PMs
- ✓ Allows more rapid development of Army technology
- ✓ Enables advancement of weapon systems such as M982 Excalibur artillery shell, lightweight M777 Howitzer, remote weapons stations, armor protection, networked lethality
- ✓ Utilizes Army personnel and facilities to assist defense contractors to more quickly advance technology development and fielding

Economic Impact

- ✓ ARDEC CRADA process marked a new way of doing business in 2001; ARDEC assessed the needs of its client base against the assets and expertise it could provide and used the CRADA process to bridge gaps and increase business.
- ✓ Revenue over last five years amounts to $108M, rising from $10M (FY04) to $33M (FY08) per annum
- ✓ Industry partners include BAE Systems, Raytheon, General Dynamics, L3, Textron, Lockheed Martin
- ✓ Over 120 active CRADAs increases utilization of existing government personnel and facilities

ARDEC CRADA Process

U.S. Army Armament Research, Development and Engineering Center (ARDEC)

XM324 Cannon Assembly

XM325 mounted on NLOS-M

M224 60mm Mortar System

XM360 test firing

ARDEC CRADA Process

U.S. Army Armament Research, Development and Engineering Center (ARDEC)

Very Affordable Precision Projectile

Test firing of M109A6 Paladin

Coyote Unattended Ground Sensor
(Coyote UGS™)

ARDEC CRADA Process

U.S. Army Armament Research, Development and Engineering Center (ARDEC)

Precision Armaments Lab

- ✓ RDECOM has unique test facilities that are available to industry.
- ✓ RDECOM-ARDEC provides over $1M per year in Test Services Agreements (TSAs) to industry.
- ✓ Principal customers are military industry precision munitions, Independent Research and Development (IR&D) programs and PEO-Ammo acquisition Programs

Davidson Advanced Warhead Development Facility

Soft Recovery System (SRS)

Expeditionary Fire Support System

Naval Surface Warfare Center, Indian Head

Background

- ✓ CRADA between NSWC Indian Head and General Dynamics Ordnance and Tactical Systems (OTS)
- ✓ Qualifies improved insensitive munition characteristics for Expeditionary Fire Support System (EFSS) 120-mm rifled ammunition
- ✓ Used on MV-22 Osprey

DoD/Warfighter Benefit

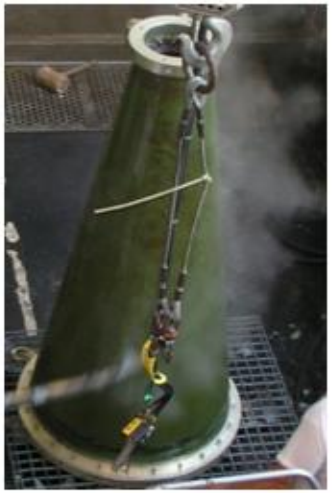
- ✓ Replaces sensitive energetic materials with Navy approved insensitive munition equivalents
- ✓ Greatly enhances safety during transport on board ships since pallets containing multiple munitions will not detonate sympathetically
- ✓ EFSS with insensitive munition characteristics provides greater lethality

Economic Impact

- ✓ NSWC Indian Head has received $2.6M to date in CRADA contributions to be used for further R&D investments
- ✓ Qualifies munitions and armaments for use in European Union countries
- ✓ General Dynamics OTS and other companies are selling munitions with qualified improved insensitivity to numerous NATO countries

Explosive Payload Testing

Naval Surface Warfare Center, Indian Head



Background

- ✓ CRADA with Battelle Memorial Institute to design and test Missile Defense Agency ballistic missile defense systems
- ✓ NSWC Indian Head designed, tested and, in some cases, fabricated performance oriented packaging used to ship explosive loaded warheads.

DoD/Warfighter Benefit

- ✓ Testing and qualification ensured Arrow 2 and Standard Missile Block 6 are effective against live threats
- ✓ Proved that kinetic energy warheads will detonate a live warhead threat
- ✓ Helped identify amount and hazards of debris falling after a strike

Economic Impact

- ✓ Ballistics table built with all parameters; fully new system; non-nuclear; type classified
- ✓ Battelle and Naval Surface Warfare Center Indian Head continue to test and qualify missile defense systems under a follow-on CRADA.

F/A 22 Raptor Power Supply Module (PSM)

Defense Microelectronics Activity

Background

- ✓ Lack of application specific integrated circuits for PSM created obsolescence problem for F/A 22 before it was fielded
- ✓ Boeing and DMEA collaborated under a CRADA and Commercial Test Agreement to redesign and prototype PSM microelectronics
- ✓ DMEA tested each application specific integrated circuit (ASIC) die to ensure it was "known good die" before Boeing built the PSM

DoD/Warfighter Benefit

- ✓ PSMs resulting from this collaborative effort used on most fielded F/A 22s
- ✓ Production line savings resulting from improved quality and elimination of rework
- ✓ Improved reliability due to DMEA testing of each ASIC die
- ✓ Collaboration with Boeing provided DMEA engineers with significant experience with microelectronics technologies early in the life-cycle

Economic Impact

- ✓ PSM is used on 11 different boards and 30 different locations throughout the F/A 22
- ✓ DMEA testing resulted in 8,500 "known good die" to Boeing
- ✓ Critical to weapon system's operation
- ✓ Other solutions to obsolescence problem would have required significantly higher acquisition costs

Manikin Integration Research Laboratory

Air Force Research Laboratory – Human Effectiveness (AFRL-HE)

Background

- ✓ Facility CRADA with General Dynamics uses government facilities and test assets to service commercial customers primarily in aerospace, defense, and automotive areas
- ✓ Activities primarily related to ejection seat, helmet, and windblast testing efforts
- ✓ Complete "family" of manikins with on-board data acquisition systems available for testing, integration, and in-field support

DoD/Warfighter Benefit

- ✓ Cross-fertilization of military and industry experts
- ✓ Reduces in-house contractor support labor costs
- ✓ Increases utilization of laboratory equipment and expertise
- ✓ Ensures that world-class facilities are functioning at efficient capacities and are available for mission-critical work

Economic Impact

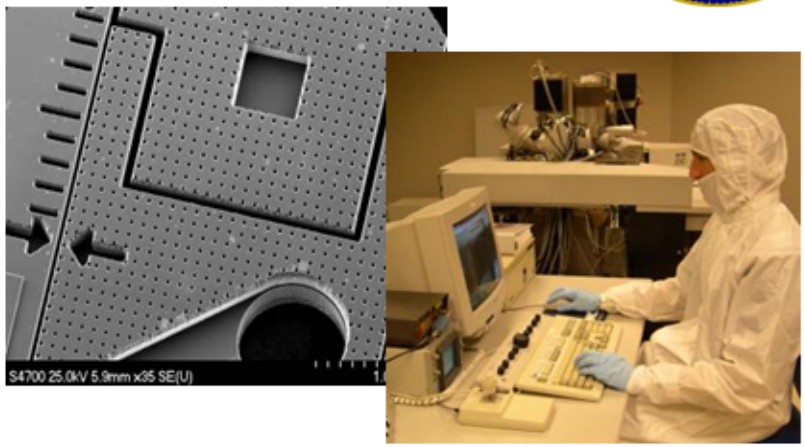
- ✓ Since 2001, General Dynamics has received over $3.1M in orders
- ✓ 5% of funds received are used to purchase equipment that enhances Manikin Integration Research Laboratory and AFRL test capabilities
- ✓ Current commercial customers include Goodrich, Gentex, Blue Origin, and Vision Systems International
- ✓ Expanding into mine-blast testing

MEMS and Nanotechnology Exchange®

U.S. Army Research Laboratory (ARL) Adelphi

Background

- ✓ Task Order CRADA between ARL and Corporation for National Research Initiatives, a 501(c)(3) non-profit organization doing business as the MEMS and Nanotechnology Exchange® (MNX)
- ✓ Speeds R&D of advanced technology by providing access to a national network of state-of-the-art design, fabrication and test facilities



DoD/Warfighter Benefit

- ✓ NSA, Air Force and Navy are clients of MNX
- ✓ Greatly facilitates access to world's most diverse array of design and fabrication expertise
- ✓ Reduces development cost for customers and promotes cost avoidance for DoD/MNX laboratories
- ✓ Increases knowledge and capability of ARL's MEMS staff
- ✓ Availability of MNX improves reliability during technology development cycle
- ✓ Warfighter is benefactor of advances in biotech, comm technology, among many others.

Economic Impact

- ✓ To date, there have been more than 4,000 private and public sector customers
- ✓ Early stage commercial use experiments include MEMS accelerometer for automobile air bags
- ✓ Business growth of MNX measured by "process runs," which at ARL alone have increased from 57 to 130 per year during last five years
- ✓ Investment in MNX from outside customers at ARL has totaled $732K with $298K backlog
- ✓ The MNX originated as a DoD vendor