



# **Technology Transfer and Transition**

**11th Annual S&ET Conference / DoD Tech Exposition**  
“Enabling Technologies to Fight Current and Future Conflicts”

**April 13, 2010**

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**Director, Office of Technology Transition**

**Office of the Director, Defense Research and Engineering/Research**

**Advanced Component Development and Prototypes**

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# Director, Defense Research and Engineering (DDRE) Imperatives

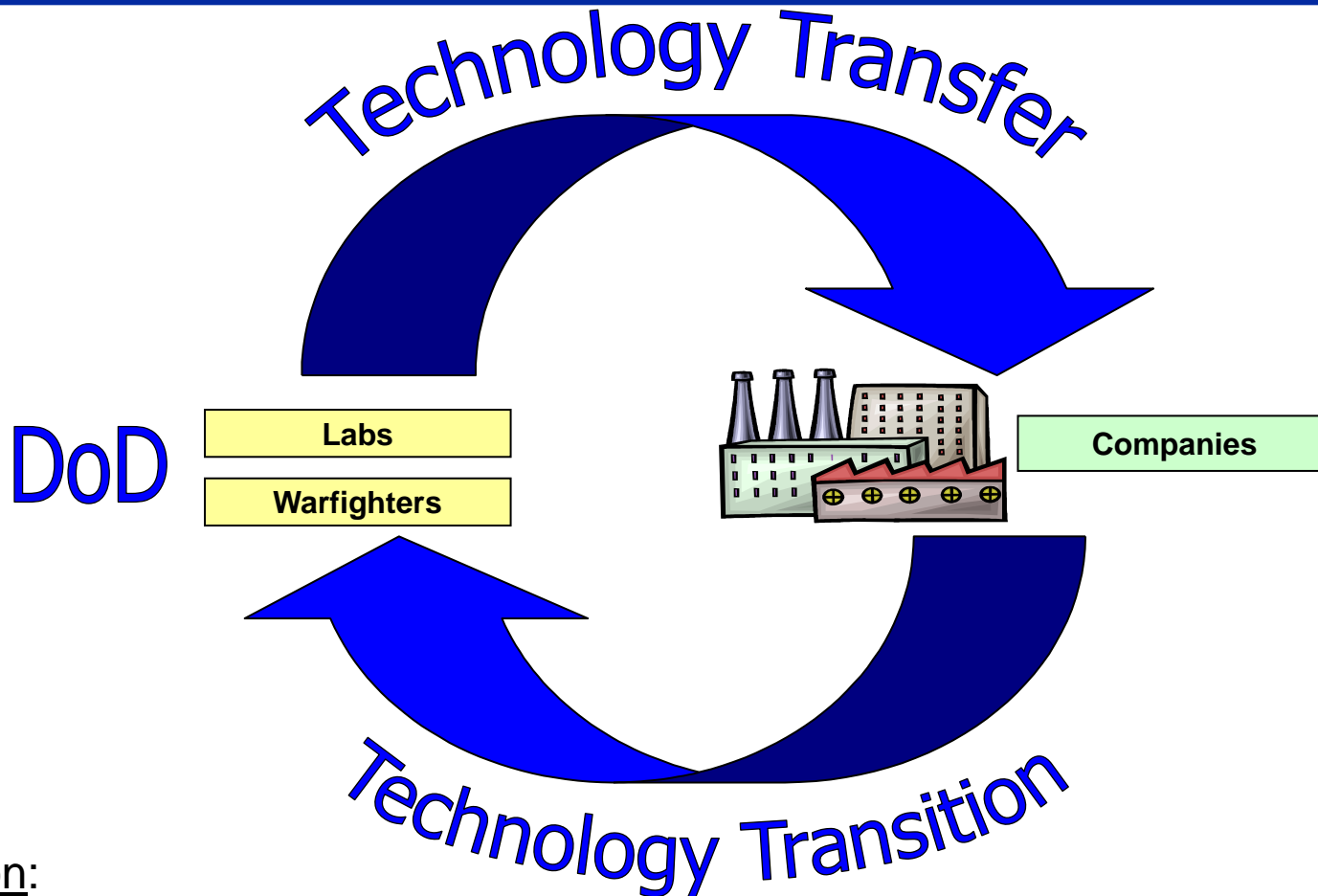


- 1. Accelerate delivery of technical capabilities to win the current fight.**
- 2. Prepare for an uncertain future.**
- 3. Reduce the cost, acquisition time and risk of our major defense acquisition programs.**
- 4. Develop world class science, technology, engineering, and mathematics capabilities for the DoD and the Nation.**

**Innovation - Speed – Agility**



# Transfer & Transition



Based on:

15 USC 3710-15, Technology Innovation

10 USC 2515, Office of Technology Transition

10 USC 2359a, Technology Transition Initiative



# Tech Transfer Program Motivation



- **Stimulate spin-off of DoD-technologies to private sector for product engineering and transition to products available for military acquisition.**
- **Integrating advanced commercial-sector technologies into DoD systems, particularly from non-traditional defense contractors through working with DoD funded Partnership Intermediaries, regional and local economic development authorities, and leveraging of SBIR.**
- **Establishing collaborative R&D projects with the private sector for cost-sharing of new dual-use technology development.**
- **Meeting statutory mandate to leverage federal R&D investment**



# Tech Transfer Benefits to DoD



- **Clear path from DoD S&T to use of technology**
- **Commercial source for production of DoD Items using DoD-developed technologies**
- **Enhanced systems capability**
- **Partnerships with leading companies in industry (as opposed to contractual relationship)**
- **Funds to support joint R&D efforts (funds-in from CRADAs)**
- **Royalties on licensed inventions to reward inventors and perform additional R&D**



# Partnership Intermediaries



- Provide skill & capabilities not resident in DoD labs:
  - **To LABS**
    - Proactive, focused, and sustained marketing of lab technologies and capabilities
    - Pursue leads
    - Closer to the marketplace and can employ a technology pull approach
    - Facilitate communications with companies
  - **To PARTNERS**
    - Help find technology solutions or new product opportunities
    - Make government “red tape” invisible
  - **To BOTH**
    - conduct market research to establish value of licensable technologies
    - understand expectations
    - develop viable license applications and commercialization plans





# Army Wound Trainer

## Field Expedient Bleeding Simulation System (FEBSS)



**Objective:** Improved medic training for soldiers, and civilian responders for traumatic, bleeding wound treatment in the field

### Benefits:

- Realism addresses the sight of blood with multiple concurrent wounds of varied types
- Suited to retrofit existing training mannequins
- Simple, portable, and inexpensive to operate

### Technology:

A system of pumps, tubing, clamps and remote control units to simulate bleeding with a mannequin or integrated into body-worn suits.

Simulated blood flow mimics one or more arterial or venal wounds.

### Participants:

- 68W School Ft. Carson, CO
- ORTA: Paul Mele and Sara Miller, Army Medical Research and Materiel Command
- Inventor: Sgt. Lynn Randall King, 91W Command
- SKEDCO Inc., Tualatin OR, licensee
- FirstLink (Pittsburgh Gateways Corp.) provided partner evaluation support and facilitation of Material Transfer CRADA and pending license agreement

**Status:** After upgrades in early 2008, commercial units have been purchased by numerous military and civilian users in the U.S. and abroad.

### Army Prototypes

Mannequin



Suit for body wear



Contact: FirstLink (888) 802-0380 info@dodfirstlink.com



# Fuels Technology



## Objective:

- SECAF goal is for all AF systems to use 50/50 blend of conventional & Fischer-Tropsch (synthetic) JP-8 by 2010.
- Another goal is 50% of jet fuel usage being synthetic fuels by FY16

## Benefits:

- Alternative fuel use by DoD vehicles increases energy security, reduces price volatility, and eventually reduces fuel costs.
- Transition to the airline industry through the Commercial Alternative Aviation Fuel Initiative

## Status:

- AFRL supplying extensive fuel property evaluations to the Alternative Fuel Certification Office (ASC).
- Continuing to support "biojet" development.
- CRADA (05-087-PR-01) tested six biodiesel fuels in a T63 helicopter engine in the Engine Environment Research Facility (EERF) and measured emissions.
- Present CRADA (02-347-PR-01) is testing advanced fuels, fuel additives, and fuel system components.
- Extensive collaborations with alternative fuel manufacturers, engine OEMs, weapon system contractors, and component suppliers

## Technology:

- The JP-8+100LT program (ATD) successfully transitioned a low-temp fuel additive to the U-2 and Global Hawk
- Fischer-Tropsch/JP-8 fuel blend successfully flown on the B-52 (Dec 06) and C-17 (Oct 07)
- Improved fuel system icing inhibitor additive scheduled for flight testing in early 2008



## Contact Info:

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- [Kristen.schario@wpafb.af.mil](mailto:Kristen.schario@wpafb.af.mil)





# TCP Industrial Metal Coatings – Replacement for Hexavalent Chromium

## Objective:

- Transfer and transition innovative anticorrosive coating technology for military and private applications

## Benefits:

- Replaces toxic hexavalent chromium (HC)
- Environmentally friendly alternative to HC
- Provides significant income to the Navy

## Participants:

- Invented by Naval Air Warfare Center – Aircraft Division (NAWCAD)
- Licenses to Luster-On Products, Inc.; Metalast International, Inc. Henkel Surface Technologies Corp.; SurTec International GmbH

## Status:

- TCP products offered for sale as HC replacement, with sales over \$9 million
- 11 patents filed by NAWCAD

**Technology:** TCP (trivalent chromium processes) is an anti-corrosion passivation coating for light metals that provides excellent appearance, wear, and corrosion resistance.

•Applications: Aluminum, steel, and other alloys

•Industries: Automotive, aircraft, hardware, computers, construction materials

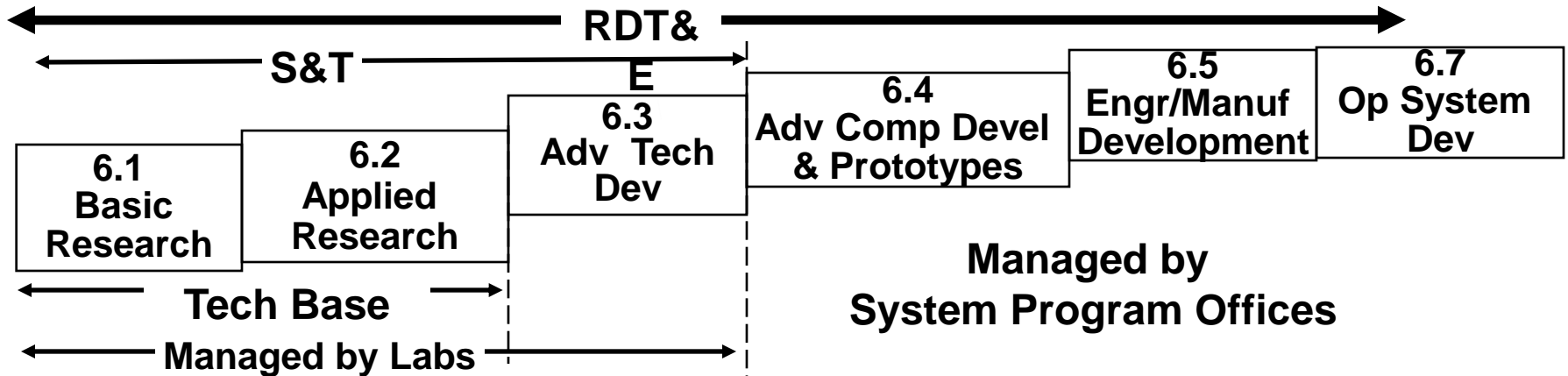
## Trivalent Chromium Processes (TCP)



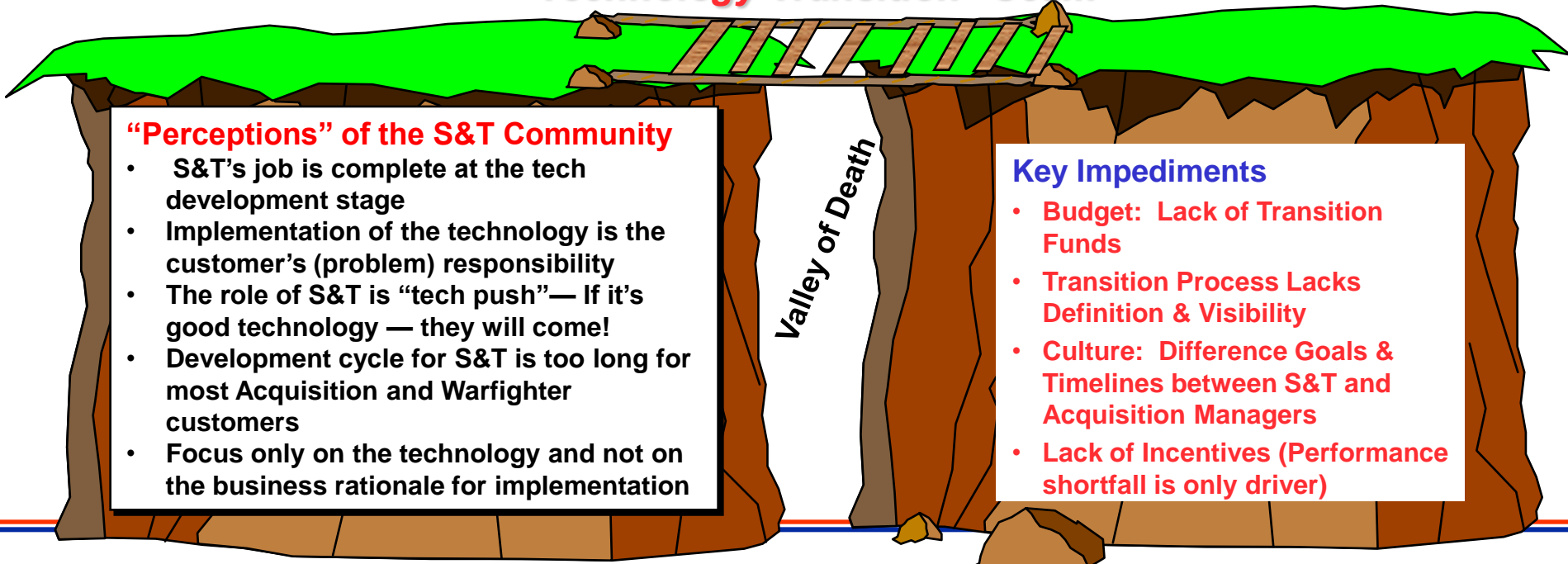
This F/A-18 Hornet aircraft is receiving a coating of TCP that will effectively protect the surface from corrosion.



# The Challenge of Technology Transition



## Technology Transition "Seam"



### "Perceptions" of the S&T Community

- S&T's job is complete at the tech development stage
- Implementation of the technology is the customer's (problem) responsibility
- The role of S&T is "tech push"— If it's good technology — they will come!
- Development cycle for S&T is too long for most Acquisition and Warfighter customers
- Focus only on the technology and not on the business rationale for implementation

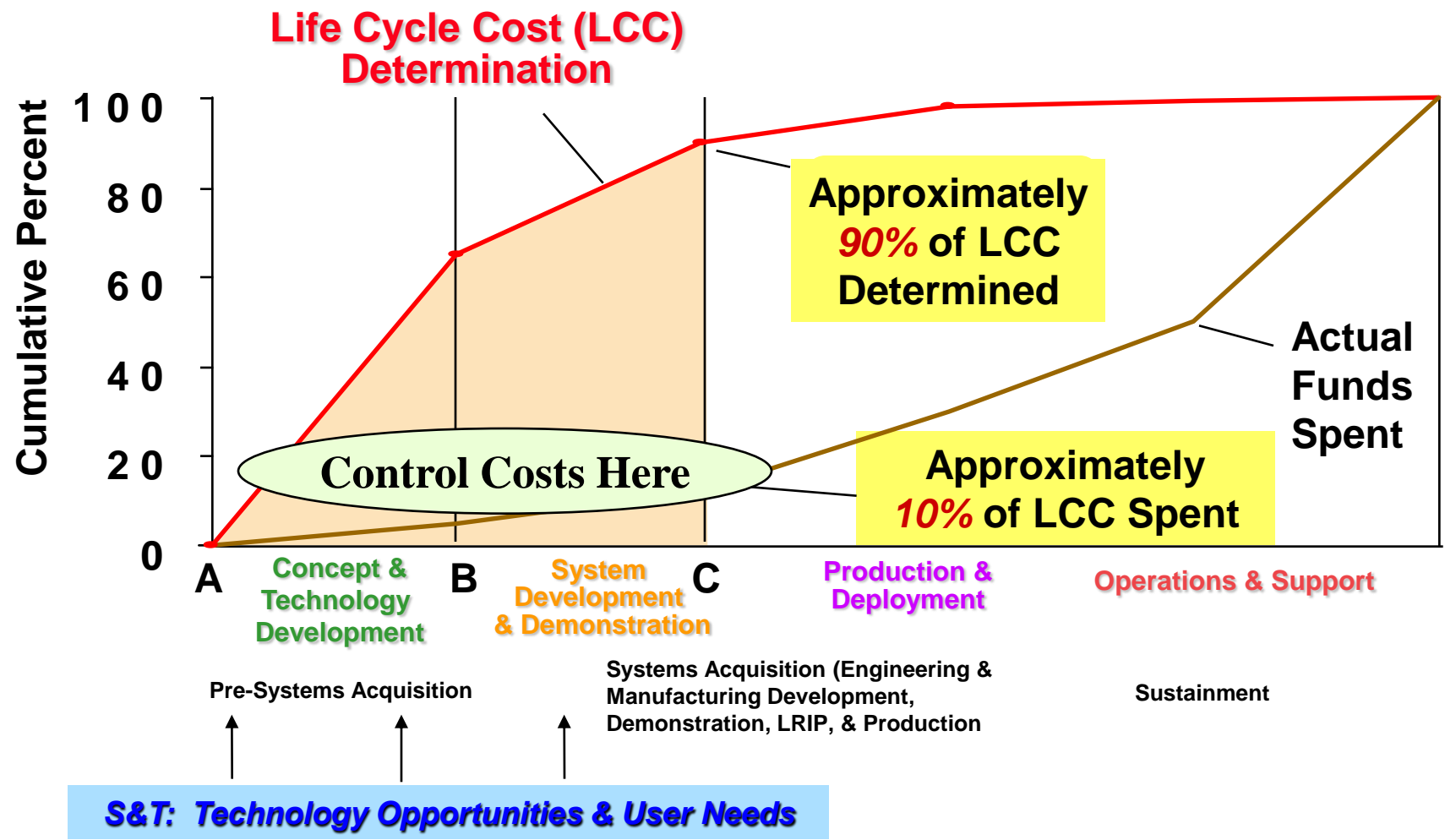
### Key Impediments

- **Budget:** Lack of Transition Funds
- **Transition Process Lacks Definition & Visibility**
- **Culture:** Difference Goals & Timelines between S&T and Acquisition Managers
- **Lack of Incentives** (Performance shortfall is only driver)



# The Need to Transition Technology Early

## Acquisition Community is Focused on Cost Reduction Throughout Life Cycle





# TECHNOLOGY TRANSITION

## What is the intent?



- **Moved into an acquisition program of record**
- **Can be acquired/procured through normal DoD procurement (i.e., GSA schedule)**
- **Has addressed DOTMLPF satisfactorily**
- **Provides sustainable capability**

**Baseline Product/Technology no longer funded by S&T program.**



# DDR&E Key Transition / Fielding Programs



**'Notional Alignment with Funding, TRLs, Acquisition Cycle, & MRLs'**

Funds	Research, Development, Test & Evaluation					Procurement	O&M	
	TRL 1 - 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9	
	Pre-Concept	Mtrl. Solution Analysis	Technology Development		Engineering & Manufacturing Development	Production & Deployment	Sustainment & Maintenance	
MRL	1 3 Feasibility/Concepts	MRL 4 Lab Environment	MRL 5 Prototypes Components	MRL 6 Prototype System	MRL 7 Systems in Production Environment	MRL 8 Pilot Line - Low Rate Initial Production	MRL 9 Begin Full Rate Production	MRL 10 Lean Production Practices

*Test Emerging Technologies for OCO*

**Rapid Reaction Fund (RRF)**

*Operational Experiments & Tech Integration for COCOMs*

**Emerging Capabilities (EC)**

*Mature DoD Laboratory Technologies (Lab Push)*

**Technology Transition Initiative (TTI)**

*COCOM / Joint/ Coalition Focused*

**Joint Capabilities Technology Demonstrations (JCTDs)**

*Mature Defense High-Impact Processes*

**Manufacturing Science & Technology (MS&T)**

*Test "Gap-Filling" Technologies for OCO*

**Quick Reaction Funds (QRF)**

*Industry "On" Ramp - Test to Procure Tech Refresh*

**Defense Acquisition Challenge (DAC)**

*Coalition Industry Mature Technology - Test to Procure*

**Foreign Comparative Testing (FCT)**

TRL: Technology Readiness Level  
MRL: Manufacturing Readiness Level  
OCO: Overseas Contingency Operations



# Technology Transition Initiative



- **Congressional Language:**

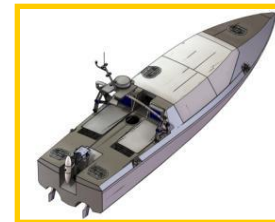
- Facilitate the rapid transition of new technologies **from S&T into acquisition programs** of the Department for the production of such technologies.

- **Objectives:**

- Accelerate the introduction of new technologies into operational capabilities for the armed forces.
- Successfully demonstrate new technologies in relevant environments.

## Weighted Criteria

- TTI Funding Accelerates Product Transition\*
- Project is from DoD S&T Base \*
- Cost Sharing to leverage funding\*
- Less than 4 years TTI Funding\*
- Established exit criteria
- Joint Focus
- Value to the Warfighter
- Technology mature – TRL 6 or 7
- Commitment to Acquisition/Procurement Path



MCM USSV



JSGPM (M50)  
with ESLIs



Husky Mounted  
Detection System



Sense & Avoid for  
Small UAS



# Technology Transition Initiative - Success Stories -



## Diagnostics Avionics Tester – FY10



Improved mission  
readiness; reduced  
aircraft repair times

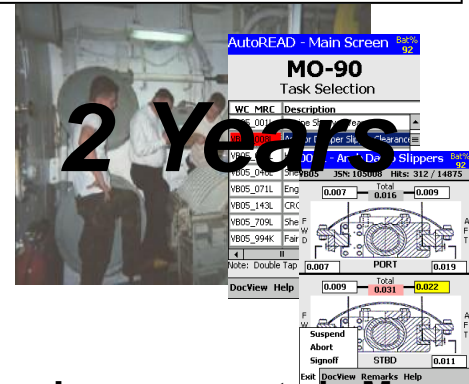
## Recent Transition Summary

- FY 09 – 6 projects transitioned
  - Average Acceleration: 31 mos
- FY 08 – 5 projects transitioned
  - Average Acceleration: 23 mos

## Highlights

- Automated Aircraft Launch & Recovery Equipment Reading Sheets ROI \$40M over 5 years
- Insensitive Munitions replaces TNT and reduces logistics impact without sacrificing lethality; enhances training
- Image Compression incorporated in USSOCOM Mission Planning Environment
- Diagnostics Avionics Tester ROI \$7M over 4 years

## Automated ALRE Reading Sheets – FY09



Improvements in Mx  
productivity and safety

## Image Compression for Digital Precision Strike Suite – FY08



Data compression to  
improve mission targeting

## Army Insensitive Munitions Projects – FY10



Retains lethality while  
improving safety



# TTI Recent Successes Precision Targeting



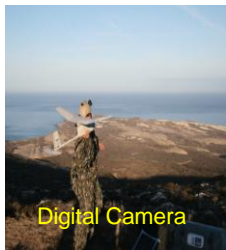
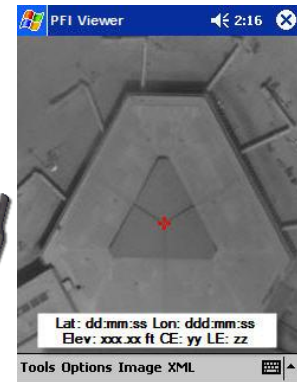
- **Image Compression for Digital Precision Strike**

- Provides SOF forces ability to collect and disseminate image and video data in bandwidth constrained environment
- Delivered capability to SOF Mission Planning Environment and deployed as part of Digital Precision Strike Suite - **3 year acceleration**



- **Precision Fires Image S/W**

- Real-time precision targeting capability on a handheld device
- Spiral upgrades delivered to Army PM Battle Command every six months; 500+ deployed to date - **2-3 year acceleration**



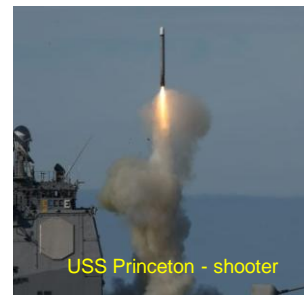
Digital Camera



Cut/Cropped -sent to shooter



PFI for Targeting and Awareness



USS Princeton - shooter



Shack - send BDA





# TTI Recent Successes Insensitive Munitions



- **Extremely Insensitive Detonating Substance and Insensitive Munitions for 155mm Artillery**

- Safer ammunition increases soldier survivability and reduces logistics burden without sacrificing mission lethality
- Army PM Combat Ammunition Systems incorporating in 155mm production - **3 year acceleration**
- PM CAS - “TTI Funding enables the acceleration of critical warfighter capabilities”; able to capitalize on unplanned tech base successes



- **Affordable IM-Compliant Training Projectiles**

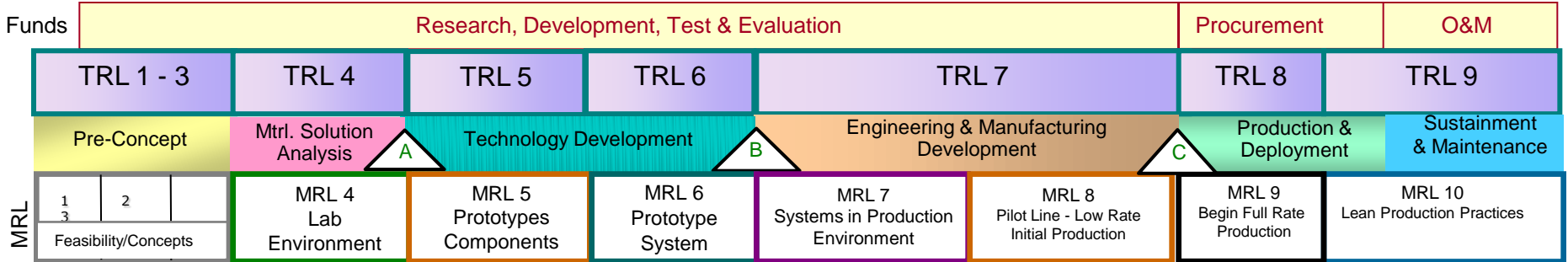
- Increased training realism and safety for gun crews, observers and fire direction
- Train as you fight
- \$15M saved each year
- Incorporated in production in FY10 - **18 month acceleration**





# DDR&E Key Transition / Fielding Programs

## 'Notional Alignment with Funding, TRLs, Acquisition Cycle, & MRLs'



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# Defense Acquisition Challenge



## Authority

- Authorized by Title 10, USC, Sec 2359b

## Purpose

- Provides **increased opportunities** for the introduction of **innovative and cost-saving technologies** into DoD acquisition programs
- Provides an “on-ramp” to DoD acquisition system for small and medium vendors
- Funds for the **Test and Evaluation of technologies that have potential** to improve current acquisition programs at component, subsystem, or system level
- Uses an established network of Service and USSOCOM liaison offices

OSD PoC: Col. Eric Burns, ODUSD (AS&C)  
Richard.Burns@osd.mil 703-602-3740



# Defense Acquisition Challenge (DAC)



- Started in 2003 – Section 2359b, USC Title X; high HASC interest
- Anyone can propose **innovations** that could **quickly improve**:
  - Affordability, manufacturability, performance, or capabilities ... at a system, subsystem or component level
  - **10:1 program ROI to date!**
- Proposals “**challenge**” existing technology or methods
  - Evaluated for merit & feasibility – must meet **warfighter requirements**
    - **TRL = minimum high 6, ready to field**
  - If testing proves successful, innovations inserted into a **program of record**
    - **Test to procure**
  - Entry into DoD acquisition for non-traditional defense industry
- **Competitive**: Annual Broad Agency Announcement (BAA) in Federal Business Opportunities & unsolicited proposals
- For more details: <https://cto.acqcenter.com/>





# Manufacturing Technology (ManTech)



- ManTech is critical for moving **disruptive technologies** into **disruptive capabilities**
- If you can't build **IT**, build **IT** affordably, reliably, and in a timely manner, you don't have **IT**.
- To have true capability, must be able to **move beyond the prototype "One-Off"**
- **Operates Under Title 10 (Section 2521)**
  - **Manufacturing process** investments that provide product performance, operational, & affordability improvements
- **All About Affordable & Timely Equipping of the Warfighter**
  - Defense essential needs **beyond normal risk** / interest of industry
  - **Pervasive needs** across systems, platforms, or components
- **Transition of Validated Technology**
  - Scale-up of processes for S&T, ATD, IR&D, & ACTD products
  - Focus: Manufacturing **process investments**



**ManTech Addresses Major QDR Issues – Affordability, Sustainability, Decreased Logistical Footprint**



# ManTech Recent Successes

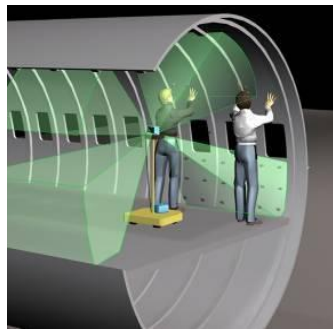
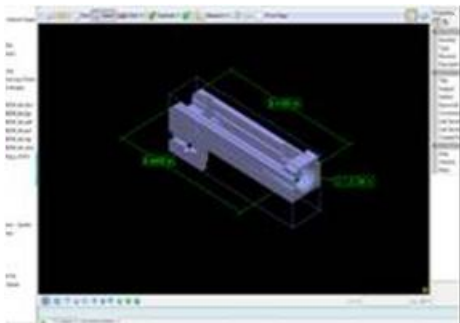


Illustration of Laser Image Projection applied to aircraft

Army MT New Uncooled Focal Plane Array - reduced unit cost from \$16K to \$2K per FPA, enabled supply chain to meet future Army procurement requirements



Navy MT - Reduced VA Class Submarine Labor 85% for 1,000s of submarine attachments and penetrations – saving more than 8000 labor hrs per ship



New Model Based Mfg – Piloted new mfg process data on critical M2 Barrels - new supply chain responded and reduced fab time 58%, cost reduced order of magnitude



DLA MT - Met Tank Tread Demand Surge for OIF

- Vital Track component experienced accelerated failures
- Advanced casting tooling method enabled industry to meet surge and demand

AF MT - AESA Radar mfg improvements reduced cost of active transmit/receive module for JSF And F-22 radars - \$745M cost avoidance



# Contact



- **Technology Transfer**
  - [techtransfer@osd.mil](mailto:techtransfer@osd.mil)
- **Technology Transition Initiative**
  - [atl.tti@osd.mil](mailto:atl.tti@osd.mil)



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# BACK-UP SLIDES

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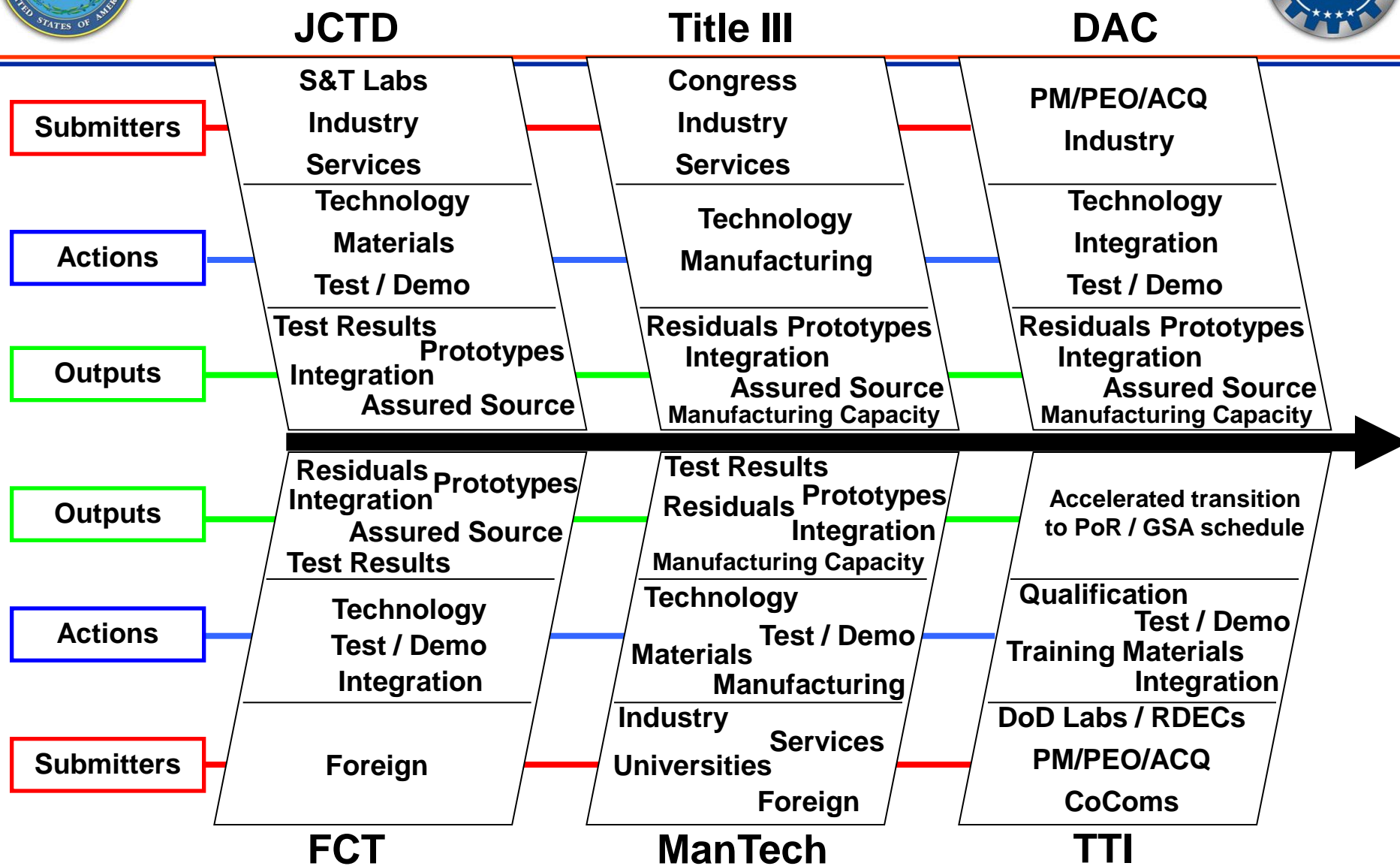
# The Transition Lexicon



- **Technology Transition**: Range of activities involved with improving, moving, maturing, & speeding technology to the marketplace
  - In DoD, this usually applies to developing, adapting, or improving commercial **and** military technologies for use in weapon system applications. For example, monitoring technology movement to:
    - ✓ the next phase of acquisition; OR
    - ✓ an actual military system that has been or may be fielded; OR
    - ✓ a military / commercial test facility or depot
- **Technology Insertion**: Introduction, placement, and integration of a demonstrated defense or commercial technology into a military system, component, or application
- **Technology Transfer**: Process of sharing, transmitting, or conveying technology data and information (intellectual property) between the government agencies, industry, and academia
- **Affordability**: Consideration of “best value” options that integrates performance, cost, producibility / manufacturability, reliability, supportability, and risk
  - Does not mean the “cheapest”



# Transition Programs



**OUTCOME: BETTER, FASTER, CHEAPER DEPLOYMENT TO THE FIELD**



# Defense Research & Engineering (DDR&E) Key Transition Programs



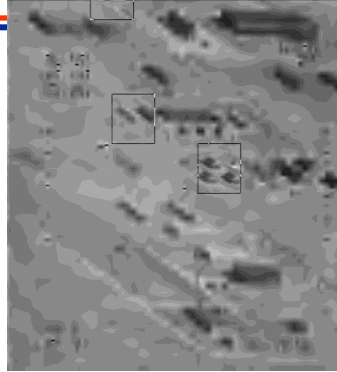
	Purpose	Funding	Outcome
Joint Capabilities Technology Demonstration (JCTD)	CoCom capability gaps (joint warfare & GWOT)	~ \$200M	Improved capability for existing programs
Defense Acquisition Challenge (DAC)	Challenge existing technologies	~ \$30M / yr	Test new tech or equipment for DoD use
Foreign Comparative Testing (FCT)	Warfighter benefit from foreign ally	~ \$30M	Test foreign NDI / commercial item for DoD insertion
Technology Transition Initiative (TTI)	Accelerate lab transition to warfighter	~ \$30M	Accelerated insertion into production and/or fielding
Quick Reaction Funds (QRF)	Test emerging technology for acceleration	~ \$30M	Fielded prototype & demo
Rapid Reaction / New Solution (RR/NS)	Test emerging technologies for GWOT	~\$50M	Tested prototype funded by Pentagon for rapid field use
Manufacturing Technology (ManTech) & Mfg. S&T	Develop new or improved mfg. processes	~ \$200M+ (Services) ~ \$10-20M (OSD)	Prototype process for industry building DoD systems
Title III / Defense Production Act (DPA)	Develop critical domestic production capabilities	~ \$18M	New domestic production lines or facilities
Technology Transfer Mechanisms	Transition S&T to market	~ \$2M (DoD) + private	Production sources for military & commercial products
Force Transformation / Operational Experimentation	Integration of technologies & experimentation to meet CoCom needs	~ \$20M / yr	Prototype systems and operational concepts



# Examples of TTI Projects

## Unmanned Sea Surface Vehicle

- Mine warfare mission package for LCS
- Accelerates capability by 2 years



## Image Compression for Digital Precision Strike

- High quality image transmission for SOF Mission Planning
- Accelerated delivery by 3 years

## Sense and Avoid for Small UASs

- S&A for Army Shadow UAS
- Accelerates capability by 2 years

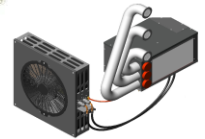
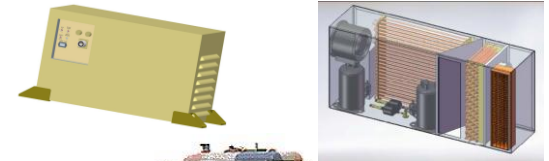


## Electronic Image Intensifier for Apache Helicopters

- Fused imagery into single device for pilot
- Accelerates capability by 3 years



38 open projects



## Tactical Idle Reduction

- Fuel savings for Army long-haul trucks
- Accelerates capability by 3 years



# Technology Transition Initiative (TTI)



## Congressional Language:

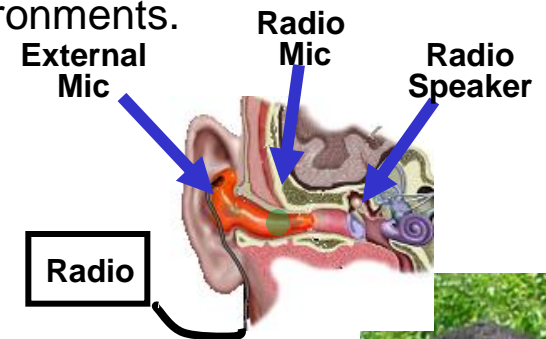
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## Criteria:

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- Project is from DoD S&T Base \*
- Cost Sharing to leverage funding\*
- Less than 4 years TTI Funding\*
- Established exit criteria
- Joint Focus
- Value to the Warfighter
- Technology mature – TRL 6 or 7
- Commitment to Acquisition/Procurement Path



OSD PoC: Dan Altobelli  
ODUSD (AS&C)  
Dan.Altobelli.ctr@osd.mil 703-607-5312



# TTI Criteria



<b>Criteria</b>	<b>How evaluated/graded</b>
<b>Commitment to Transition</b>	<b>Most heavily weighted criterion; strong evidence of commitment to incorporate the technology into a weapon system or capability</b>
<b>Value to the Warfighter</b>	<b>Identify direct impact the ability to prosecute/win a war, save lives, or provide other operational enhancements/efficiencies; link to the appropriate Joint Capability Area; near-term impact to Global War on Terror</b>
<b>Established Exit Criteria</b>	<b>Key performance parameters identified</b>
<b>Potential for joint use</b>	<b>Joint Service/Agency/Combatant Command applicability is desirable</b>
<b>Technology Maturity at the time of proposal submission</b>	<b>Mature technologies ready to transition</b>
<b>Funding must accelerate technology transition into DoD acquisition/sustainment programs (Mandatory)</b>	<b>Fills a gap between current S&amp;T and acquisition funding</b>
<b>Cost sharing to leverage TTI funding (Mandatory)</b>	<b>May be R&amp;D, O&amp;M or Procurement funds</b>
<b>Project duration must be 4 years or less (Mandatory)</b>	<b>Shorter duration projects rated higher than longer duration projects; goal is transition in 2 years or less</b>
<b>Technology must be from DoD S&amp;T base (Mandatory)</b>	<b>Legacy funding for technology developed. (6.1, 6.2, 6.3, SBIR, DARPA, etc. )</b>



# Technology Transition & Insertion: The View Depends on Where You Sit

- **Warfighters**

- Identify capability gaps, not technologies
- Don't know what equipment they want, except at Radio Shack, Wal-Mart and Toys R Us
- Need short term improvements for today, not tomorrow, much less 1 to 5 years from now

Operators and joint warfighters are hard-pressed to take the time to understand technology

- **Technology Developers**

- Generally, will not listen to the warfighters when they say what they think it is that they want
- Working to create the next generation capability – cost and time are generally not relevant

Conversely, S&T / laboratory engineers do not appreciate what the warfighter needs or acquisition

- **Service PMs, SPOs, Programs of Record (PoR)**

- It's cost, schedule, & performance!
- Risk is not desirable and you pay for it

- **The Budget Process, Comptroller, Congress ...**

- DO NOT allow or incentivize risk
- Timing: Two Budget Years plus ...
- Little opportunity for 'quick' insertions within the budget year against a constantly changing threat

When is the last time you or someone you know received recognition for failure?



# Globalization of S&T



**"In 2001, India graduated almost a million more students from college than the United States did. China graduates twice as many students with bachelor's degrees as the U.S., and they have six times as many graduates majoring in engineering. In the international competition to have the biggest and best supply of knowledge workers, America is falling behind."**

**--"The World is Flat", Friedman, 2005**

**China's Gross Domestic Product is now 2<sup>nd</sup> in the world to the U.S.**

**For the first time ever, all members of China's Politburo Standing Committee, the highest tier within the Communist Party, are card-carrying engineers.**

**China had 15 companies on Forbes Global 500 list in 2004, up by 4 from the 2003 rankings.**

**India had only 1 company on the Global 500 in 2003. In 2004, there are 4 Indian companies.**

**IBM Global Services India unveiled its global delivery centre in Hyderabad on June 14, 2005, the fifth IBM center in India.**

**" The last 25 years in technology have just been "the warm-up act." Now we are going into the main event, and by the main event, I mean an era in which technology will truly transform every aspect of business, of government, of society, of life."**

***Carly Fiorina, ex-Hewlett-Packard CEO***  
**2004**