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Deputy Under Secretary of Defense

Advanced Systems & Concepts

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9th Annual Science & Engineering Conference

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The Advanced Systems and Concepts Portfolio of Opportunities

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OSD/AT&L/DDR&E/AS&C

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OSD/AT&L/DDR&E/AS&C Mission

OSD / Advanced Systems & Concepts

- **Find, Integrate, Demonstrate, and Transition** operational concepts and technologies for **multi-Service, Joint** & **Coalition Warfare Needs**
- Leverage RDT&E Defense-wide resources through partnerships with Services and Agencies to meet the **Most Critical Needs** of the joint warfighter as defined by **Combatant Commanders (COCOMs)**
- **Induct Innovative Technologies** inside the traditional Planning, Programming, Budgeting, and Execution (PPBE) process that result in an enduring **Capabilities-based Portfolio** to defeat asymmetric threats

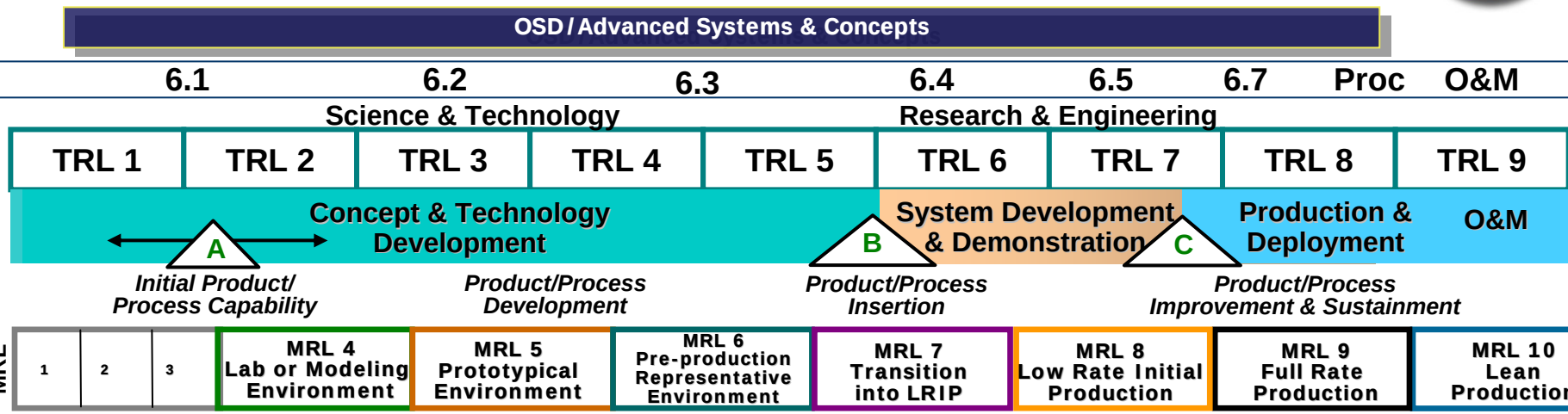
Thrusts: Agile, Adaptive, Affordable, Relevant, Urgent, Enduring, Transition

How Advanced Systems & Concepts Functions

OSD / Advanced Systems & Concepts

- **Multi-Service Needs-Driven**
  - Monthly meetings with COCOMs - Progress on Deliverables
  - Frequent meetings with Intel Community
  - Participation in JCIDS and in JS/StratCom/DDR&E-sponsored studies
- **Technological Awareness**
  - Formal searches, pursuits and harvests of specified critical technologies
  - Briefings from industry (Domestic and International)
  - Intimate with technology development and assessment organizations
    - Services, Agencies, Intel Community, DHS, DOE, etc.
- **Program Oversight**
  - Organize, vet, select, and defend programs and projects
  - Validated Service and CoCom Priorities; IPLs and Most Pressing Needs
  - Wholly or partially funding projects – a core function
  - Closely monitor program and project execution
- **Transitioning Capabilities and Transferring Technologies**
  - Identify transfer and transition partners, pathways, PORs and POMs
  - Oversee transition process and progress; stimulate as necessary
  - Fund select game-changing technology enablers and transformation

Advanced Systems & Concepts Portfolio



COCOM /Joint/Coalition focused — *Joint Capability Technology Demonstrations* — *Demo 1-3 yrs*

AC/JCTDs Transition Enabler – "joint peculiar" capabilities — *JCTD Transition & DAE Pilot Program*

Industry "On" Ramp – Test to Procure Tech Refresh — *Defense Acquisition Challenge*

Service, SOCOM Nominated - Test to Procure — *Foreign Comparative Testing*

DOD S&T Push — *Tech Transition Initiative*

DoD Technology Transfer — *Formerly TechLink* — *to Private Sector*

Domestic Technologies Critical to National Security — *Defense Production Act (Title III)*

ManTech Joint Investments — *Defense Manufacturing Technology – Next-Gen Multi-Service Enablers*

MRLs - - a Technology Transition Risk Reducer

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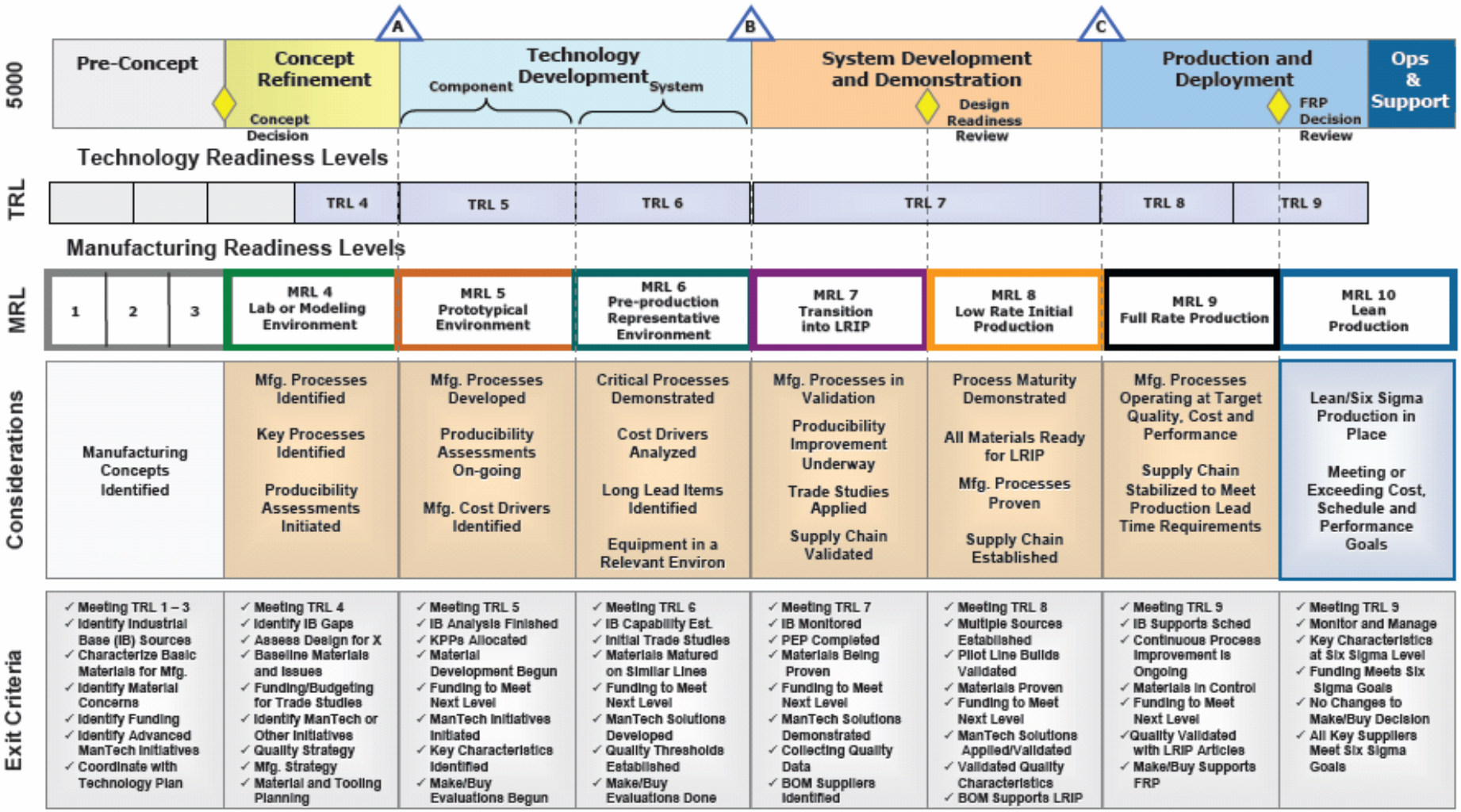
Manufacturing Readiness Levels



for the latest on MRLs, see http://www.ml.afrl.af.mil/mlm/about_manufacturing_readiness_levels.html

FY08 Emerging Defense-Wide ManTech Initiatives

Current D-ManTech Program Drives 6 New Initiatives (examples):

- **Ceramic Matrix Composites Manufacturing Initiative**: to reduce cost and establish manufacturing technologies needed to develop and sustain advanced turbine engines
- **System-on-Chip Manufacturing Initiative**: advance manufacturing processes for packaging of system-on-chip systems; initial applications in communication and precision guided weapons
- **Prosthetics and Orthotics Manufacturing Initiative**: to integrate advanced manufacturing processes and materials that result in custom composite orthotics and prosthetics for wounded warrior amputees

Out-year and Potential FY08 D-wide ManTech Rolling Starts:

- **Identify/transition advanced manufacturing processes/technologies** to create significant productivity/efficiency in defense manufacturing base
- Radically alter defense industrial base through “disruptive” manufacturing
- Examples: solder-free electronics, advanced fixed and rotary wing aircraft structures, ballistic protection, conformal load bearing antennas

Defense Acquisition Challenge (DAC)…

…DoD's On-Ramp to Industry

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- ***Scope:***
  - Allows anyone to propose innovations that could quickly improve -
    - ✓ Affordability, manufacturability, performance, or capabilities at a system, subsystem or component level
  - Competitive: Annual BAA in Federal Business opportunities and unsolicited proposals
  - Proposals "challenge" existing technology
    - ✓ Evaluated for merit & feasibility
    - ✓ If testing successful, innovations inserted into a program of record
    - ✓ Provides industry entry into DoD acquisition
- ***Metrics & Measures***
  - Over 1200 proposals submitted
  - 68 projects awarded & ongoing
  - 70 companies from 26 states
  - 70% are small / medium enterprise technology providers
  - ROI (14 completed projects) is > 9:1

Spray Cool Technology: Electronics Sprayed with Non-Corrosive Coolant in a Hermetically Sealed Housing

Before SprayCool: 482 Pounds & 17 Cubic feet

Employed in Counter Targeting System - Part of OVERWATCH ACTD

4 units deployed to Iraq

After SprayCool: 100 Pounds & 2.6 Cubic feet

Mini Combat Trauma Patient Simulation System: Training medics at Camp Pendleton

Casualty simulator improves skills of medical personnel in mass casualty & triage - over 3500 medics trained & deployed to Iraq; attrition rate of trainees reduced from over 20% to 6%

Enhanced Performance Location Report System Tactical Data Network: Replaces manual network planning with automated system

Reduces complexity and need for manpower redundancy, deployed to 900 users (MEF II) in Iraq, enabling rapid and accurate information flow and data priority on the joint/coalition battlefield

CTO* FY08 Emerging Opportunities

Defense Acquisition Challenge (DAC) Program

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Current DAC (Examples) - - Supports 13 continuing projects ($13M)

- ***Omni-directional Antenna for M156 Magneto-Inductive Remote Activation Munition System (MI-RAMS)...*** **Test 3-Axis Antenna for Army/SOF MI-RAMS allows placement of demolition charges and their initiator in any attitude (vice vertical only)**
- ***Mobile IP Interface to Tactical Data Links (TDL)..*** **Test TDL to enable uninterrupted and real-time coordination/re-tasking of combat missions, challenging current system that requires manual reconfiguration**
- ***Sinuous Spiral Antenna for AN/ALQ211 EW System*** **...Test antenna candidate that may enable warfighter to better identify enemy transmission signals, improving threat geo-location and threat detection and defeat in all aircraft attitudes**

Out-year / Potential DACs: Estimate 8 to 12 new start FY09 projects ($15M)

- **Address warfighter operational issues / functional capabilities (effectiveness, employment, survivability, force protection, and/or sustainability)**
  - How: 'Challenge' existing legacy systems/equipment by testing mature technology for use in acquisition programs-of-record
  - Examples: Improved medical trauma simulation equipment; rapid armor or composites repair kits at unit level; better chemical / biological protective clothing; improved, lighter-weight, longer-lasting sources of power

***Comparative Testing Office**

Foreign Comparative Testing (FCT)…

…the search for world-class technologies

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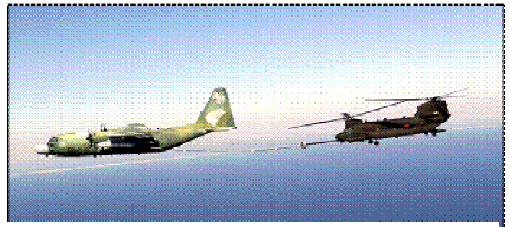
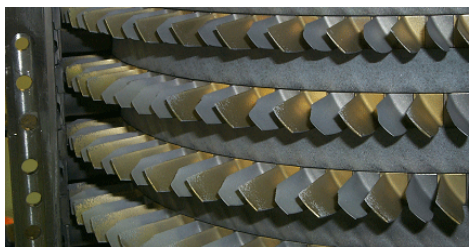
- ***Scope:***
  - Seeks international technologies for US warfighting needs
  - Leverages mature technologies for economic/speedy buys
  - Provides US Forces with new capabilities
  - Technologies assessed for use, bought from foreign source or manufactured under license in US



UK system can refuel two aircraft at once, avoiding $40 million in R&D

- ***Program Measures & Metrics (1980-2007)***
  - OSD investment of $1.1B has avoided $7B in costs
  - 567 projects started, 488 completed, 266 met test req's
  - 184 projects resulted in procurements worth about $8B
  - Accelerated fielding averaging 5–7 years
  - Participation from 27 allied and coalition partners
  - Vendor partnerships in 33 U.S. states
  - Past 5 years: Transition rate from test-to-procure > 80%

South-African developed Buffalo mine clearing vehicle probing & clearing mines & IEDs in Iraq



Russian erosion-resistant coating triples life of compressor blades in MH-53 helicopter, avoiding $1.6 million annually

Korean fiber optic mesh detects breaks and enhances perimeter security

Italian venture, the Joint Service Combat Shotgun, used in Iraq as a “door-buster”

Swedish bunker buster system fired from confined spaces, used in Afghanistan and Iraq

CTO* FY08 Emerging Opportunities

Foreign Comparative Testing (FCT) Program

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Current FCTs (Examples) - - Supports 12 continuing projects ($17M)

- ***Fire Control System for SOF Combat Assault Rifle (SCAR) Grenade Launcher*** **- Test fire control and ammunition programming systems for enhanced grenade launch module for SCAR, improving range and suppressing hostile fire and other threats**
- ***A/C Arresting System for F-22 and JSF*** **- Test computer-controlled caliper-disk aircraft arresting system that increases functionality and capability to arrest both heavy aircraft and lightweight fighters**
- ***Advanced Airborne Expendable Infrared Countermeasures (IRCM)*** **- Test the effectiveness of expendable IR countermeasures to counter emerging advanced infrared Man-Portable Air Defense Systems**

Out-year / Potential FCTs - - Support 8 to 12 new start FY09 projects ($16M)

- **Address warfighter operational issues / functional capabilities (effectiveness, employment, survivability, force protection, and/or sustainability)**
  - **How: Test mature, non-development allied equipment and technology for use in acquisition programs-of-record**
  - **Examples: Light-weight, high-energy density batteries; health monitoring systems; improved active and passive armor protection; real-time, persistent surveillance**

***Comparative Testing Office**

The Technology Transition Initiative (TTI)

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- Objectives
  - Accelerate transition of new technologies from DoD S&T programs into acquisition for production and deployment to US Armed Forces
  - Demonstrate new technologies in relevant environments
- Partners and Processes
  - Technology Transition Council
  - Technology Transition Working Group

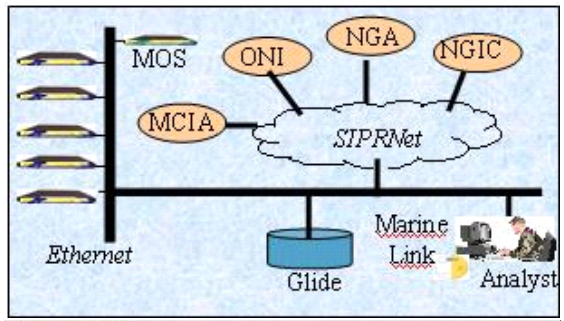
Countermeasures Protection System

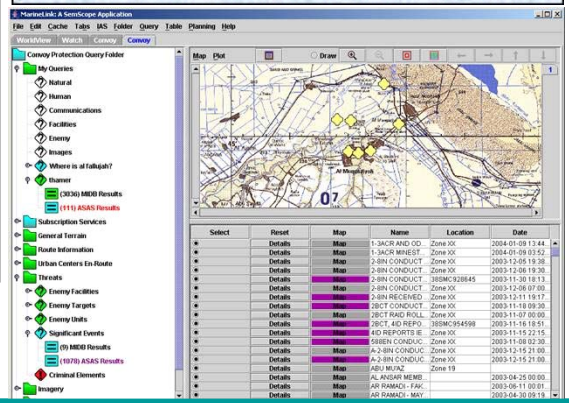
- Improves force protection against radio-controlled IEDs
- Deployed in GWOT

Water Purification Pen

- Eliminates risk of exposure to diseases and bio-chemical pollutants
- Deployed in IRAQ with each of the Services
- Sent as part of Tsunami relief effort in S.E. Asia

Semantic Web Network





- Incorporated into Marine Link
- Deployed w/1st and 2d MEF in Iraq
- Saves Analyst 4-5 hours per manual query

Technology Transfer Programs

- Objectives
  - Ensure full use of the Nation's investment in R&D (15 USC 3710)
  - Rapidly enhance warfighter capabilities via technology exploitation
- Benefits
  - Clear path from DoD S&T to application of technology
  - Commercial source for DoD items using DoD-developed technologies
  - Speed to deployment and cost-saving advantages
- Partners
  - US Industry (as opposed to contractual relationship)
  - Funds to support joint R&D efforts (funds from CRADAs)
  - Royalties on licensed inventions to reward inventors and perform R&D




FY08 Technology Transfer & Transition Initiatives

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Current TTI Projects (Examples): 12 continuing projects ($20M)

- ***Accelerate Extremely Insensitive Detonating Substances (EIDS) and Insensitive Munitions (IM) Solution in 155mm Artillery Ammunition:*** Greater soldier survivability and reduced ammo storage/relocation detonation risk while retaining weapon lethality
- ***Improved Heating Technology (IHT) for the Unitized Group Ration:*** Self-heating group ration that sustains warfighters in remote, austere locations
- ***Joint Service General Purpose Mask (JSGPM) Filter End-of-Service-Life Indicator:*** $10M/yr savings in reducing unnecessary filter exchanges
- ***Solid State Laser Igniter for Artillery Applications:*** Safer, cheaper, more reliable means of firing 155mm artillery
- ***Tactical Idle Reduction Equipment for Heavy Tactical Vehicles:*** Saves 15M gallons/year in fuel with associated reduced fuel convoy personnel risks

Out-year/Potential TTI Projects: 6 to 8 new start FY09 projects ($10M)

Focus on TTI projects that enable affordable and decisive military superiority

- Address the following high-level mission areas: Battlespace Awareness; Stability of Operations; Cultural Awareness; Force Management; Command, Control and Information Management; Net-Centric Operations; Protection; Joint Training; Tailored Force Application

FY08 Defense Production Act Title III Initiatives

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Current DPA/T3s:

Atomic Layer Deposition Hermetic Coatings: ...domestic ALD for electronic components; transition to fabrication process for DDG-1000.

ALON/ Spinel:...domestic source of durable ceramics for transparent armor and apertures used in IR equipment and ballistic windows.

Beryllium Production: :...domestic source of high purity beryllium for defense sensors, missiles and satellites, avionics, weapon applications.

Boron Fiber: ...modernizing manufacturing processes of sole domestic source of boron fiber.

Coal-based Carbon Foam: ...establishing high-volume production for carbon foam materials in light weight tooling & non-structural components.

Reactive Plastic CO2 Absorbent: ...expanding production of reactive plastic CO2 absorbent to reduce hazards/increase diver mission duration.

Lithium Ion Batteries for Space:...long-life cells for space systems using assured domestically produced materials.

Military Lens Systems: ...advanced optics for multi-spectral fused imagery.

FY08 Defense Production Act Title III Initiatives

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Emerging/Imminent DPA/T3s:

Armstrong Titanium Production ...project aims to develop capabilities that lead to domestic production of low-cost titanium (**RFP in-process**).

Methanol Fuel Cells: ...components for soldier-portable equipment power.

SWORDS Safety Confirmation Testing and Production ...establish capability to produce a modified robotic system for confirmation testing.

Life Cycle Support Center for Unmanned Systems ...expanded capacity to support unmanned systems upgrade and repair for DoD and first responders.

Light-Weight Ammunition & Armor...establish production capacity for rigid polymer ammo cartridges to reduce weight for warfighters and transportation.

Out-year/Potential DPA/T3s:

Gallium Nitride (GaN) Radar Monolithic Microwave Integrated Circuits

S-Band radar: affordable production capability for GaN MMICs on SiC (fy09)

X-Band radar: affordable production capability for GaN MMICs on SiC (fy10)

Joint Capability Technology Demonstrations

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- **Enable Combatant Commanders to fill seams and gaps in core warfighting capabilities…particularly multi-Service operations**
- **Deliver new and *relevant* technology to warfighters *quickly***
  - ***The JCT Demonstration Program is not a procurement program***
  - ***JCTDs provide options that can lead to accelerated procurement***
- **Overcome resistance to transformational concepts (eg, tech risk)**
- **Integrate technology, joint doctrine and coalition operations**
- **Chartered to bypass delays in fielding innovative capabilities… …requires Transition Planning upfront.**

A Deliberate Technology Transition Strategy is Required to Begin a JCTD

JCTDs are not developmental projects...

- ~~Development~~ (Integrate to Demonstrate)

...JCTDs integrate, demonstrate and deliver new capabilities for urgent COCOM needs within 1 - 3 years and become enduring warfighter resources.

- Adaptation, Modification, Refinement, Prototype, Tech Insertion, Improvement, Revision, etc. to enable Joint, Coalition or multi-Service operations

JCTDs apply, integrate, prototype, modify, adapt and deliver new capabilities to satisfy validated COCOM urgent needs.

FY08+ JCTD Initiatives & Emerging Opportunities

Current JCTDs:

Communications Air-Borne Layer Expansion (CABLE) (STRATCOM/USAF): **Airborne communications backbone network for IP-based, high capacity data transfer with secure gateways to interconnect data links and voice**

Joint Force Protection Advanced Security System (JFPASS) (STRATCOM / USN / USAF): **Integrated system protects expeditionary military installations**

Hard Target Void Sensing Fuze (HTVS) (STRATCOM / USAF): **Competitive prototype of survivable, void sensing fuze to destroy deeply buried targets**

Shadow Harvest (SOUTHCOM / USAF): **Demonstrate a rapidly configuarable non-traditional ISR pod on a C-130 aircraft to find obscured targets**

Out-year/Potential JCTDs:

Net Zero Plus (CENTCOM / USA): **Utilizes alternative energy technologies to reduce energy footprint at military facilities and forward operating bases**

Cross Domain Collaborative Information Environment (CD-CIE) (JFCOM / DISA): **Open standards, non-proprietary, secure, scalable, cross domain collaborative info environment for multinational information exchange**

Collaborative Security Environment (CSE) (SOUTHCOM / JFCOM): **Integrated decision and assessment tool to support coalition security**

Joint Recovery and Distribution System (JRADS) (TRANSCOM / Army): **Integrates joint cargo handling system for intermodal load and recovery ops**

Strategic Initiative on Innovation and Tech Transfer

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- Technology access has changed throughout the world; proliferation of potentially disruptive technologies is the new way of global competition and economic success; DoD is no longer at tje forefront of most tech research; fewer sources for growing numbers of warfighter-relevant technologies with shorter threat/refresh/support cycles

- The Strategic Initiative for Innovation and Technology Transition is tasked to create an action plan that will accelerate the movement of technology to Warfighters
  - particular emphasis on global outreach, flexible contracting, and strategic linking of the Department's agile acquisition initiatives to set conditions for an "outward looking" culture ... a transformation!

References and Discussion

Advanced Systems & Concepts (AS&C)	**www.acq.osd.mil/asc**	**703-695-5036**
Joint Capability Tech Demo (JCTD)	**www.acq.osd.mil/actd**	**703-697-5558**
Comparative Test Office (FCTs)	**www.acq.osd.mil/cto**	**703-602-3740**
Office of Technology Transition	**www.acq.osd.mil/ott/tti**	**703-607-5316**

Considering Warfighter R&D Investments…

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…questions should be answered affirmatively:

1. Does the action address the COCOM's needs[1]?
2. Is a significant Joint capability or military advantage gained?
3. Do we have a clearly stated and attainable goal/outcome?
4. Have risks and costs been fully and frankly analyzed?
5. Have all other DOTMLPF[2] means been fully explored?
6. Is there an exit strategy to avoid endless development?
7. Have consequences of inaction been fully considered?
8. Can support be garnered from the Services[3] and Congress?
9. Are experienced people available to execute the effort?
10. Can results be demonstrated to project champions (<PCS)[4]?

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[1] Integrated Priority Lists and Most Pressing Military Issues – as validated by JCS J8
[2] DOTMLPF: Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities
[3] Enduring outcomes are all about timely transition to an affordable and sustainable capability
[4] Demonstrate 80% capability before CoCom champion/sponsor moves to next assignment

Criteria proposed by John Kubricky for selecting project candidates to support CoCom needs.