OSD Manufacturing Technology Overview
New Orleans, LA
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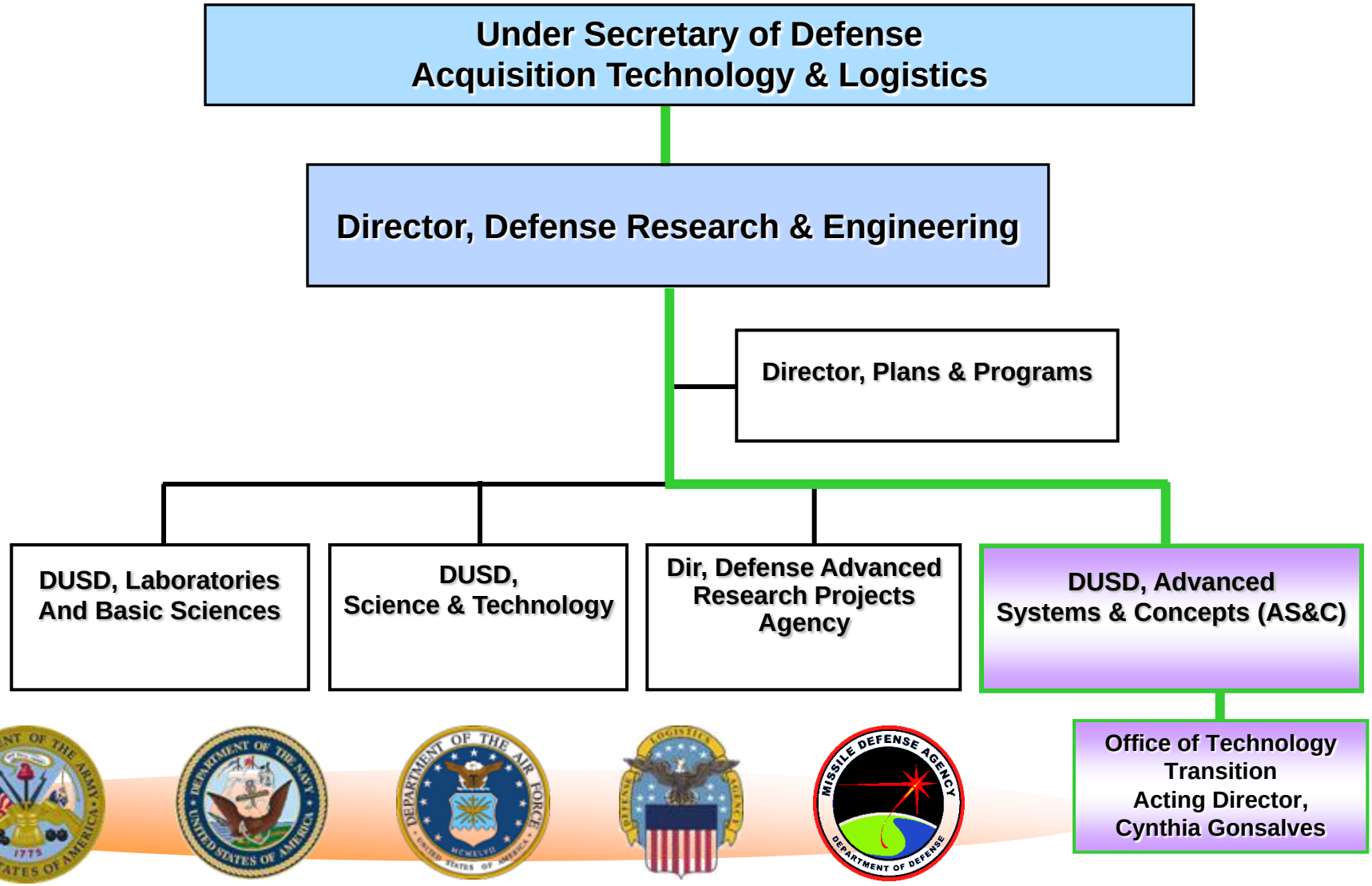
Topics

- Organization
- Manufacturing Readiness Level (MRL)
- GAO Study on Manufacturing Readiness
- DoD Strategic Plan
- Manufacturing S&T Program (OSD D-Line)
- Industrial Base Innovation Fund (IBIF)
- American Reinvestment and Recovery ACT (ARRA)
- Summary

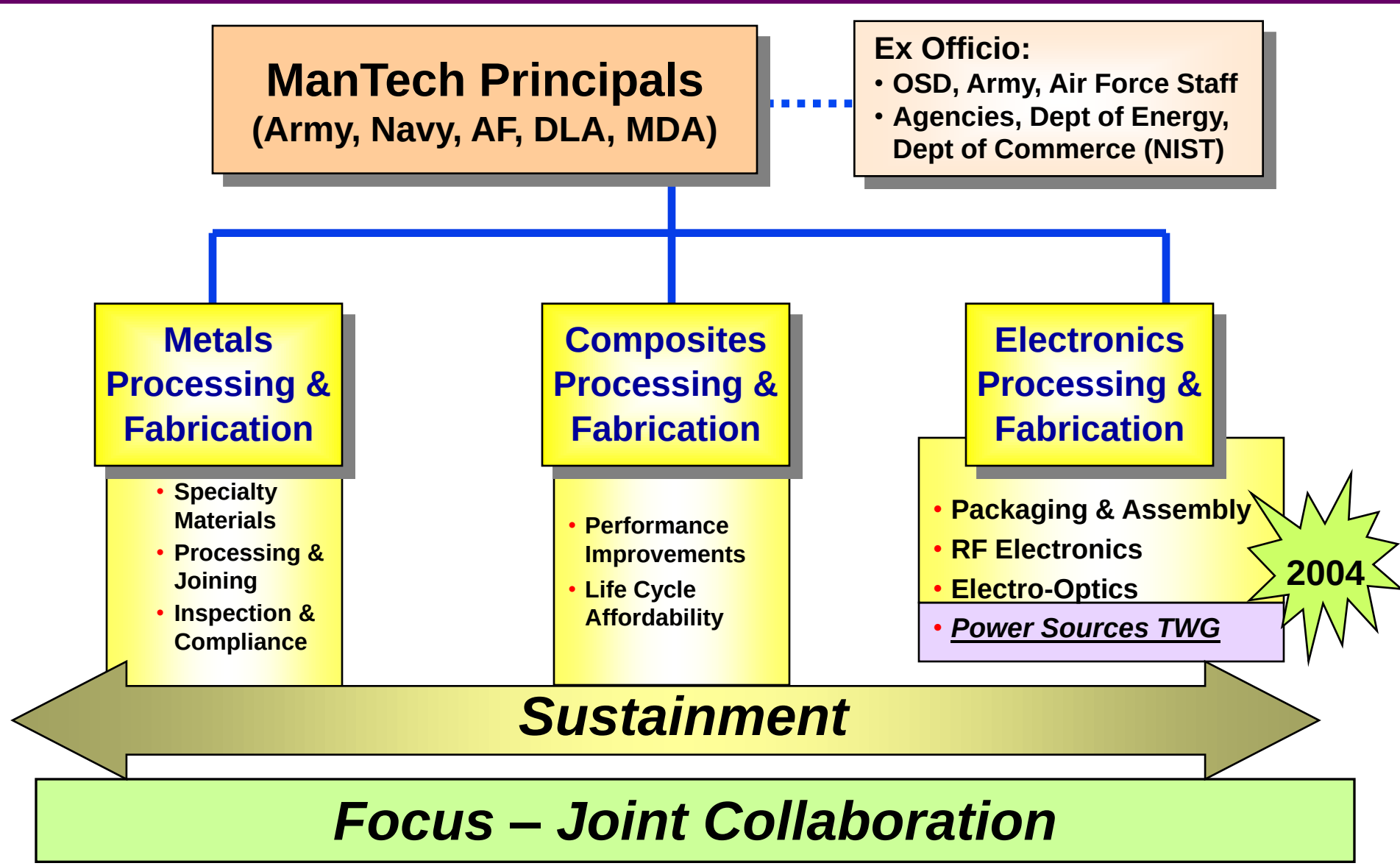
AT&L Chain of Command



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, ATDs, IR&D, & ACTD products
    - Focus: Manufacturing process investments, not product design

Joint Defense ManTech Panel (JDMTP)



MRL - Background

Immature technology & unstable manufacturing processes are major acquisition drivers

- Recent GAO study of 72 programs: RDT&E costs up by 42% with schedule slippage of 20%

Manufacturing Readiness Levels (MRL) Developed

- Common Standard and framework for identifying, communicating, and managing manufacturing risks
- Establish and promote manufacturing risk management as basic principal of technology development and acquisition programs
- Establish DoD standard for manufacturing readiness to support decision makers at key milestones
  - Milestone A – MRL4
  - Milestone B – MRL 6
  - Milestone C – MRL 8
  - FRP Decision – MRL 9
- Support the development and maintenance of necessary knowledge and skills within the DoD workforce to support this best practice already used by key U.S. defense industries

Equip the DoD Enterprise with Knowledge Based Approach to Manufacturing Risk Management - Standard, Tools, and Training

Manufacturing Activities

- DOD 5000.2 signed 2 December 2008 by AT&L
- Collaboration within OSD to align manufacturing activities to existing acquisition and technical reviews
- Integrate Manufacturing Readiness activities into the Systems Engineering Process
- Defense Acquisition Guidebook (DAG) – being updated to reflect increased focus on mfg early in acquisition development (TDS and Acq Strategy)

All MR products are available at www.dodmrl.org

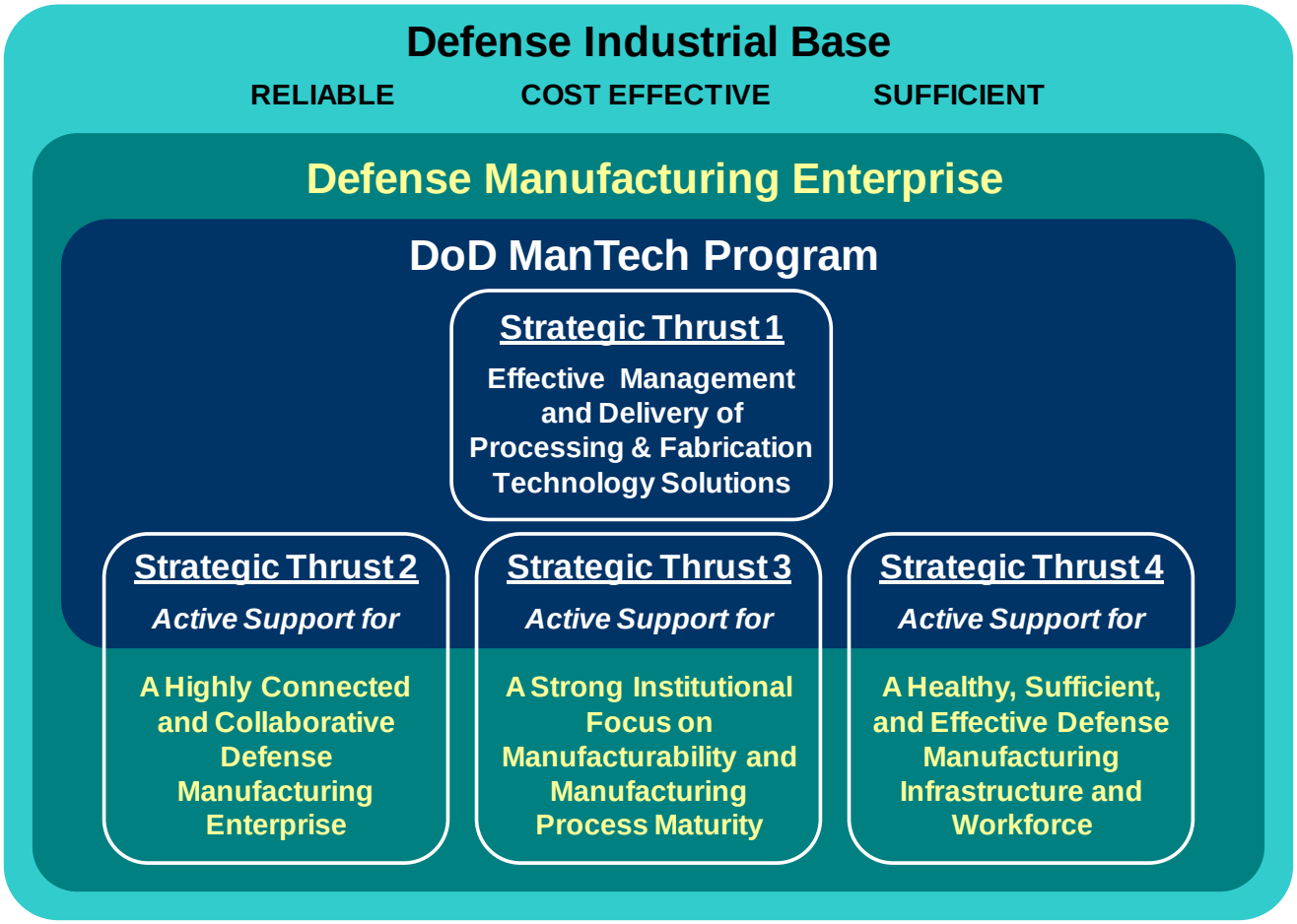
GAO Study
MRL & Integration RL Implementation

- A 12 to 14 month review to examine the manufacturing aspects of the acquisition process & the potential benefits that could be derived from manufacturing & integration readiness levels
- GAO plans to look at DOD's initiatives, & commercial sector companies & their practices for comparative purposes
- OSD in-brief Monday, 11 January 2009
- OSD, Services/Agencies
- Industry Participants Wanted
- Any volunteers from the audience??? More to Come..

ManTech Strategic Plan (MTSP)

- Congressionally directed by NDAA 2008 language
- The DoD ManTech Strategic Plan was signed by AT&L March 2009
- Strategic messages:
  - Strong, positive support for ManTech program in all camps; recurring calls for bold thinking
  - Affordability remains an overarching concern
  - Institutional focus on "Manufacturability" is strategically important--keep championing the Manufacturing Readiness Assessment (MRA) concept
  - Workforce concerns are pervasive; responsibility for solution sets not clear

Strategic Thrusts



A balance between ManTech's core program responsibilities and active support for broader defense manufacturing enterprise needs

ManTech Strategic Plan (MTSP)

- The plan:
  - Emphasizes affordability as a "focusing theme"
  - Leverages existing program strengths--much is going well
  - Expands the focus on 21st Century trends and a global, collaborative context for framing ManTech investments--*joint/crosscutting capabilities & enablers are key*
  - Provides direction for model-based & network-centric approaches to enhance common operating pictures, product data exchange, supply chain integration
  - Postures the ManTech program as a strategically important tool for DoD leadership priorities in S&T, acquisition, and sustainment

FY 2009 ManTech Budget

RDT&E-Defense Wide	*Dollars in Thousands*			
Appn Line: Various	**Approp Delta:**	**+$49,300**	**+$46,200**	**+$78,800**
MANTECH	**Budget**	**House**	**Senate**	**Conference**
Appropriations	**$197,955**	**$247,255**	**$244,155**	**$276,555**
Army –Industrial Preparedness (0708045A)	$69,084	$89,884	$78,284	$91,084
Air Force – ManTech (0603680F)	$39,729	$43,729	$42,729	$45,329
Air Force – Industrial Preparedness(0708011F)	$0	$6,000	$0	$4,800
Navy – Industrial Preparedness (0708011N)	$56,681	$63,181	$56,681	$61,881
DLA – Industrial Preparedness (0708011S)	$20,480	$32,480	$44,480	$55,280
Defense (PE 060368D8Z)	$11,981	$11,981	$21,981	$18,381
	Auth Delta:	**+$16,000**	**+$52,700**	
Authorizations	**$197,955**	$213,955	$250,655	
Army –Industrial Preparedness (0708454A)	$69,084	+78,084	+80,084	
Air Force – Industrial Preparedness (0603680F)	$39,729	+43,729	+39,729	
Air Force – Indust Prepared. BA 7	$0	+3,000	$0	
Navy – Industrial Preparedness (0708011N)	$56,681	+56,681	+58,381	
DLA – Industrial Preparedness (0708011S)	$20,480	+20,480	+50,480	
Defense Wide (PE 0603680D8Z)	$11,981	+11,981	+21,981	

Defense-Wide Manufacturing Science and Technology Program - Overview -

Program Motivation:

- Responds to Section 241 of NDAA 2006 and GAO reports on acquisition program cost drivers
- Identify and transition advanced manufacturing processes and technologies that would achieve significant productivity and efficiency gains within the defense manufacturing base

Product: mature or lower risks manufacturing processes that can transition to programs of record, industry, or follow-on maturity programs

Execution Approach: Air Force Manufacturing Technology Program

Customer: Industrial Base, Programs of Record, and follow-on maturity programs

Measure of Success:

- Decreased production costs or time to production
- Increased affordability – unit costs and life cycle costs
- Improved operational availability – mean time between failure reduced
- Accelerated application of emerging technologies

Defense-Wide Manufacturing Science and Technology Program - Funding -

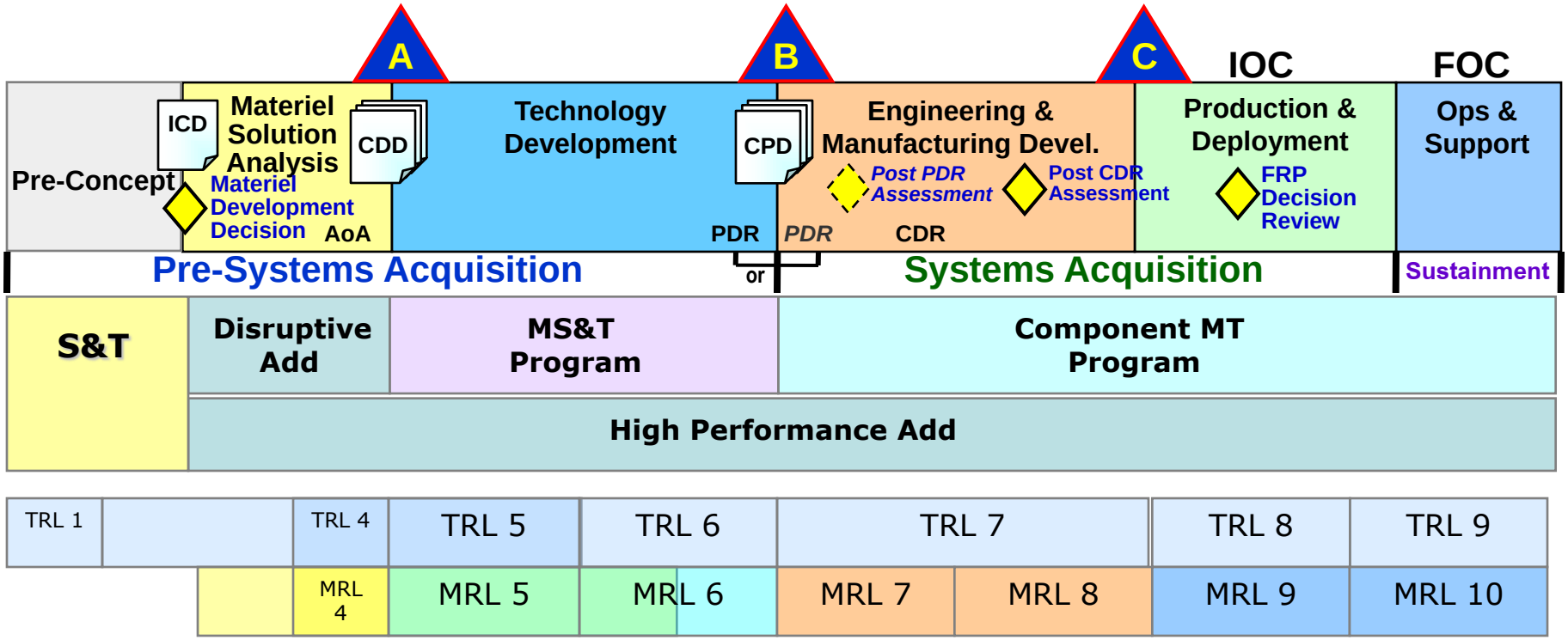
Dollars in thousands	FY 09 PBR	FY 09 Appropriation	FY 10 PBR
PE 0603680D8Z	$11,981	$18,280	$14,638

- Take risks that components/agencies can not take within respective portfolio
  - modeling and simulation, production processes for emerging warfighting technologies
- Inform DoD wide policy via manufacturing demonstrations and pilots
  - new 3D technical data, new manufacturing process data files
- Address cross-cutting manufacturing issues and opportunities
  - no ownership issues e.g. lead free

- FY 09 Congressional adds and status
  - High Performance Manufacturing
    - National Constituent add
    - Launching efforts in
      - Next generation tools for model based manufacturing enterprise
      - Model based manufacturing enterprise tools to support Future Combat System

Manufacturing Maturity Targets

- Core MS&T targets Technology Readiness Levels (TRLs) and Manufacturing Readiness Levels (MRLs) of 5 to 6
- High Performance Manufacturing focuses on “above the shop floor” issues and targets TRL/MRL from 3 +
- Disruptive Manufacturing targets TRL/MRL of 3 to 4



Selection Criteria

1. Basic ManTech Tenet *(a Go/No-Go Decision)*

- Enhances manufacturability / producibility of a process or component
- Beyond reasonable / normal industry risk
- Requirement is defense-essential or defense-unique

By:

- **Improving an Existing Manufacturing Processes**
- **Establishing a New Manufacturing Process**
- **Exploiting Business Practices**
- **Expediting Transition of Emerging Technology**

2. Joint Service, Cross-Cutting Impact

- Multi-service, multi-system applications
- Enterprise issues beyond the ability of a single service to address
- Stimulate early development of manufacturing processes
  - Warfighting capability, cost, cycle time benefits do not have to be firm yet

3. Implementation

- Path towards transition during and after the proposed program
  - Implementation not required immediately after a program
  - Next step may be a service MT program

Defense-Wide Manufacturing Science and Technology Program - Technical Goals -

- FY09 Technical Goals - Continued 4 core technical initiatives and 2 congressional adds
  - Ceramic Matrix Composites Manufacturing Initiative
  - Low Observable Materials Manufacturing Initiative
  - System-on-chip Manufacturing Initiative
  - Prosthetic and Orthotics Manufacturing Initiative
  - High Performance Manufacturing R&D - congressional add
  - Disruptive Manufacturing – congressional add
- FY 10 Strategic Goals
  - Strengthen linkage to Industry and S&T communities – Emerging S&T Technologies, DARPA, Technology Focus Teams, National Defense Industrial Association (NDIA)
- FY10 Technical Goals
  - Launch new-start projects in materials, electronics, and model based enterprise manufacturing

MS&T FY09/FY10 Strategic Themes

- Directed Energy (offensive and defensive)
- Survivability
  - Ballistic protection
  - Low observable structures & transparencies
  - Countermeasures
- Disruptive Green and Energy Technologies
  - Power & Energy
    - Li-Ion battery
    - Solar cells
    - Fuel cells
  - Lead free solder
  - Nano for electronics
  - Fuel efficiency
    - Advanced structures
    - Propulsion
  - Environmentally friendly manufacturing
- Manufacturing Best Practices
  - Model Based Enterprise, Lean, supply chain visibility, network centric manufacturing...

Standing Technology Focus Team (TFT) Proposal

- Standing TFTs on big areas
  - Provide the top 5-6 objectives for respective technology areas in the 1st year
    - Target date for reaching objectives is 5-10 years out
  - Revalidate the objectives and deep dive in 1 or 2 areas, each subsequent year
  - Brief results to the DSTAG

Big Areas

- **Advanced Electronics ($520M)**
- **Advanced Materials ($340M)**
- **Information Systems ($1.870B)**
- **Robotics & Autonomous Systems ($100M)**
- **Human Systems ($440M)**
- **Sensors & Surveillance ($980M)**
- **Energy & Power ($620M)**
- **Space?**
- **Directed Energy?**

We have performed assessments in big areas. We need to continue to populate websites and get info out.

- ✓ **Electronics**
- ✓ **Materials (Meta/Thermal Mgmt/Energetic Mat)**
- ✓ **Info Systems (Info Assurance/Networks/SW)**
- ✓ **Robotics/Autonomy**
- ✓ **Human Systems (Accel Learning)**
- ✓ **Sensors (Thru the Wall and IRFPAs)**
- ✓ **Energy & Power (Thermal Mgmt)**

Industrial Base Innovation Fund (IBIF)

•The Department of Defense Appropriation Act for Fiscal Year 2008, Pub. L. 110-116, provided $24 million for the Industrial Base Innovation Fund (IBIF) in the Research, Development, Test and Evaluation, Defense-Wide appropriation.

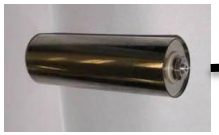
•The conferees provide $24 million for the Industrial Base Innovation Fund to ensure that investments are made to address shortfalls in manufacturing processes and technologies in support of the Department's long-term and short-term needs

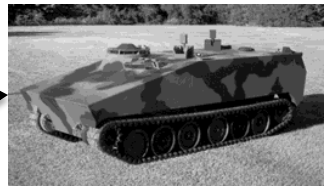
•This program is being executed through the Defense Logistics Agency's Manufacturing Technology Budget

•Of the $24 million provided by Congress, almost 20% ($4.625 million) was allocated to Power and Energy proposals

FY08 IBIF - UHP Li-ION TECH FOR THE JSF/DE APPL'NS (SAFT America, Inc)

SAFT UHP | JSF MODULE | F-35





HYBRID ARMORED VEHICLES

PROBLEM

- Evolving Power Needs of the F-35 JSF Aircraft with Short Circuit Current in excess of 4,000 A RESULT: Thermal Runaway Destruction of Battery and Aircraft

OBJECTIVE or SOLUTION

- Industrialize the robust VL5U cell technology to eliminate the weak Glass to Metal seal in the JSF cell design. Provides increased low temperature performance margin, a producible cell design, and reduced acquisition cost.

APPROACH

- Transition the VL5U cell development technology to production.
- A: Optimize mixing and coating for thin electrodes, reduce variability in electrode calendering and winding, & use production welding
- B: Optimize cell weight and bussing and validate abuse tolerance
- C: Incorporate VL5U cell in JSF Module and validate performance

BUSINESS STRATEGY

- **Joint:** AFRL/RZPS and USA RDECOM/TARDEC
- **Execution:** USAF
- **Performing Organization(s):** Air Force Research Laboratory/RZPS
- **Projected Start Date and Duration**: 26 Sep 08 (21 Months)

Funding ($K)	FY08	FY09	FY10	FY11	Total
OSD ManTech	$1,400	$0	$0	$0	$1,400
USA ManTech	$0	$0	$0	$0	$0
PM	$0	$0	$0	$0	$0
Industry	$360	$0	$0	$0	$360
Total Annual	$1,760	$0	$0	$0	$1760

COTR: John Erbacher (937-255-2372)

LEVERAGED EFFORTS

- AF UHP Technology & USA Prototype VL5U Cell Developments
- Industrialized VL5U Cell and Design will be incorporated in the JSF and Hybrid Armored Vehicle Development Programs.
- Other Opportunities Include Tri Service DE Applications & USA FCS

BENEFITS / WARFIGHTER RELEVANCE

- A Robust 270 V JSF Battery
- Short Circuit Protection
- Low Temperature Increased Performance Capability
- Reduced Parts Count (TBD)

IMPLEMENTATION

- Army: Hybrid Armored Vehicles for FCS
- Navy: JSF Carrier Variant
- Air Force: JSF and DE Development Programs

FY08 IBIF - Press Upgrades for the Thermal Battery Cells
EaglePicher Technologies, Joplin MO

Problem:

- Thermal battery manufacturing relies on hydraulic presses to form the pellets that form thermal battery cells. Tight control of pressing parameters is critical to achieving acceptable yield and performance.
- Existing presses at EP require enhancement to achieve better pellet yields and quality

Hydraulic presses used to make thermal battery pellets will be upgraded with modern controllers and measuring devices to improve the manufacturing processes

Technology Approach

- IBIF investment will co-fund these press control and measurement improvements at EaglePicher
- Modern controllers and press measurement devices will be adapted to the specialized presses and validated for all pellet types (anode, cathode, separator/electrolyte and heat)
- Will improve ALL thermal batteries made by EP for Air Force, Army, Marine Corps and Navy weapons, and increases surge production capacity

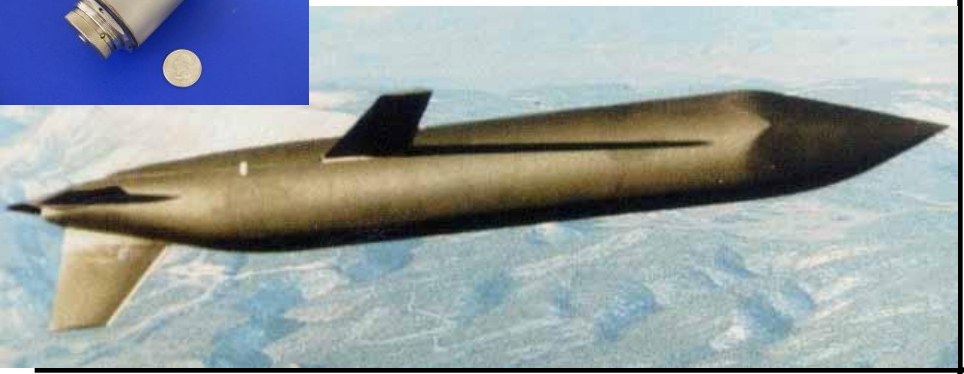
Status

- Project time line to completion is six months
- Estimated start date is May 2009
- Contracted via Picatinny Arsenal

COTR: Sam Stuart (812) 854-5958

FY08 IBIF - Development of Industrial Process for High Yield, High Quality Automated Thermal Battery Stacking & Inspection (Advanced Thermal Batteries Inc).

Advanced Cruise Missile



PROBLEM

High cost of hand built thermal batteries

OBJECTIVE

Reduce cost of battery production

APPROACH

Research design and cost of the automated pellet stacking part of the battery assembly

BUSINESS STRATEGY

- Of interest by several services
- Executed by Air Force for DLA
- Performed by Advanced Thermal Batteries, Inc.
- Started 1 Oct 08 for 14 months

Funding	FY-08	FY-09
IBIF	$652K	TBD

LEVERAGED EFFORTS

- This technology is of interest to primarily the military.
- The automation of battery assembly can reduce costs.

BENEFITS / WARFIGHTER RELEVANCE

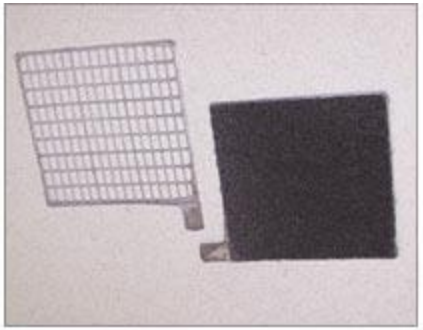
- Cost of batteries to targeted systems reduced by 7.5%.
- Potentially higher reliability due to less human touch.

IMPLEMENTATION

- Present battery in Advanced Cruise Missile
- Present battery in MK-54 Torpedo

COTR: Robert Drerup (937) 904-4373

FY08 IBIF - Advanced Process Engineering for Cost Effective Battery Mfg. (Firefly Energy)



Conventional lead grid (left).
Firefly carbon-graphite foam grid (right)

Challenge

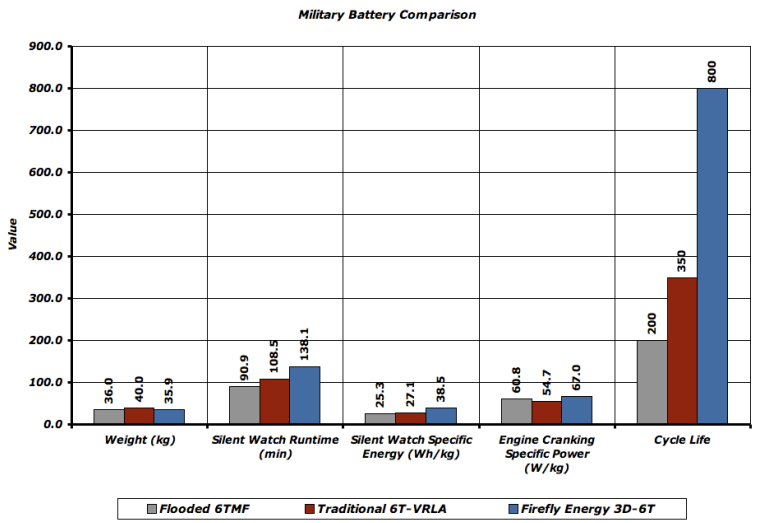
Current lead acid batteries have limitations when used in hot climates, relatively short shelf lives and are not able to meet future needs such as “Silent Watch

•Project Goals:

•To replace traditional lead acid batteries with advanced lead acid technologies
• Improved process engineering to reduce scrap and improve component performance
• Develop automated production techniques to produce these batteries in a cost effective manner
• Reduce the unit price of the new battery

Benefits

- Performance
  - Up to 50% increase in battery runtime
  - 4 fold increase in cycle life
  - 20% reduction in battery weight
- Logistical
  - Reduced battery demands
  - Reduced maintenance costs
  - Less batteries to store and transport
- Projected (contractor) annual savings
  - $1M+ over 100,000 batteries (Assumes only a 20% conversion to Firefly 6T)
  - Life cycle costs could be between $36 - $63M per year depending on actual demand



COTR: Marc Gietter (732-532-6764)

Industrial Base Innovation Fund (IBIF)

- FY 09 - $19 million add
- BAA amount: $10 million
- 8 Dec: JDMTP submits topics to DLA
- 9 Jan: BAA advertised in FED BIZ OPS
- Early Feb: Pre-proposal Conference
- 6 Mar: BAA closes
- April 2009: Proposal review
- June 2009: Selectees announced

ARRA Projects

- $5M Ceramic Matrix Composites
- $19M Fuel Cell Manufacturing Technology Initiative
  - Leverages DDRE Grand Challenge
  - 2 Fuel Cell Systems
  - 25 Watt Soldier Portable (follow-on to success of 2008 DOD Wearable Power Challenge)
  - 300 Watt Squad Level Charger to support GSE (endorsed by PEO-Soldier)

FY09 ARRA Project
Soldier Portable and Squad Level Fuel Cells

DESCRIPTION

- Develop soldier portable (25 watt) and squad level (300 watt) fuel cells
- Leverage existing technologies to mitigate risk
- Conduct field testing of systems to assure user acceptance
- Automate production lines to increase reliability and decrease unit cost
- Initiate LRIP
- Transition products to PM SWAR and DLA.

BENEFITS/METRICS

- Establish domestic production base
- Economic stimulus to U.S. industry through job creation and retention.
- Provides power for battery recharging.
- Reduces battlefield logistics of fuel and batteries.

FUNDING ($M)

FY08	FY09	FY10	FY11
0.0	19.0	0.0	0.0

Look for the opportunity to bid in FED BIZ OPS by end of May 2009

Thank You!


DEPARTMENT OF DEFENSE
DLA
MDA
ARMY
AIR FORCE
NAVY
MANUFACTURING TECHNOLOGY PROGRAM