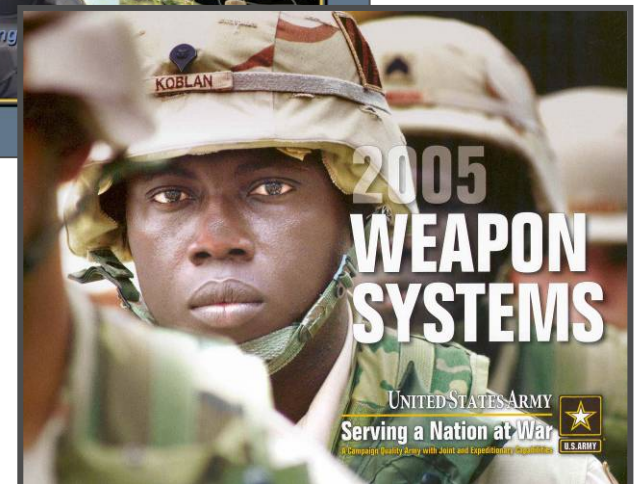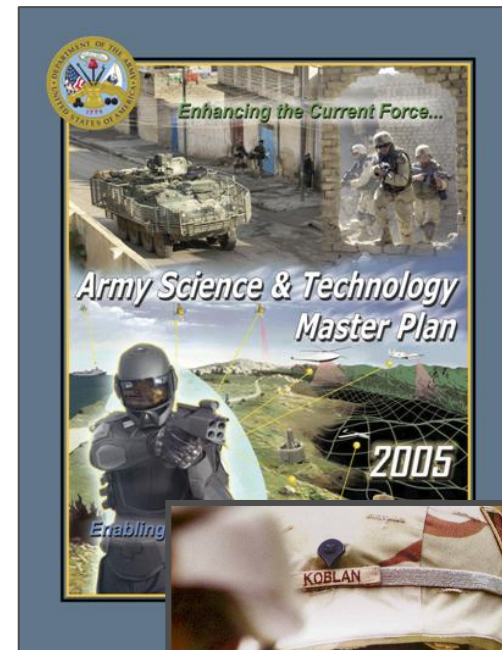# Army Science & Technology

NDIA Army Approach to Disruptive Technologies and Transition

20 April 2006

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Purpose

- ## **Describe some Army Disruptive Technologies**
  - ### **Future Combat Systems**
  - ### **Solid State Laser Technology**
  - ### **Immersive Training**

- ## **Describe Technology Transition Issues**

Capabilities for a Joint and Expeditionary Army

Current Force

~100 lb. load

70+ tons

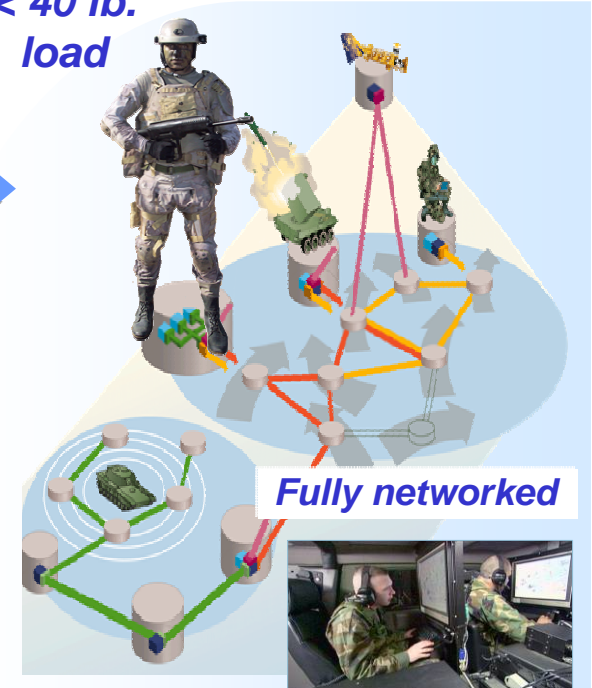**< 10 mph**

Future Force

< 40 lb. load

Enabling the Future Force

Science and Technology—develop and mature technology to enable transformational capabilities for the Future Modular Force while seeking opportunities to accelerate technology directly into the Current Modular Force
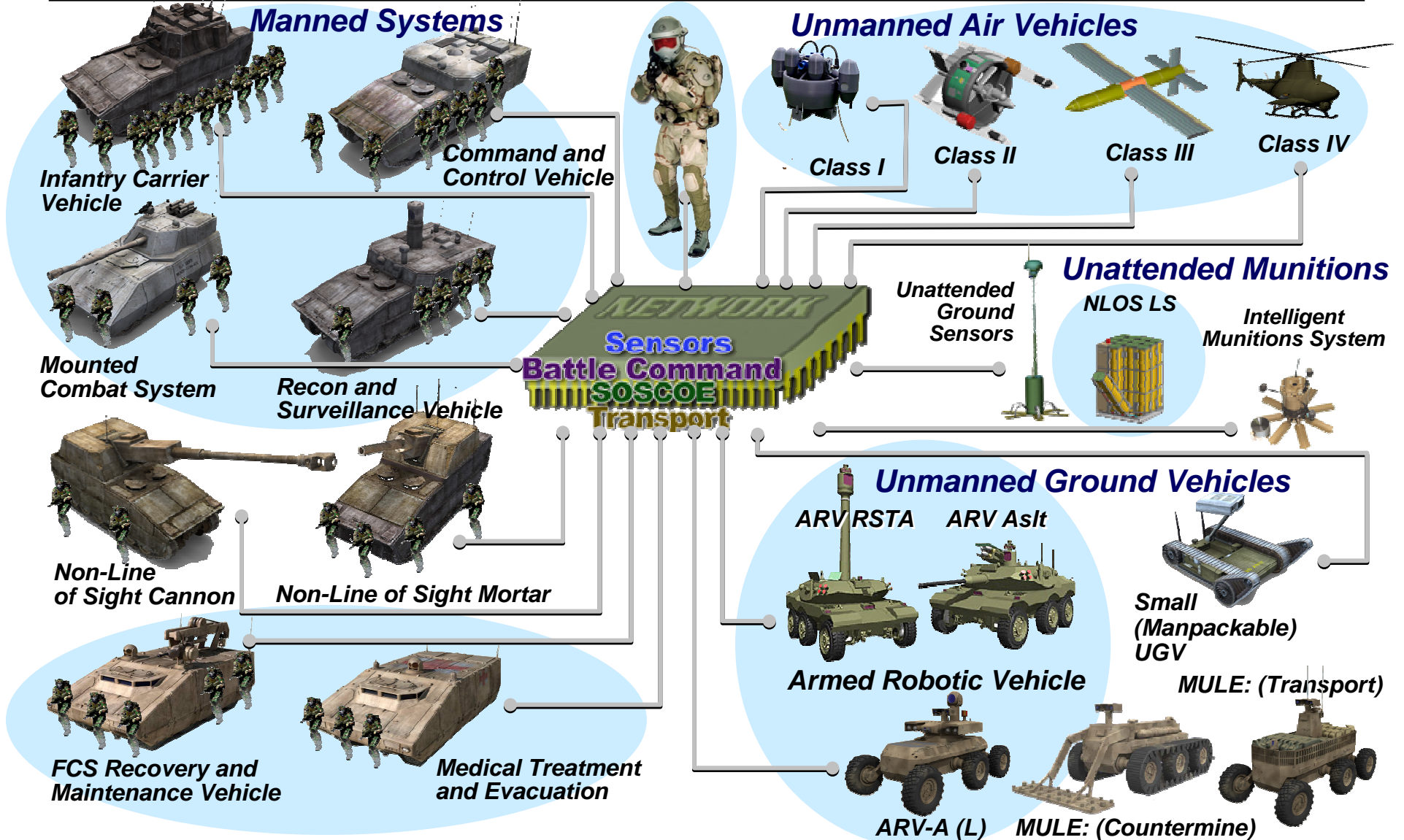
Enhancing the Current Force

Fully networked
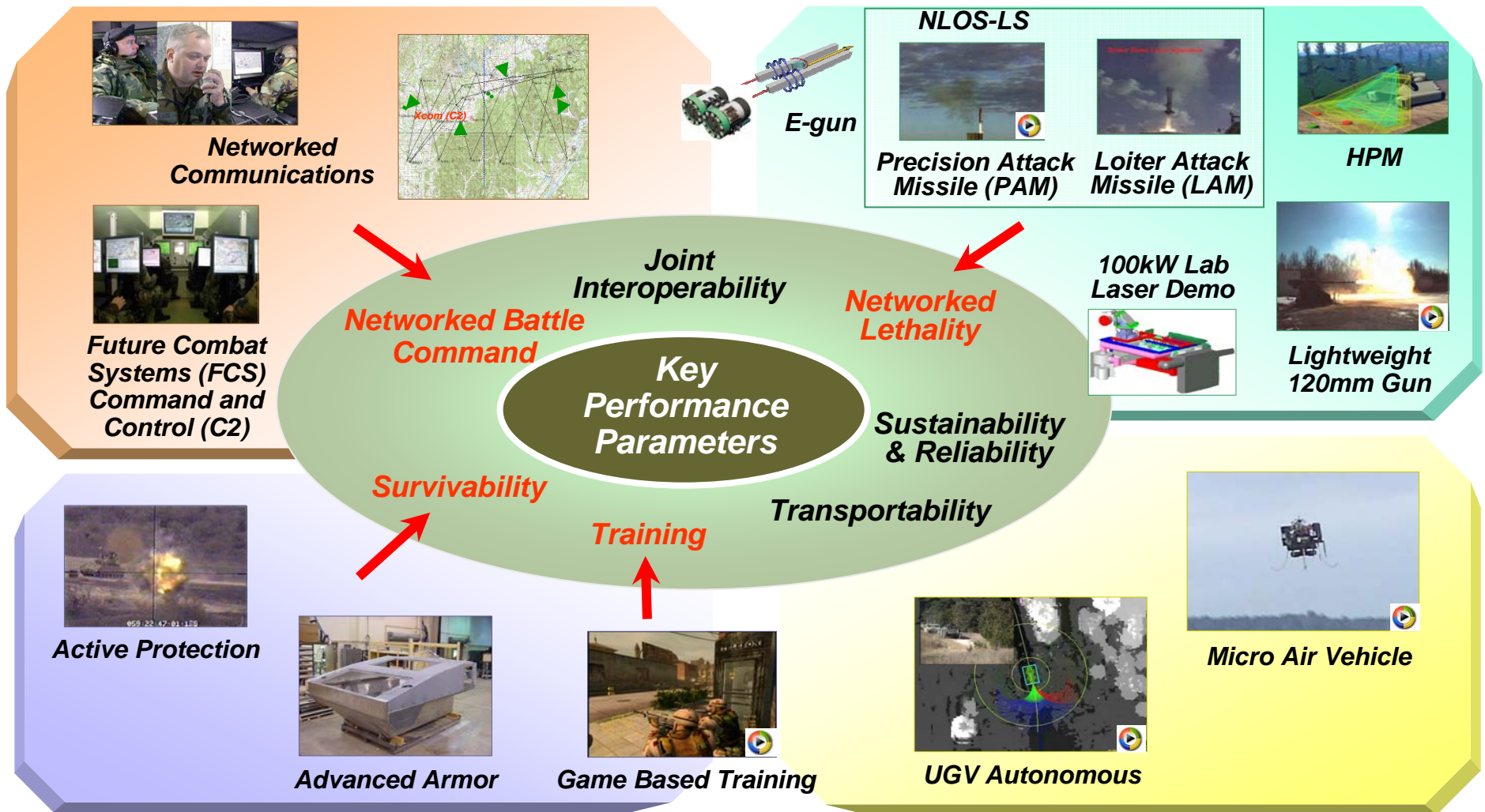
< 30 tons

> 40 mph

Future Combat Systems

U.S. ARMY

Manned Systems

Infantry Carrier Vehicle

Command and Control Vehicle

Mounted Combat System

Recon and Surveillance Vehicle

Non-Line of Sight Cannon

Non-Line of Sight Mortar

FCS Recovery and Maintenance Vehicle

Medical Treatment and Evacuation

Unmanned Air Vehicles

Class I

Class II

Class III

Class IV

NETWORK
Sensors
Battle Command
SOSCOE
Transport

Unattended Ground Sensors

Unattended Munitions

NLOS LS

Intelligent Munitions System

Unmanned Ground Vehicles

ARV RSTA

ARV Aslt

Armed Robotic Vehicle

ARV-A (L)

MULE: (Countermine)

MULE: (Transport)

Small (Manpackable) UGV

Disruptive Technologies for FCS

Networked Communications

Future Combat Systems (FCS) Command and Control (C2)

E-gun

NLOS-LS

Precision Attack Missile (PAM)

Loiter Attack Missile (LAM)

HPM

100kW Lab Laser Demo

Lightweight 120mm Gun

Joint Interoperability

Networked Battle Command

Networked Lethality

Key Performance Parameters

Sustainability & Reliability

Survivability

Training

Transportability

Active Protection

Advanced Armor

Game Based Training

UGV Autonomous

Micro Air Vehicle

Why FCS? Providing Strategically Responsive Forces with Information Dominance and Paradigm Shifting Lethality & Survivability

# Solid State Laser (SSL) Technology for Force Protection

Develop and demonstrate weapons-traceable Solid State Laser (SSL) technologies for future force

Program Provides:

- **Development of solid state high energy laser technologies to meet size, weight & efficiency needs of the future force**

- **25kW lab laser demonstrated in FY05, 100kW laser scheduled for demo in FY09**

- **Initial development of a 100kW laser for integration into SSL weapon demo in FY13**

- **Assessment of SSL lethality against targets of interest**

- **Exploration of novel laser concepts for high laser efficiency & low weight**
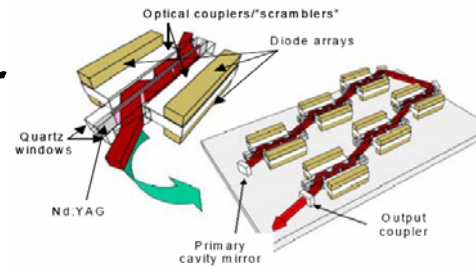
Textron 100kW Concept
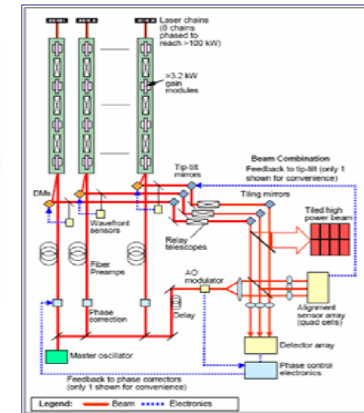
Northrop Grumman 100kW Concept

Notional Concept for Battlefield Employment of High Energy Lasers

Why Lasers?
Ultra-Precision, Scaleable Effects, Speed of Light Target Closure

Immersive Training

Embedded Training for FCS

Virtual Targets on Live Terrain

OneSAF Objective System

Sound

Flatworld

Gaming and Animation

Computer Graphics

HOLODECK

Artificial Intelligence

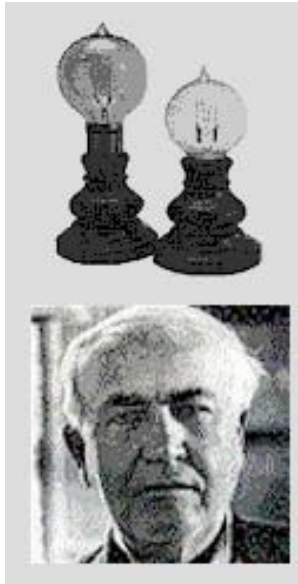"JFETS"—Joint Fires & Effects Trainer System at Fort Sill

Mission Rehearsal— Virtual Humans

Research in simulation environments for training, mission planning and rehearsal

Transitioning Technology
from Ideas to Capabilities

- **Technology concept**

- **Army Technology Objective**

- **Technology Transition Agreement**

- **Mature technology and transition to Program Manager**

3.6 Technology Development

3.6.1 Purpose. The purpose of this phase is to reduce technology risk and to determine the appropriate set of technologies to be integrated into a full system. ==Technology Development is a continuous technology discovery and development process reflecting close collaboration between the S&T community, the user, and the system developer.== It is an iterative process designed to assess the viability of technologies while simultaneously refining user requirements.

Technology Transition—
Technology Transition Agreements

Documents acquisition program needs for Critical Technologies from the S&T community

Key elements:

- **Program requirements**

- **Maturation strategy**

- **Milestones & schedule**

- **Funding**

- **Deliverables**

- **Key personnel**

FCS Technology Transition Agreements

Signed

- Security Systems and Algorithms (CT3B2)
- Dynamic Sensor-Shooter Pairing Algorithms & Fire Control (CT14)
- Recoil Management & Light Weight Cannon (CT17)
- Distributive Collaboration of Manned/Unmanned Platforms (CT18)
- Signature Management (CT26)

Signed 14

Being worked

- Water Generation and Purification (CT22A)
- Survivability (CTs 25A, 25B & 27)
- Power Distribution and Control (CT29)
- Manned Ground Vehicle High Density Packaged Power (CT31)

Draft 36

Partnering with PEOs to ensure maturity of Critical Techs

How do we get technology products to the warfighter faster?

- **Mature technology and get it to the PMs**
  - *Generate more options: "no single point of failure"*
  - *Demonstrate technology in operational environments*
  - *Defense Acquisition Guidebook:*
    - *"… the S&T Program is uniquely positioned to reduce the risk of promising technologies before they are assumed in the acquisition process."*

- **Use rapid acquisition initiatives**

- **Shorten SDD time**
  - *Technology matured and risk reduced in S&T*
  - *More concurrent developmental and operational testing*

- **Reduce time to production**
  - *Early operational testing*
  - *Manufacturing technology*

Lock requirements sooner

Technology Transition Issues— an S&T Perspective

- *Increasing Technology Readiness Level (TRL) does not by itself speed transition—evidence of TRL becomes debatable*

- *PMs use their own criteria to make technology maturity decisions—some want more tests, some want the final S&T demo to be in a form, fit, function equal to the final system, which is yet to be built*

- *Need stronger partnerships—commitment—between technology development and acquisition communities*

- *System Development & Demonstration (SDD) funding shortfalls*

- *Limited procurement funding may make the technology unaffordable*

If there was a simple answer or solution we wouldn't have issues

Technology Transition is a Contact "Sport"

- **PMs not convinced the technology is mature**
  - *Labs may promise more than they can deliver*
- **PMs want S&T to mature technology more—using S&T money**

  OR

- **PMs may want to control technology development**
  - *Time and money is lost "rediscovering" the technology*
- **PMs are concerned about too many integration unknowns**
  - *PMs doubt the technology is producible*
  - *S&T doesn't provide form, fit, function for the PM's system*
- **PMs may want to use their own contractor—not the S&T demo contractor**
- **PMs may find "acceptable" technology from non-S&T sources**

A Reasonable Way Ahead?

PEOs should require PMs to explain why they didn't use the technology available from the lab

- *PMs need to fulfill their agreements with the Labs or be upfront and tell them 'No'*

- *PMs need to commit resources to integrate the technology beyond that which is reasonable to expect from the Lab—the Labs don't integrate*

A Reasonable Way Ahead—more?

MACOMS/DASA(R&T) should require Lab Directors to show what they are doing to make the technology acceptable to the PM

– *Lab Directors need to come forward with proposed changes to the technical program when customer needs change*

– *Labs need to deliver what they say they are going to or inform the customer that they cannot do it*

Don't be absolutely program centric—
make technology decisions based upon what is best for the ARMY

Where do we go from here?

- *Don't be limited by traditional solutions*

- *Seek technology insertion opportunities*

- *Take technology when its ready*
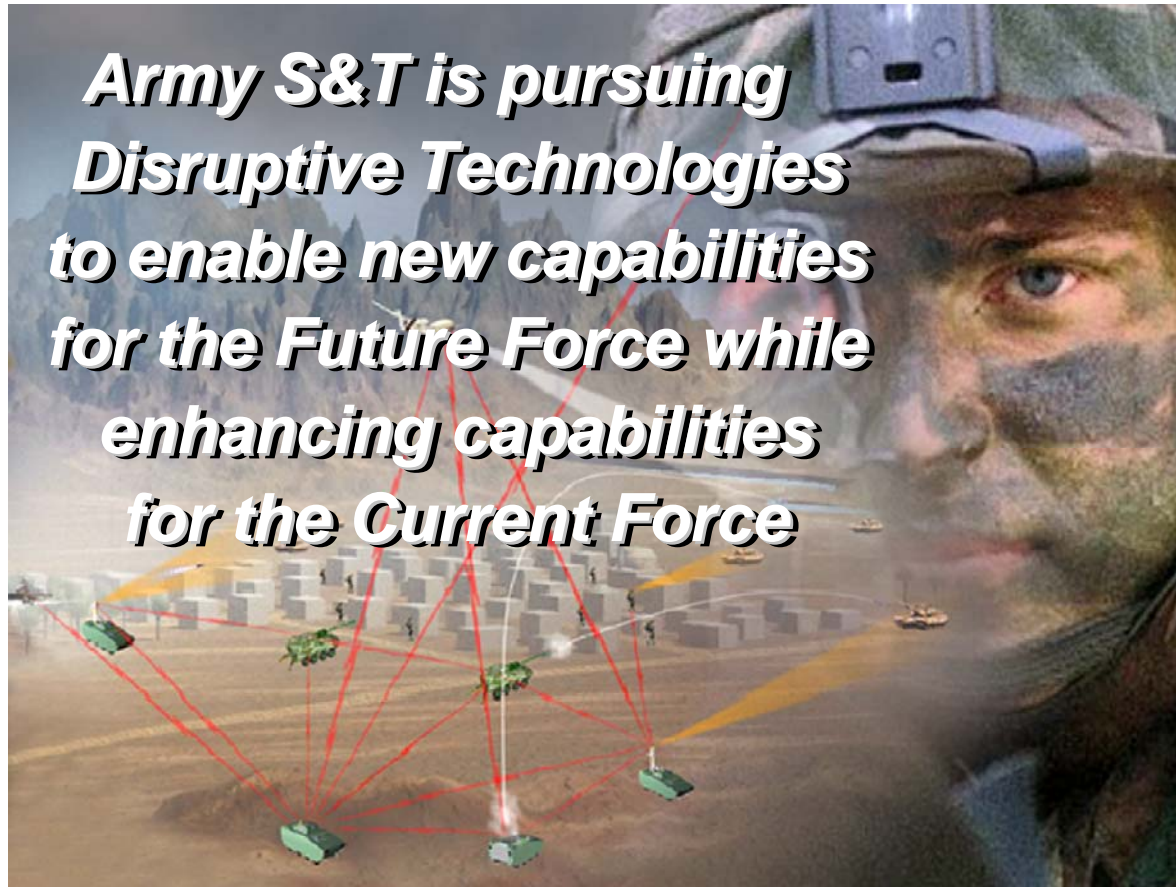 - *Get an independent assessment*

S&T Transitions—we can do it 2000-2005

S&T Complete	*SDD Transition*	*Current Status*
Hunter Sensor Suite-1997	*1999*	*Currently in production as LRAS3, 700+ fielded*
GLMRS-1999	*2001*	*In production*
OICW-1999	**Pub RFP for SDD on-hold pending JCIDS results and JROC review*	*SDD (OICW-1) funded*
HSTAMIDS-2000	*SDD 2000*	*In LRIP—AN/PSS-14*
SAPI-2000	*Specifications to PM-SEQ*	*Fielded as Interceptor Body Armor*
Life Support for Trauma & Transport -2001	*2001 (3rd Quarter)*	*In production*
PGMM-2001	*MS B Sep 2003 fully funded*	*SDD fully funded*
Chitosan Bandage-2001	*2002 fully funded*	*In production*
One Handed Tourniquet (OHT)-2001	*2002 fully funded*	*In production—improved & renamed Combat Application Tourniquet*
SATCOM OTM - 2002	*SATCOM Antenna—WIN-T*	*WIN-T in SDD*
Tactical C2 Protect-2002	*Network Security Software—WIN-T*	*In production 4ID IRAQ*
ASTAMIDS-2003	*SDD 2003*	*Fully funded through FY09*
LCMR-2003		*In production*
Shortstop-2003	*Modified to be counter-IED system; Core WARLOCK family of systems*	*Fielded*
GSTAMIDS-2004	*SDD 2004*	*Fully funded through FY12*
Agile Commander-2004	*C2 software for MCS*	
MOSAIC-2004	*Network Comms software for WIN-T*	*WIN-T in SDD*
LSTAT-2004	*In SDD*	
NLOS LS-2004	*2004*	*SDD fully funded for FCS*
TWS-2004	*2004*	*In production*
Rechargeable Li-ion Battery-2004	*NA*	*In production*
Zinc Air Battery-2004	*NA*	*In production*
120mm Gun-2005	*2006*	*PM FCS selected for manned gun system*
DRAMA-2005	*Network Comms software for WIN-T*	*WIN-T in SDD*

The Army…
Transforming while at War

Army S&T is pursuing Disruptive Technologies to enable new capabilities for the Future Force while enhancing capabilities for the Current Force

"Beware when any idea is promoted primarily because it is "bold, exciting, innovative, and new." There are many ideas that are "bold, exciting, innovative and new," but also foolish."

Secretary Rumsfeld