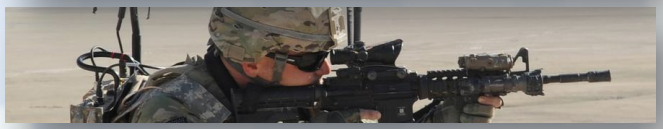
Army Science and Technology (S&T) Lethality Portfolio Overview


Mr. Mike Holthe
Director, Lethality Portfolio
Office of the Deputy Assistant Secretary of the Army for Research and Technology

3 June 2015

Agenda

- Army S&T Mission, Vision and Roles
- Enterprise
- Investment Strategy
- Resourcing
- Portfolio Investments
- Summary

Army S&T Principles

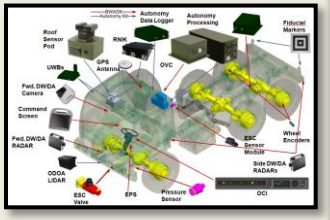
MISSION: ***Identify, develop and demonstrate technology options that inform and enable effective and affordable capabilities for the Soldier***

VISION: ***Providing Soldiers with the technology to Win***

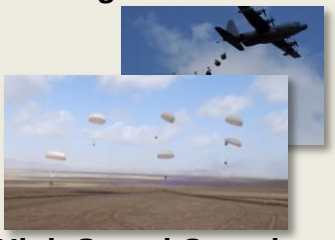
Current Force

Deployable Force Protection Adaptive Red Team

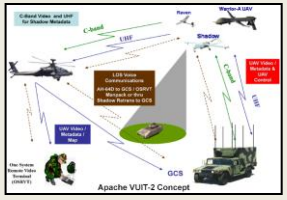
Advanced Rotary Wing Aerial Delivery Sling Load Net



Autonomous Mobility Appliqué System



High Speed Container Delivery System

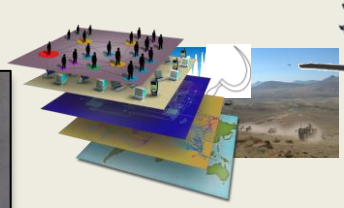


Video from Unmanned Aerial Systems

Enabling the Future Force

Enhancing the Current Force

Future Force



Cyber tools

Next Generation Rotorcraft

Neuroscience

High Energy Lasers

Occupant Centric Platform

Roles for S&T

- **Solve current problems – Operational Needs Statements (ONS)/Joint Urgent ONS (JUONS)**
- **Improve current system capability – Engineering Change Proposals (ECPs), product improvements**
- **Drive down technical risk for Programs of Record (PoRs)**
- **Inform affordable and achievable requirements**
- **Investigate new technology/approaches for potential Army application**
- **Determine technology/system vulnerabilities and identify mitigation**
- **Conduct "technology watch" functions**

Who are we and how are we organized?

Army S&T Enterprise

Secretary of the Army
Honorable John M. McHugh

Under Secretary of the Army
Honorable Brad R. Carson

Assistant to the Secretary of the Army for Acquisition, Logistics, and Technology
Honorable Heidi Shyu

Deputy Assistant Secretary of the Army (Research & Technology)
Ms. Mary J. Miller

* Percent of S&T core program executing, PB16

74%*	8%*	14%*	3%*	2%*
Army Materiel Command	U.S. Army Medical Command	U.S. Army Corps of Engineers	U.S. Army Space & Missile Defense Command	HQDA, G-1 Personnel
Research, Development & Engineering Command	Army Medical Research & Materiel Command	Engineer Research & Development Center	Space & Missile Defense Command Technical Center	U.S. Army Research Institute for the Behavioral and Social Sciences
Army Research Laboratory; Research, Development & Engineering Centers	Laboratories	Laboratories		

Note: Figures may not add due to rounding

Army S&T Enterprise—Research, Development & Engineering Centers & Labs

- U.S. Army Materiel Command
- U.S. Army Medical Command
- U.S. Army Corps of Engineers
- U.S. Army Space and Missile Defense Command
- Headquarters, Department of the Army, G-1

Tank Automotive RDEC

Cold Regions Research & Engineering Lab

Natick Soldier RDEC

Research Inst. of Environmental Medicine

Armament RDEC

Communications -Electronics RDEC

Construction Engineering Research Lab

Research Inst. of Chemical Defense

AMRDEC - Army Aeroflightdynamics Directorate

RDECOM HQ

Research Inst. of Infectious Disease

Army Research Institute for the Behavioral & Social Sciences

Walter Reed Army Inst. of Research

Edgewood Chem Bio Center

ARL - Battlefield Environments and Survivability Elements

Space and Missile Defense Command Technical Center

ARL - Army Research Office

Army Research Lab (ARL)

Geospatial Research Laboratory

AMRDEC - Aviation Applied Technology Directorate

Institute of Surgical Research

Aviation & Missile RDEC

ARL - Simulation & Training Technology Center

Engineer Research and Development Center
Coastal & Hydraulics Lab
Environmental Lab
Geotechnical & Structures Lab
Info Tech Lab

Aeromedical Research Lab

Total Civilian Manpower: ~17,000

- ~12,000 Scientists & Engineers
- ~5,000 Technicians, Analysts, and Administrative support
- ~500 Military S&E

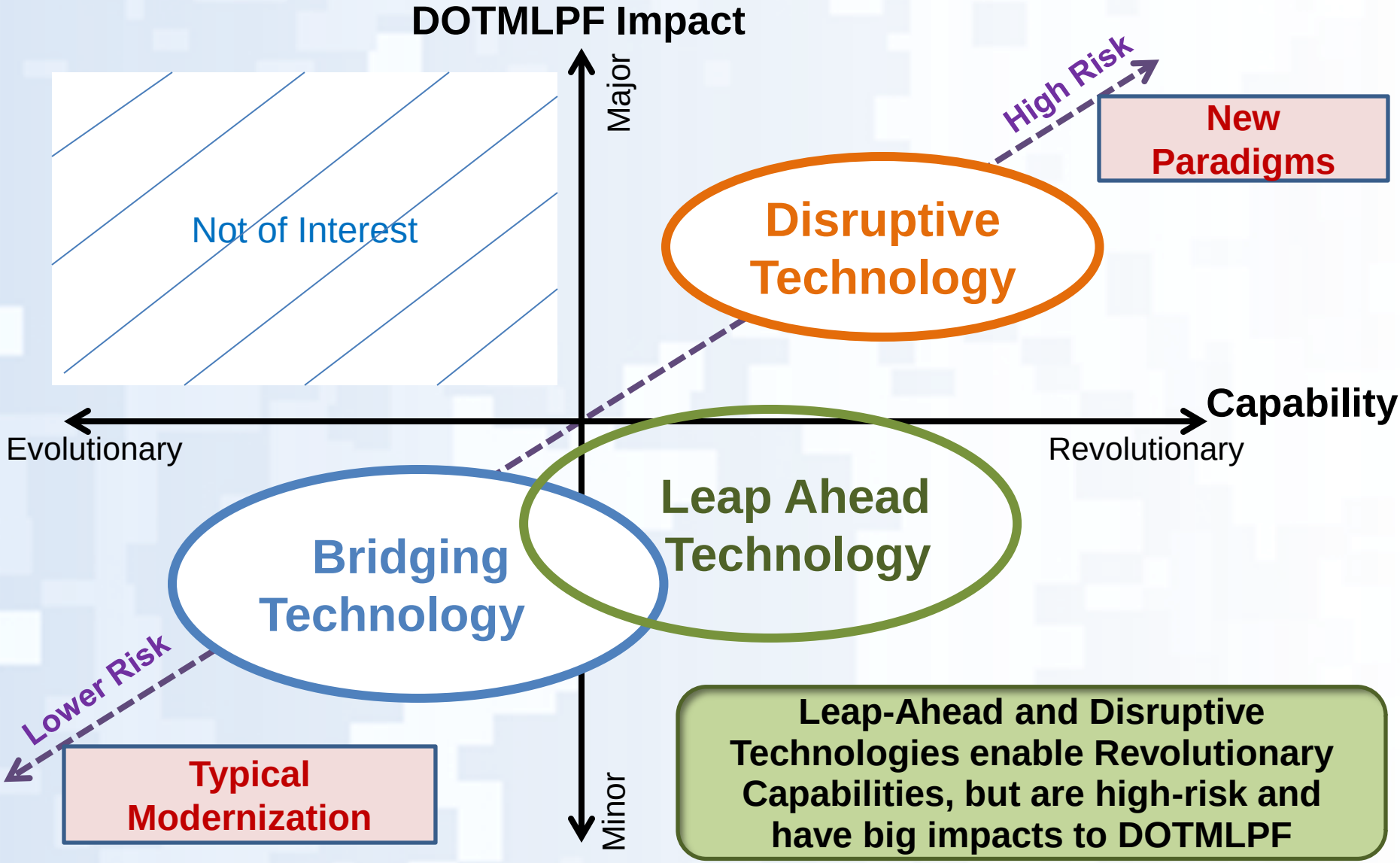
How do we make investment decisions?

How we prepare for an uncertain future…
Addressing the probable, possible, and unthinkable

- To maintain a leading edge in technology, S&T must continue; once given up, too expensive and too time-consuming to regain lost ground
- Threat assessments primarily address the "probable"
- Preventing tactical, operational, and strategic surprise requires S&T to address the "possible" and the "unthinkable"

Army S&T must have a broad investment strategy

Technology Payoffs
Capability & Impact to DOTMLPF



Army Enduring Challenges

- Greater ***force protection (Soldier, vehicle, base)*** to ensure survivability across all operations
- Ease ***overburdened*** Soldiers in Small Units

- Timely ***mission command & tactical intelligence*** to provide situation awareness and communications in <u>all</u> environments
- Reduce logistic burden of ***storing, transporting, distributing*** and ***retrograde*** of materials

- Create ***operational overmatch*** (enhanced lethality and accuracy)

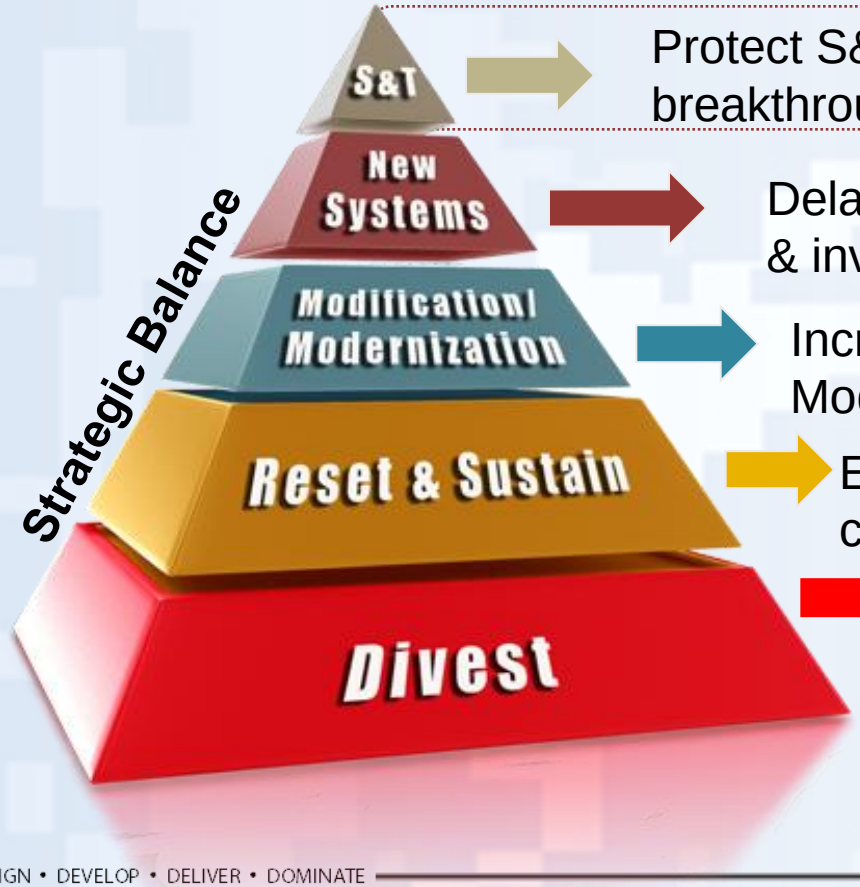
- Achieve operational ***maneuverability*** in all environments and at ***high operational tempo***
- Enable ability to ***operate in CBRNE environment***
- Enable ***early detection*** *and* ***improved outcomes for Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD)***
- Improve ***operational energy***
- Improve ***individual & team training***

- ***Reduce lifecycle cost*** of future Army capabilities

How are we funded?

Modernization Strategy in a Fiscally Challenged Environment

- **Reduce procurement quantities to match force structure reductions**
- **Gained efficiencies**
  - **Leveraging multi-year procurement (Black Hawk, Chinook)**
  - **Incorporate Better Buying Power initiatives (contracting, should-cost, competition)**



Protect S&T to ensure next – generation of breakthrough technologies

Delay some new capability development & invest in next generation of capabilities

Incremental upgrades to increase capabilities; Modernize aging systems

Enable near-term readiness for contingencies

Reduce O&S cost; address Non-Standard Equipment

O&S= Operations & Support

S&T Resources
Funding Categories, Work Focus, Timeframes

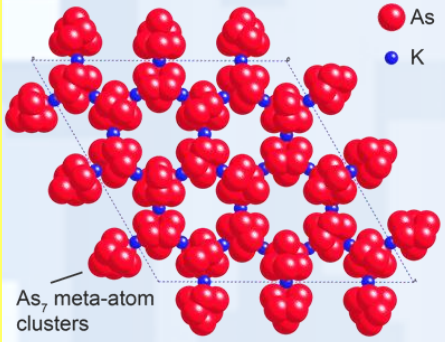
As of PB16

S&T (RDT&E BA 1-3)

Development → **Acquisition** (Procurement Appropriation)

6.1: Basic Research

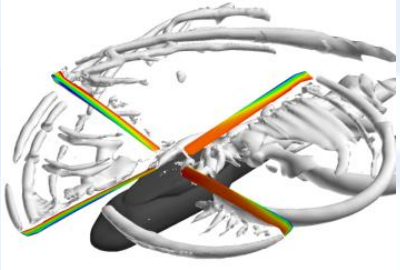
Material Science



- Understanding to solve Army-unique problems
- Knowledge for an uncertain future

6.2: Applied Research

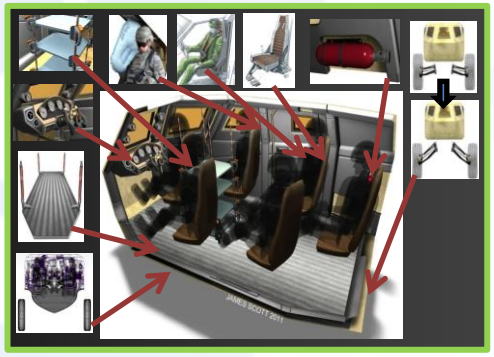
Aeromechanics and Computational Methods



- Applications research for specific military problems
- Components, subsystems, models, new concepts

6.3: Advanced Technology Development

Occupant Centric Protection



- Demonstrate technical feasibility at system and subsystem level
- Path for technology spirals to acquisition—rapid insertion of new technology

6.4: Technology Maturation Initiatives

- Funds technology maturation efforts, including competitive prototyping and experimentation in support of selected pre-Milestone B Programs of Record.

6.6: Technical Information Activities

- Advisory Bodies
- Reporting and Info Dissemination
- Studies and Tech Assessment

6.7: Manufacturing Technology

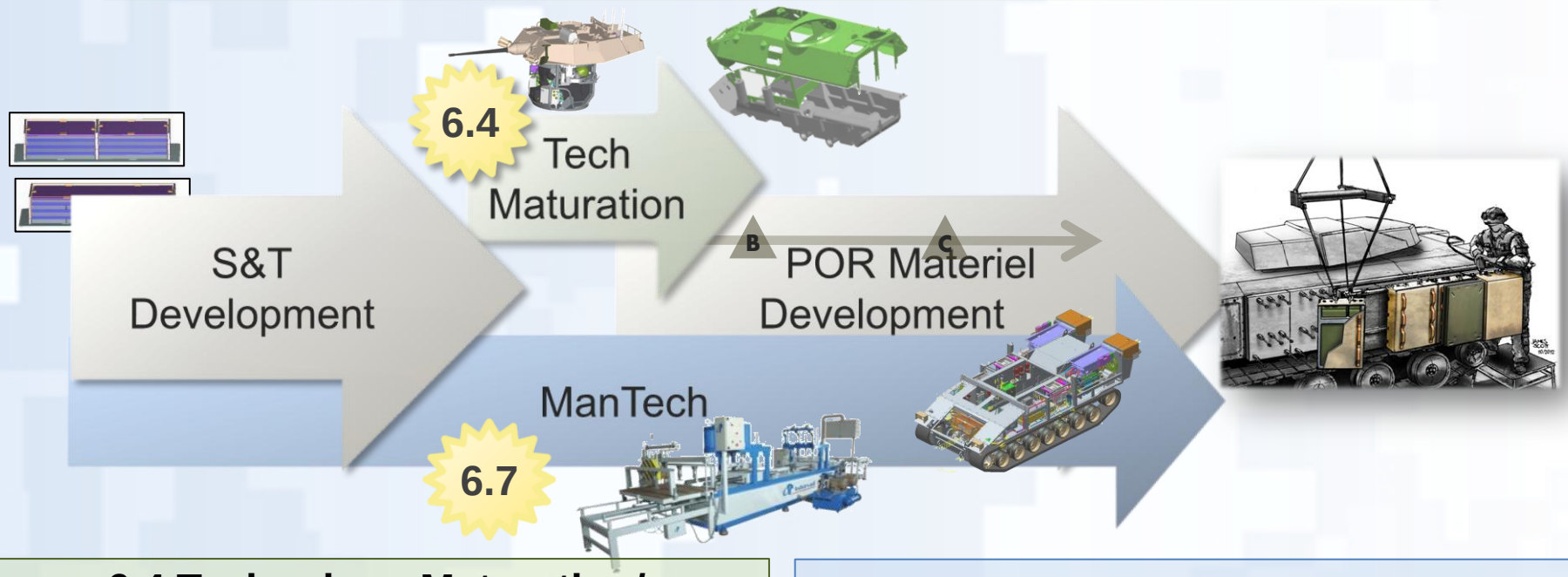
- Address manufacturing issues and facilitate affordable production of weapon systems and materials

Far Term	Mid Term	Near Term
12-20+ yrs	6-12 yrs	0-6 yrs

Note: Figures may not add due to rounding

Technology Maturation/ Manufacturing Technology Strategy

Goal: Enabler programs to mature key capabilities the Army needs, applied when and where appropriate to "ramp up" technology insertion.



6.4 Technology Maturation/ Prototyping

- Further mature technologies (goal TRL 7)
- Enable competitive prototyping prior to MS B
- Inform materiel requirements
- Drive down technology and cost risks
- Accelerate capabilities to the Warfighter

6.7 Manufacturing Technology

- Provide efficient and affordable manufacturing for next-generation combat systems
- Reduce production risks and manufacturing costs

How do we manage the Lethality Portfolio?

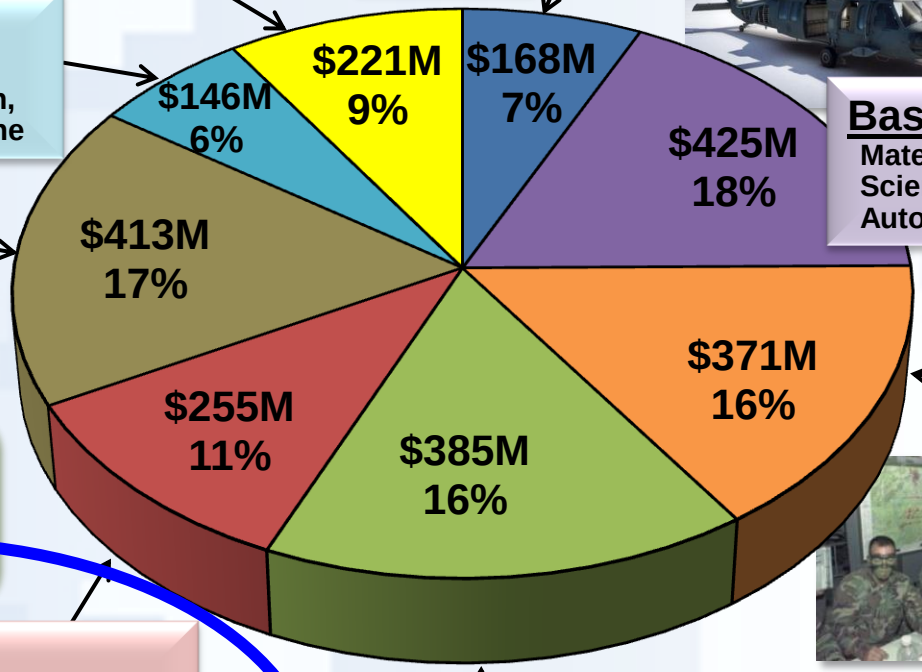
Army Investments by Portfolio

PB16 - $2.4B (FY16)

Soldier/Squad
Personnel, Training, Human System Integration, Dismounted mission equipment and power & energy

Air
Advanced air vehicles; unmanned aerial systems; manned/unmanned teaming

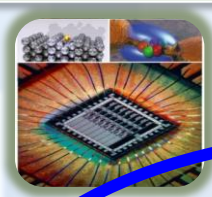
Medical
Combat Casualty Care, Infectious Disease mitigation, clinical/rehabilitative medicine

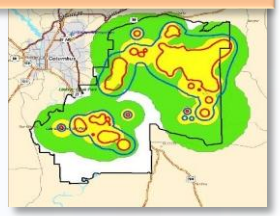


Basic Research
Materials Science; Medical/Life Sciences; Quantum/Info Science; Autonomy; Networks

Innovation Enablers
High Performance Computing; Environmental Protection; Base Protection; Studies; Technical Maturation Initiatives; Procurement

C3I
Secure Comms-on-the-move; cyber/EW; sensors





Lethality
Offensive/Defensive kinetic (guns, missiles), Soldier Weapons, Directed Energy (HEL) weapons

Ground Maneuver
Combat/tactical ground platforms/survivability; unmanned ground systems; austere entry; power & energy

Army Investments	FY16
BA1	$425M
BA2	$880M
BA3	$896M
BA4	$41M
BA7	$48M

BA6 $32M, Procurement $62M

FY16

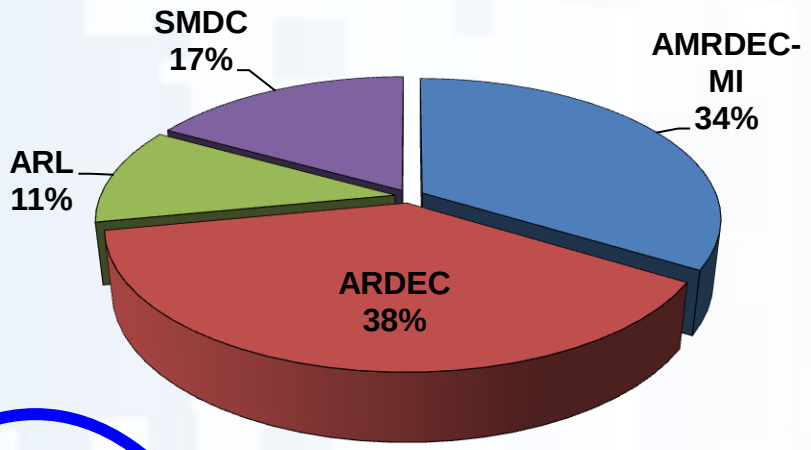
As of PB16

Lethality Portfolio

Lethality Portfolio

6.2 and 6.3 Funding

$254M



Air Defense	Fire Support	Close Combat	Soldier Weapons	Directed Energy	Weapons Enablers
$34M	$47M	$30M	$23M	$48M	$73M
Investment Areas • Counter UAS/CM • Counter RAM • Radars	**Investment Areas** • Artillery • Rockets • Mortars	**Investment Areas** • Squad Weapons • Ground Vehicle Weapons • Air Launched Weapons	**Investment Areas** • Enablers • Ammunition • Precision Effects • Volume Effects • Counter Defilade • Optics & Fire Control	**Investment Areas** • High Energy Laser • High Power Radio Frequency	**Investment Areas** • Energetic Materials • Warheads • Propulsion • Guidance • Seekers

Lethality S&T Strategy

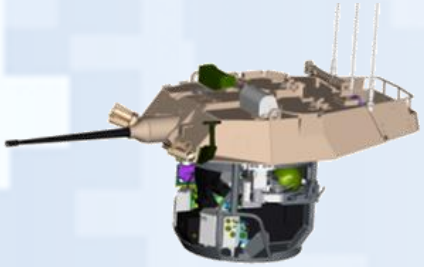
Goal: To achieve overmatch at extended ranges with precise and affordable weapons

Key Research Areas

- Energetics, Propulsion and Warheads for increased range and decisive effects
- Guidance for improved precision and GPS-denied precision
- Directed Energy Weapons
- Affordable component technologies to address weapon cost drivers
- Seeker technologies to defeat moving targets and air defense threats

High Energy Laser Mobile Demonstrator

Disruptive Energetics: 40mm Grenade with 155mm Artillery Effects



Improved Medium Caliber Weapon System

Low-Cost Tactical Extended Range Missile

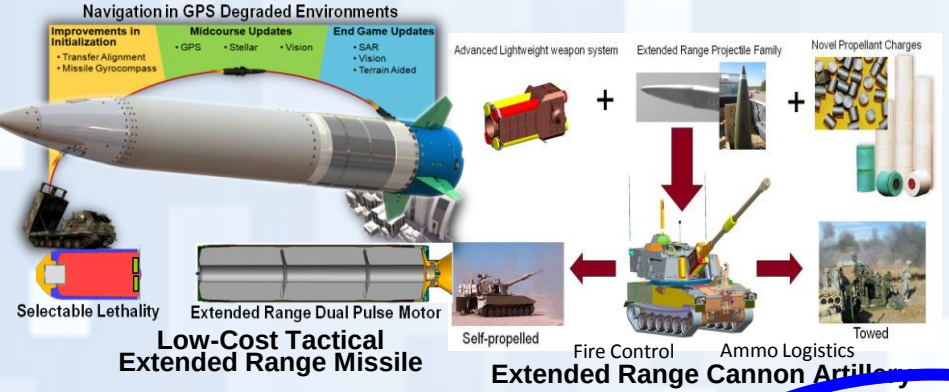
Drivers

- CSA Strategic Priorities
- Army Strategic Planning Guidance
- Army Enduring Challenges
- Air & Missile Defense Strategy
- Arms Soldier Weapons Strategy
- Army Capabilities Needs Analysis
- Force 2025 and Beyond
- Army Operational Concept

Lethality Major Efforts

Long Range Fires – Artillery/Rockets

Goal: Provide range extension, accuracy in GPS denied environments, and defeat of area and point targets

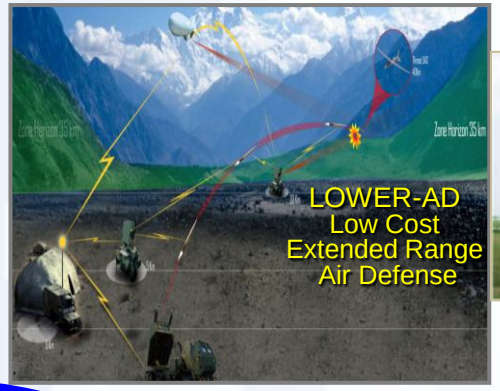


Low-Cost Tactical Extended Range Missile

Extended Range Cannon Artillery

Affordable Air Defense – KE & DE

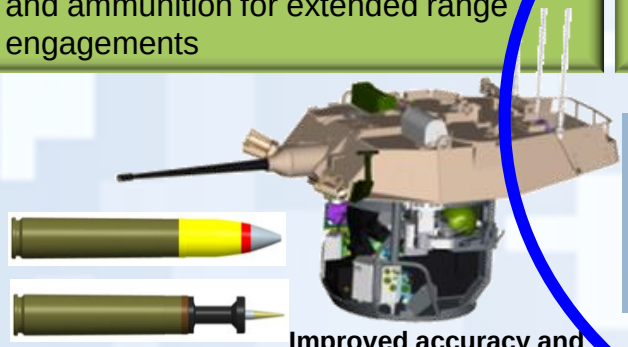
Goal: Demonstrate affordable options (kinetic and directed energy) to defeat RAM, UAS and Cruise Missiles



High Energy Laser Mobile Demonstrator

Medium Caliber Weapons

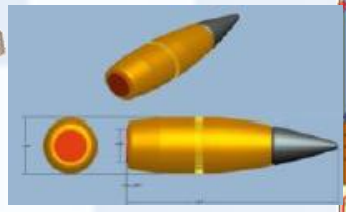
Goal: Demonstrate a more accurate and lethal medium caliber weapon system and ammunition for extended range engagements



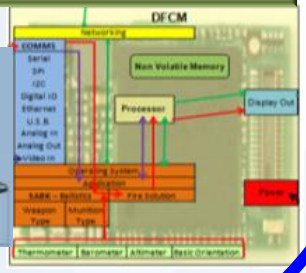
Improved accuracy and increased range for medium caliber weapon systems

Small Arms Weapons Tech

Goal: Demonstrate small arms ammunition, weapons, optics and fire control technologies for precision at extended ranges with reduced weight



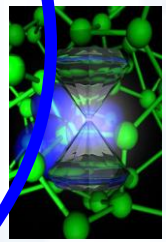
One Way Luminescence Tracer



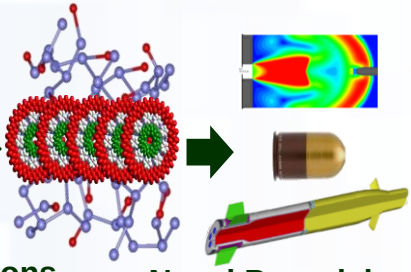
Small Arms Ballistic kernel

Disruptive Energetics

Goal: Provide 3-10x yield in Energetics leading to game changing leaps in weapons effects and range.



New Formulations



Novel Propulsion

Soldier Weapons Investments (PB16)

Portfolio Thrust Areas	6.2 and 6.3 Technology R&D Examples	Capability Gaps Addressed
Enablers	Disruptive Energetics; Adaptive solid lubricants; Active stabilization	<u>Required Capability:</u> Future Army maneuver forces require the capability to fire, maneuver, and survive in close combat to close with and capture, kill, or neutralize the enemy. <u>Gaps :</u> • The Army lacks sufficient capability to enable riflemen to accurately engage and kill adversaries out to 600m • Snipers lack the ability to engage targets at 1500m with precision rifle fire
Ammunition	One-way luminescence; improved tungsten carbide	
Precision Effects	From precision-guided to steerable; scalable effects	
Volume Effects	.50 cal advanced remote/robotic armament; lightweight polymer ammo	
Counter-Defilade	Advanced fuzing and extended range for 40mm LV grenade	
Optics & Fire Control	Direct View Optics; Multi-mode targeting sensor; Pre-shot detection	

Technology investment focus is to increase the squad capability and mitigate threat overmatch

Summary

- Align S&T investments and develop a modernization strategy that creates technology insertion opportunities for Programs of Record
- Invest S&T resources where we must (i.e., Army-specific areas), and leverage where we can -- from industry, other Services/Agencies, Federally Funded Research Development Centers, National Labs, academia, and international partners
- Look to harness investments in technologies that reduce operational and sustainment costs, increase combat readiness, and increase reliability
- Keeping Updated with all small arms stakeholders via different acitivities: JSTAC TDS; S3R; POM submission; LIRA; AUSA; NDIA
- Business Opportunities—See next page for web site address

Army S&T has a responsibility to lay the foundation for Army's technology needs that drive future capabilities

Summary (Cont'd)

For Business Opportunities, see the following Organizations:

Armaments Research Development and Engineering Center (ARDEC)

https://www.pica.army.mil/TechTran/policy/

Army Research Laboratory (ARL)

http://www.arl.army.mil/www/default.cfm?page=6

Defense Innovation Marketplace
(www.DefenseInnovationMarketplace.mil)

Army Science & Technology

Providing Soldiers with the Technology to Win

ARMY S&T
SCIENCE & TECHNOLOGY