



Army Science & Technology



“America’s Army – Decisive Force”

Army S&T Priorities

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Office of the Deputy Assistant Secretary of
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Purpose



- **Update S&T strategy development**
- **Review the new processes we are implementing in Army S&T**
- **Highlight opportunities for partnership**





What we have learned ...



We have learned from last decade of war ...



***This is What We Learned –
It's all about the Soldier and...***

***“In the past the small unit was
built around the fighting system.
Today and for the future, the
fighting system must be built
around the small combat unit.”***

MG(R) Robert Scales*

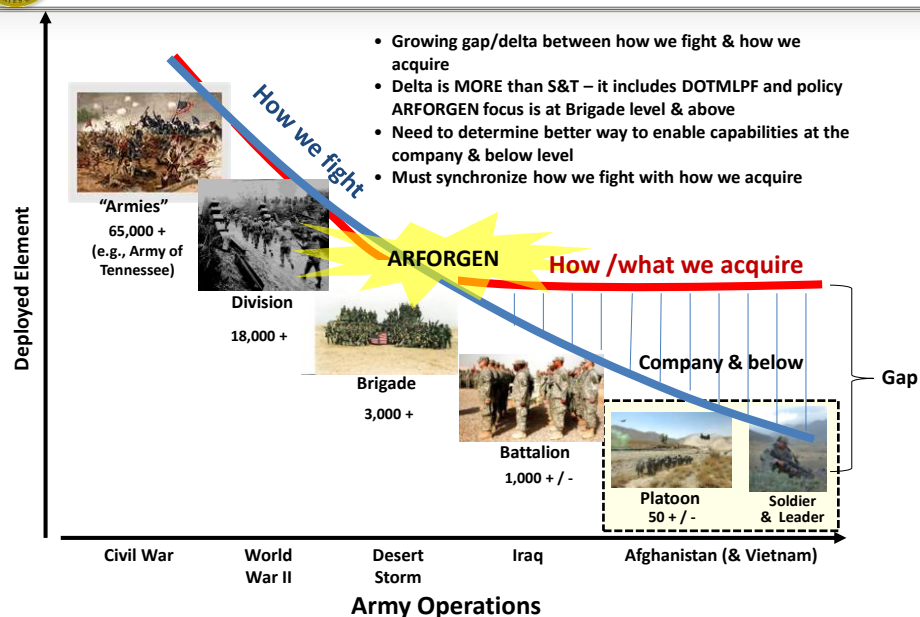
*Ground Combat Vehicle CONOPS -
Concept paper dated Dec 2, 2010

DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS ARE THE DECISIVE EDGE

ARMY S&T
SOLDIER & LEADER



Where should our focus be?



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Soldier Tech - DRAFT

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We will continue to pursue programs focused on the Soldier and small unit capabilities with the intent of making our formations more flexible, adaptable and lethal.

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What we have done ...

Since 2010 we have been making strides to address...

DASA(R&T)'s Problem & Challenge

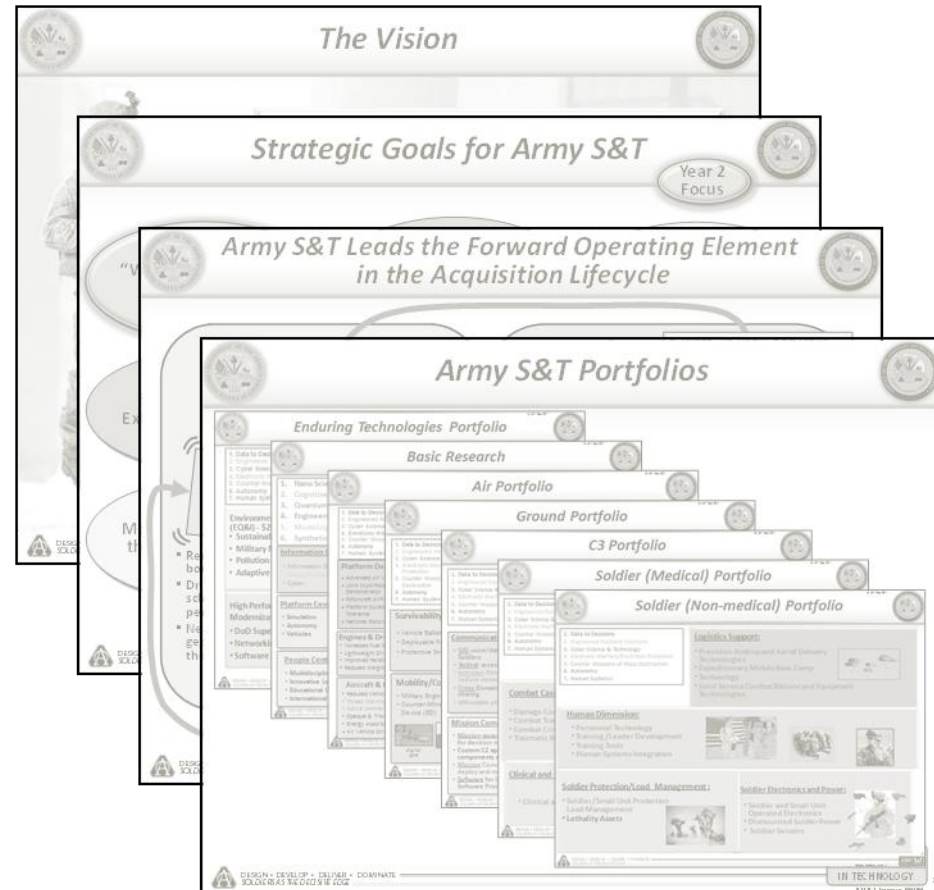
• The Problem

- It takes too long to get technology enabled capabilities to the field
- Army S&T is perceived as irrelevant

• Fixing the Problem requires:

- New comprehensive strategy
- Changing the culture
- Restoring confidence in Army S&T
- Building a strong Partnership with Leadership
- Motivating the workforce towards results

We have validated a new set of priorities for and approaches to managing Army S&T...



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The Vision



Vision

Provide *Technology Enabling Capabilities* that Empower, Unburden and Protect our Soldiers and Warfighters in an environment of Persistent Conflict

Our Challenge

Deliver these technologies through effective partnerships in synchronization with Army Force Generation (ARFORGEN) and fiscal processes

Respond Rapidly to Technological Evolution





Strategic Goals for Army S&T



**Year 2
Focus**

**"World Class" Science
& Technology**

**Timely Transition of
the Right
Technologies**

**Recognized Leader in
Defense
Development and
Engineering**

**Strong Internal &
External Partnerships**

**High Quality,
Relevant Facilities
and Capabilities**

**Balanced Investment
Portfolio**

**Highly Skilled,
Motivated Workforce
that Exemplifies our
Core Values**

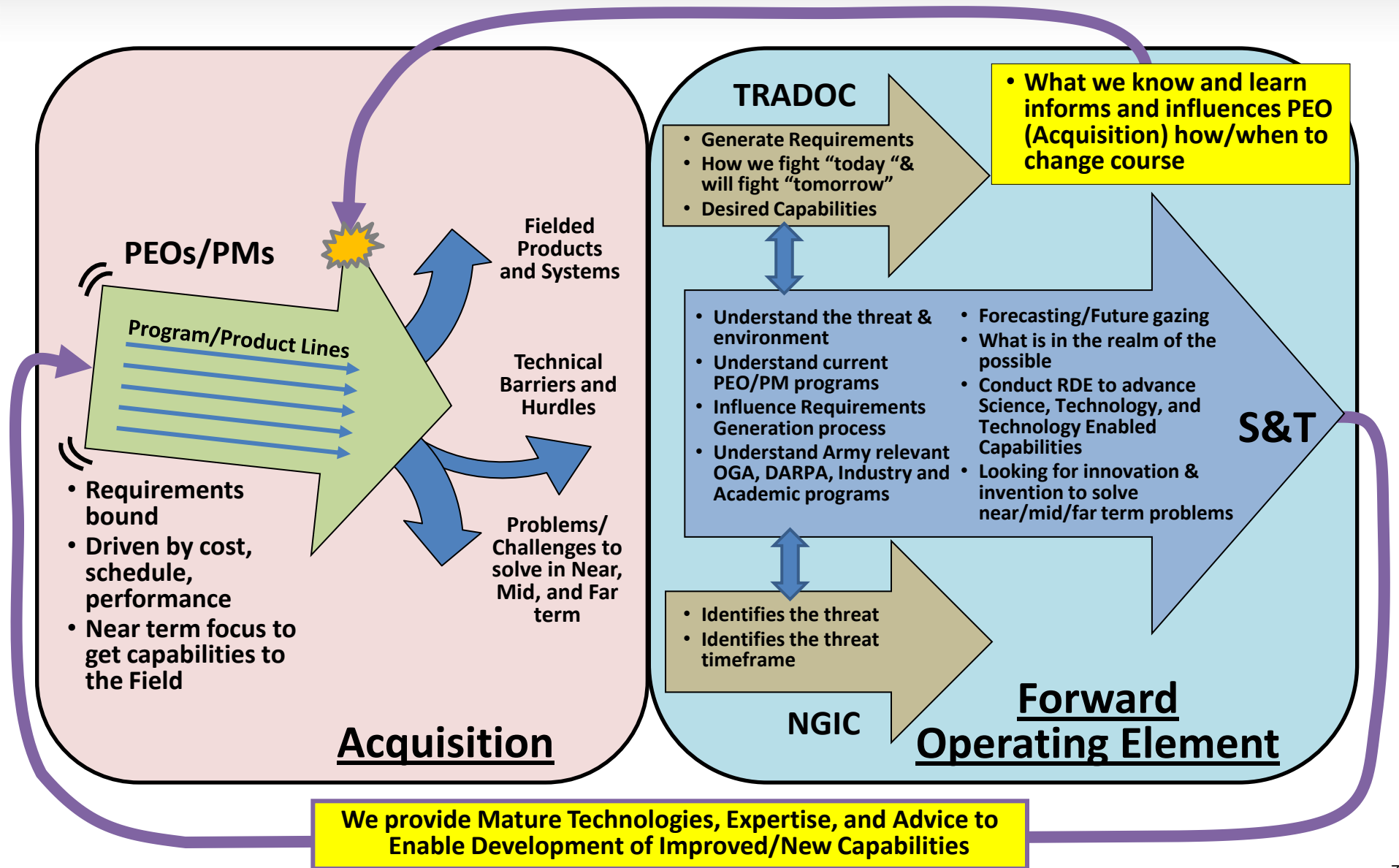
**Effective, Efficient, &
Adaptable Processes**

**Government and
Public Understanding
of Our Value**





Army S&T Leads the Forward Operating Element in the Acquisition Lifecycle





S&T Portfolios

Enduring Technologies Portfolio

Basic Research

Air Portfolio

Ground Portfolio

C3 Portfolio

Soldier (Medical) Portfolio

Soldier (Non-medical) Portfolio

1. Data to Decisions
2. Engineered Resilient Solutions
3. Cyber Science & Technology
4. Electronic Warfare/Electronic Protection
5. Counter Weapons of Mass Destruction
6. Autonomy
7. Human Systems

Environment (EQ&I) - \$2B

- Sustainable
- Military Modernization
- Pollution
- Adaptive

High Performance Modernization

- DoD Super
- Networking
- Software

1. Nano Science
2. Cognitive
3. Quantum
4. Engineered Resilient Solutions
5. Modeling
6. Synthetic

- Information Science
- Information Science
 - Network Science
 - Cyber

- Platform Center
- Simulation
 - Autonomy
 - Vehicles

- People Center
- Multidisciplinary
 - Innovative Learning
 - Educational
 - International

1. Data to Decisions
2. Engineered Resilient Solutions
3. Cyber Science & Technology
4. Electronic Warfare/Electronic Protection
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- Platform Development
- Advanced Air Vehicle
 - Joint Multi-Role Demonstrator
 - Rotocraft Airframe
 - Platform Durability
 - Tolerance
 - National Rotocraft

- Engines & Drivetrains
- Increased Fuel Efficiency
 - Lightweight Drivetrain
 - Improved Reliability
 - Reduced Weight

- Aircraft & Systems
- Reduced Vehicle
 - Threat Warning
 - Active Jammer
 - Opaque & Transparent
 - Energy Absorption
 - Air Vehicle Structure

Survivability

- Vehicle Ballistics
- Deployable Force
- Protective Structures

- Mobility/Counter-Mobility
- Military Engine
 - Counter-Mine Device (IED)



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- Communications
- GIG voice/data Soldiers
 - Tactical access
 - Intrusion Detection
 - Cross Domain sharing
 - Affordable phase

- Mission Command
- Mission-aware for decision making
 - Custom C2 applications
 - Mission Command components
 - Software for C2
 - Software Product

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Combat Casualty

- Damage Control
- Combat Trauma
- Combat Critical
- Traumatic Brain Injury

Clinical and

- Clinical and

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- Logistics Support:
- Precision Airdrop and Aerial Delivery Technologies
 - Expeditionary Mobile Base Camp
 - Technology
 - Joint Service Combat Rations and Equipment Technologies

Human Dimension:

- Personnel Technology
- Training /Leader Development
- Training Tools
- Human Systems Integration

Soldier Protection/Load Management:

- Soldier/Small Unit Protection
- Load Management
- Lethality Assets

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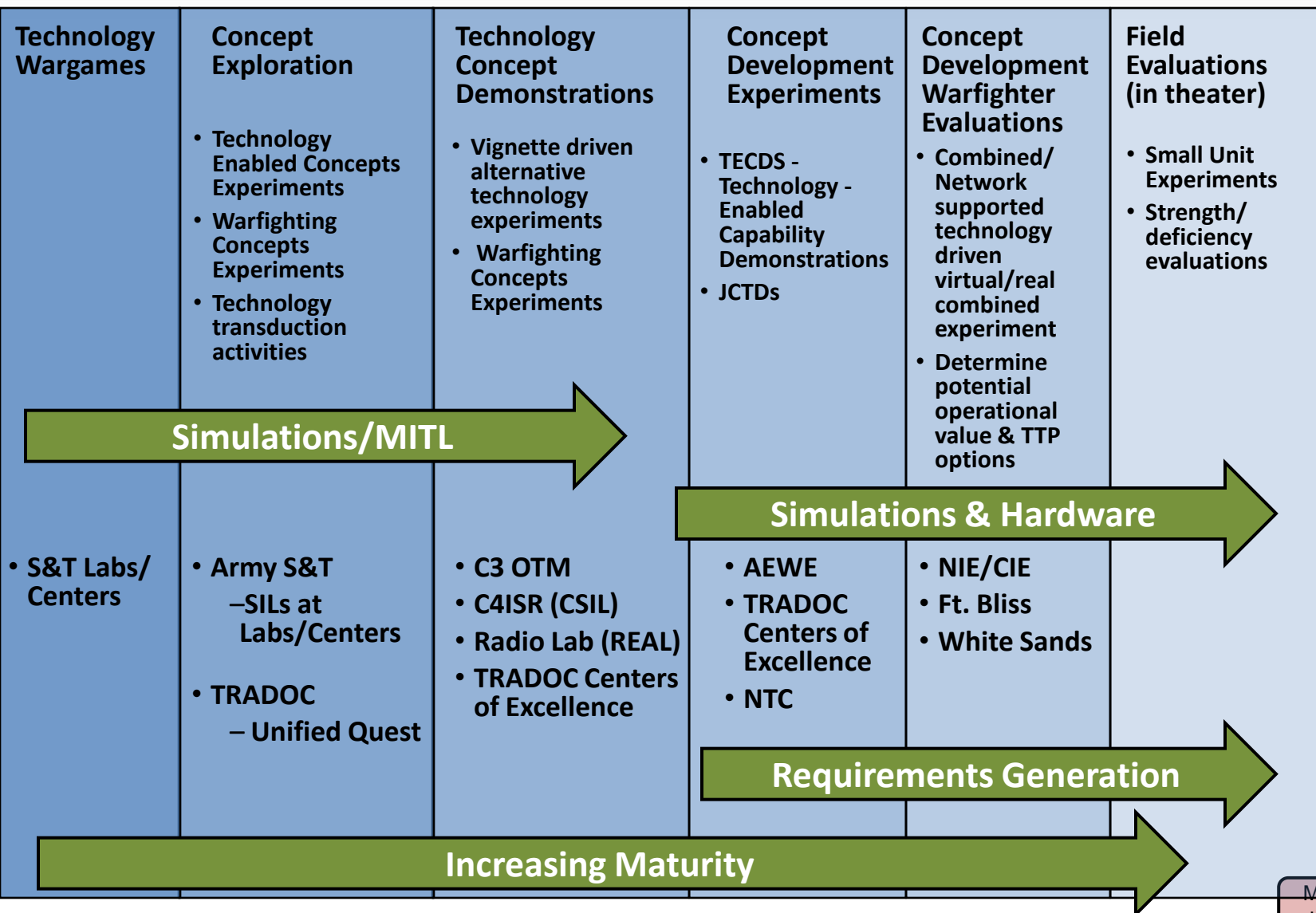




Experimentation Venues

Technology Enabled Concepts through Warfighter Evaluations

PORs and Supporting
Requirements (DOTMLPF)



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S&T Resources: Funding Categories, People, Partnerships

6.1, 6.2, 6.3



Basic Research

6.1

- Obtain knowledge for an uncertain future—invention and discovery
- Understand theories and phenomenology that may impact Army needs

People

Theoretical & Experimental Scientists

- Chemists
- Physicists
- Material scientists
- Psychologists
- Physiologists
- Neuroscientists
- Mathematicians
- Medical doctors

Partnerships

64% Universities/Industry
36% In-House

Applied Research

6.2

- Conduct research and apply knowledge/understanding to specific Army problems and challenges
- Conceptualize and experiment with components, subsystems, models—discovery and innovation

People

Scientists, Technologists, Experimentalists

- Chemists
- Physicists
- Material scientists
- Psychologists
- Physiologists
- Neuroscientists
- Mathematicians
- Medical doctors
- Nutritionists
- Electronics

Partnerships

33% Industry
67% In-House

Advanced Technology Development

6.3

- Develop and integrate technologies at sub-system and system level
- Demonstrate feasibility of technology enabled capabilities
- Define transition paths to accelerate introduction of technology enabled capabilities to the Warfighter

People

Scientists, Engineers, Designers, Fabricators

- Chemical
- Civil
- Industrial
- Aerospace
- Structural
- Biomedical
- Thermodynamicists
- Mechanical
- Clothing designers
- Colorists
- Electrical
- Psychologists

Partnerships

60% Industry
40% In-House





S&T Resources: Funding Categories, People, Partnerships

6.4, 6.6, 6.7

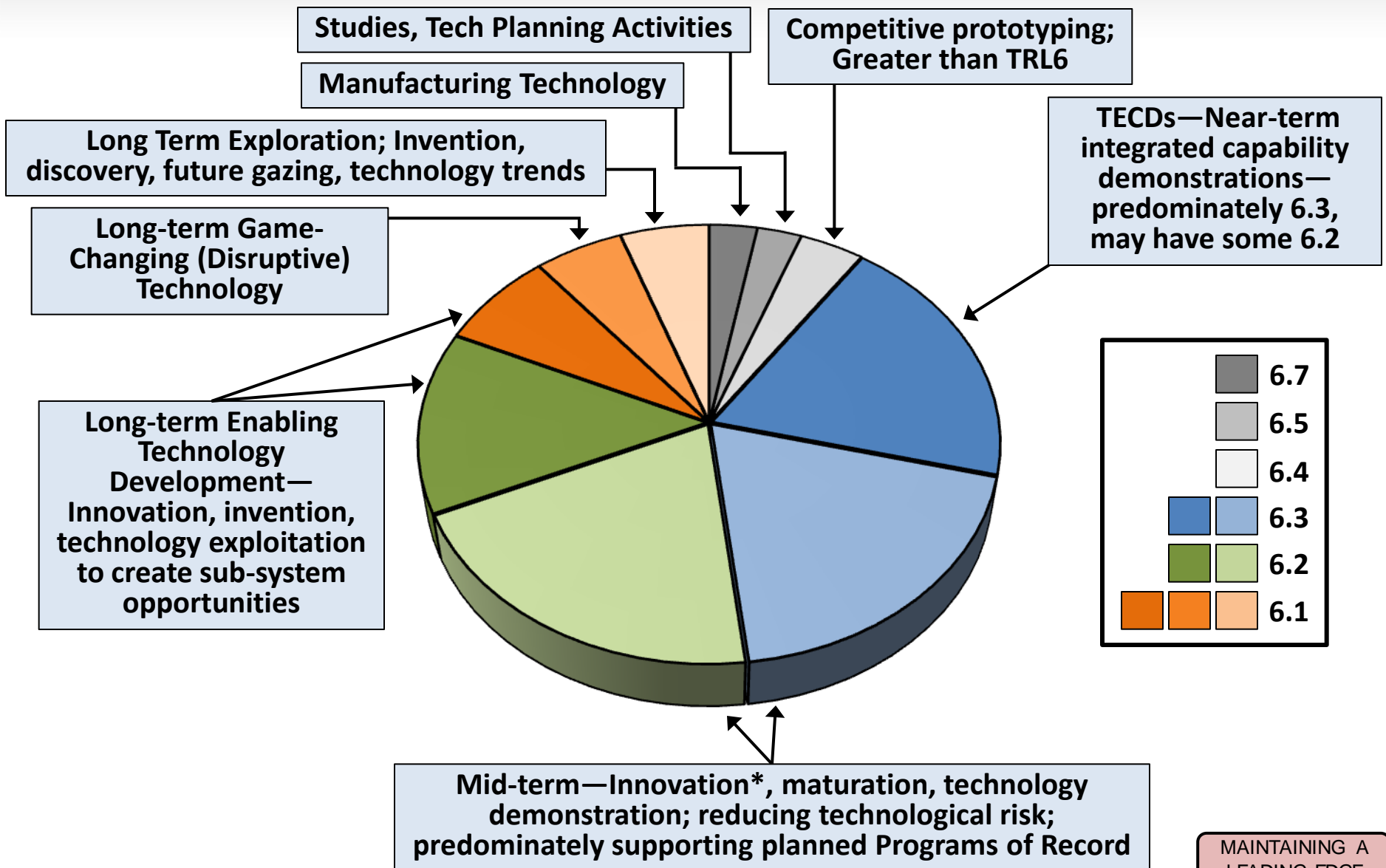


Technology Maturation Initiatives	Technical Information Activities	Manufacturing Technology
6.4 <ul style="list-style-type: none">Funds efforts necessary to evaluate integrated technologies that will expedite technology transition to programs of record.Funds technology maturation efforts, including competitive prototyping, for selected pre-Milestone B programs of record.	6.6 <ul style="list-style-type: none">Supports upgrading the accuracy, timeliness, availability, and accessibility of scientific, technical, and management information at all levels of the Army R&D community.Management of this accurate and timely technical information is essential for enabling Army Science and Technology (S&T) leadership to refine investment strategy and quickly react to emerging opportunities and issues.	6.7 <ul style="list-style-type: none">Address manufacturing challenges for new technologiesFacilitate affordable production that impacts Army procurement
People Scientists, Engineers, Designers, Fabricators <ul style="list-style-type: none">ChemicalCivilIndustrialAerospaceStructuralBiomedicalThermodynamicistsMechanicalClothing designersColoristsElectricalPsychologists	People S&T Management and Technical Analysis <ul style="list-style-type: none">Technical Analytical SupportFinancial Analytical SupportStrategic PlanningSpecialized Review BoardsArmy Science BoardBoard on Army S&TNational Defense UniversityTechnology Maturity AssessmentsArmy High Performance Computing CentersScience Advisors to Combatant Commanders	People Engineers, Industrial Designers, Craftsmen <ul style="list-style-type: none">ChemicalCivilIndustrialAerospaceStructuralBiomedicalMechanicalSystemsProcessPlant managementMaterials
Partnerships 90% Universities/Industry 10% In-House	Partnerships 90% Industry 10% In-House	Partnerships 84% Industry 16% In-House





S&T Investment Strategy Balanced Portfolio



* Includes Rapid Innovation Funding

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Sources Informing S&T (6.2 & 6.3) Investment Decisions for 2014-2028



Commercial

Other Services

International/Allies

NGIC

Army Capstone Concept

JCIDS

DoD Priorities

"The Squad is the foundation of the decisive force; it is the cornerstone of all units."

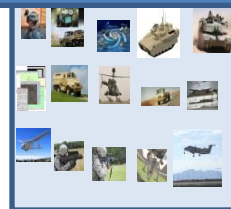
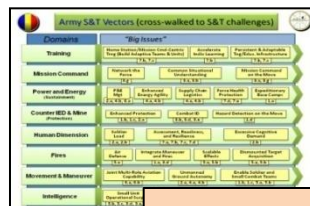
(Jan 25 2012 - CSA remarks at AUSA ILW Breakfast)

"...recalibrate its [U.S.] and make selective additional investments in:"

- Counter Terrorism & Irregular Warfare
- Deter & Defeat Aggression
- Project Power Despite Anti-access/Area Denial Challenges
- Counter Weapons of Mass Destruction
- Operate Effectively in Cyber & Space
- Maintain a Safe, Secure & Effective Nuclear Deterrent
- Defend Homeland & Provide Support to Civil Authorities
- Provide Stabilizing Presence
- Conduct Stability & Counterinsurgency Operations
- Conduct Humanitarian, Disaster Relief, & Other Operations

in:

- Mission Command
- Intelligence
- Movement and Maneuver
- Fires
- Protection
- Sustainment
- Training and Leader Development
- Institutional Army
- Human Dimension



BA4 Tech Maturation

Three things S&T must invest in:

- 1) What we do that no one else does (maintaining core competencies)
- 2) What we do to advance capabilities
- 3) What "big bets" that others invest in so we can counter

Wargaming Exercises

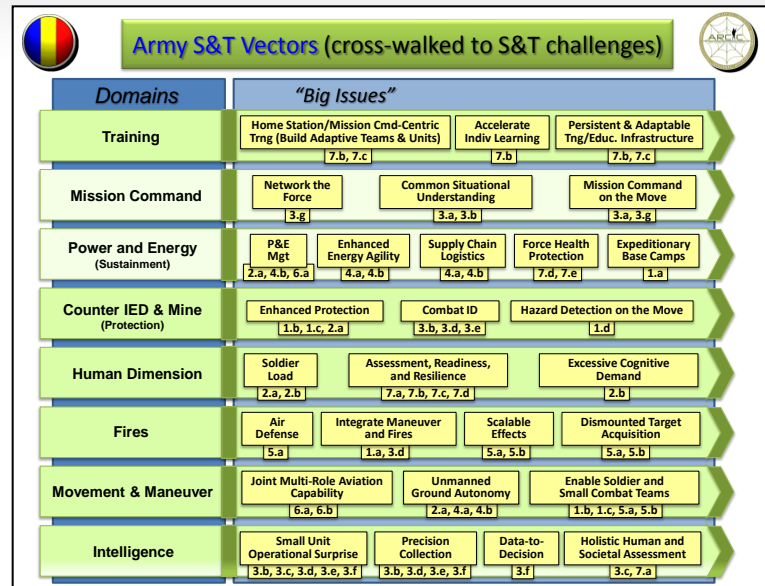
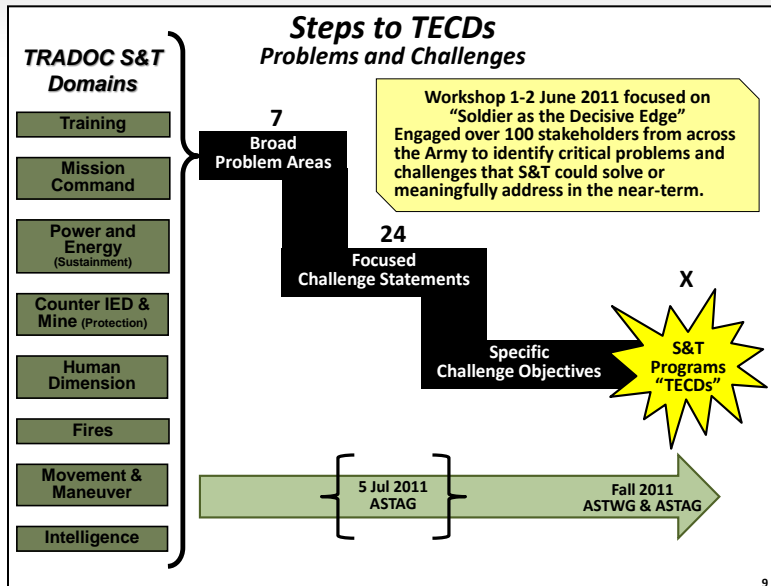
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Generating Near Term S&T Priorities

7 Problems and 24 Challenges?



Big Army Problems that S&T Must Help Solve
Current Focus: "Soldier as the Decisive Edge"

- There is insufficient **FORCE PROTECTION** to ensure highest degree of survivability across the spectrum of operations.
- Soldiers in Small Units (squads/fire teams/crews) are **OVERBURDENED** (physically and cognitively); this degrades performance and may result in immediate, as well as, long term consequences.
- U.S. Army squads are too often **SURPRISED** in tactical situations. Soldiers in Small Units lack sufficient timely **MISSION COMMAND & TACTICAL INTELLIGENCE** to understand where their assets are, who and where the enemy is, who and where non-combatants are and to document and communicate this information to each other and higher echelons.
- We spend too much time and money on **STORING, TRANSPORTING, DISTRIBUTING and WASTE HANDLING** of consumables (water, fuel, power, ammo and food) to field elements, creating exposure risks and opportunities for operational disruption.
- Soldiers in Small Units have limited capability to integrate maneuver and fires in all environments to create **TACTICAL OVERMATCH** necessary to achieve mission objectives.
- Operational **MANEUVERABILITY** (dismounted & mounted) is difficult to achieve in complex, austere, and harsh terrains and at high **OPTEMPO**.
- We do not understand **WHAT MAKES THE HUMAN TICK** in a way that can lead to assured ability to perform operational, high **OPTEMPO** missions effectively and without secondary negative effects.

Problems listed in no particular order – validated by Senior Army Leadership

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24 Army S&T Challenges

	Challenge #	Challenge Title
Top 5	1b	Force Protection – Soldier & Small Unit
	1c	Force Protection – Occupant Centric Platform
	2a	Overburdened – Physical Burden
	3a	Surprise/Tactical Intelligence – Mission Command
	7d	Human – Medical Assessment & Treatment
Next 5	1a	Force Protection – Basing
	7b	Human – Individual Training to Tactical Tasks
	3b	Surprise/Tactical Intelligence – Actionable Intelligence
	4a	Sustainability/Logistics – Basing
	4b	Sustainability/Logistics – Transport, Distribute & Dispose
Remaining 14	1d	Force Protection – On the Move (Ground)
	2b	Overburdened – Cognitive Burden
	3c	Surprise/Tactical Intelligence – Cultural / Linguistic
	3d	Surprise/Tactical Intelligence – Organic Combat ID
	3e	Surprise/Tactical Intelligence – Overwatch Persistent Surveillance
	3f	Surprise/Tactical Intelligence – METT-TC Data/Information/Knowledge
	3g	Surprise/Tactical Intelligence – Network
	5a	Tactical Overmatch – Deliver Decisive Effects
	5b	Tactical Overmatch – Targeting/Hand-off
	6a	Maneuverability – On the Move (Air)
	6b	Maneuverability – Degraded Visual Environment (brown-out)
	7a	Human – Strength-based Soldier Characteristic Assessments & Readiness
	7c	Human – Collective Training for Tactical Operations
	7e	Human – Trauma Management

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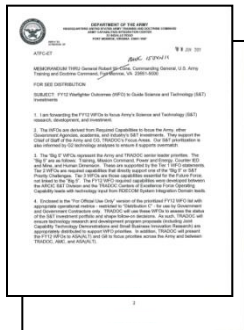
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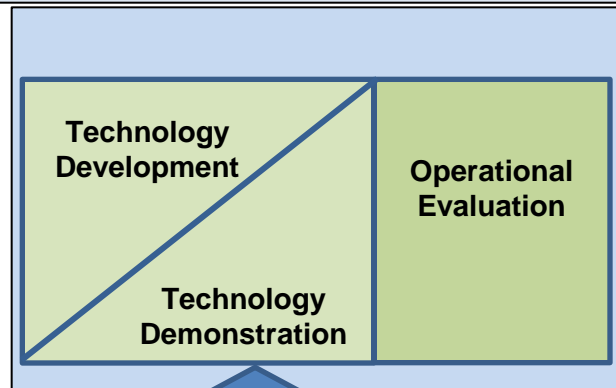


Characteristics of Technology Enabled Capabilities Demonstrations (TECD)

Warfighter Outcomes



TECDs—Near-term integrated capability demonstrations—predominately 6.3, may have some 6.2



Field Limited Capability

Continue Development

Terminate

Responsible PEO/PM
Or
Other mechanism

Acquisition
PoR

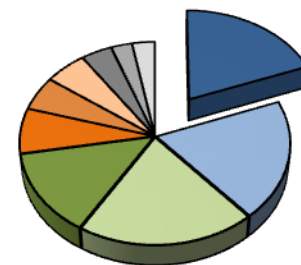
Army's Capability
Portfolios



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- Integrated programs across all S&T
- Integrated solutions/multiple systems
- Output is a full capability
- High-level oversight, including TRADOC involvement
- Current status – 9 TECDs approved against Top 10

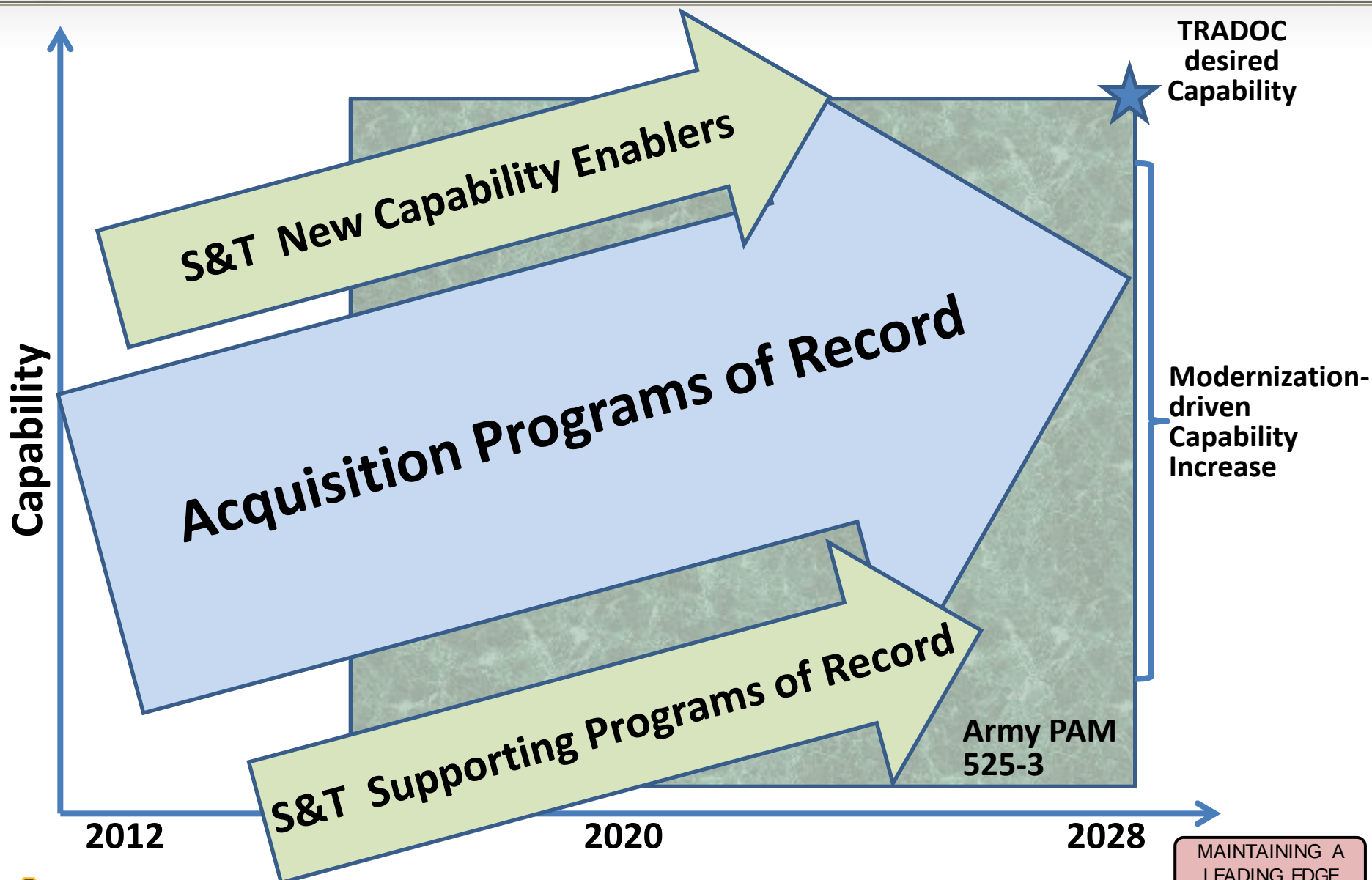


Goal: ~50% Army S&T BA3 Invested in these programs





Current Army Modernization Path



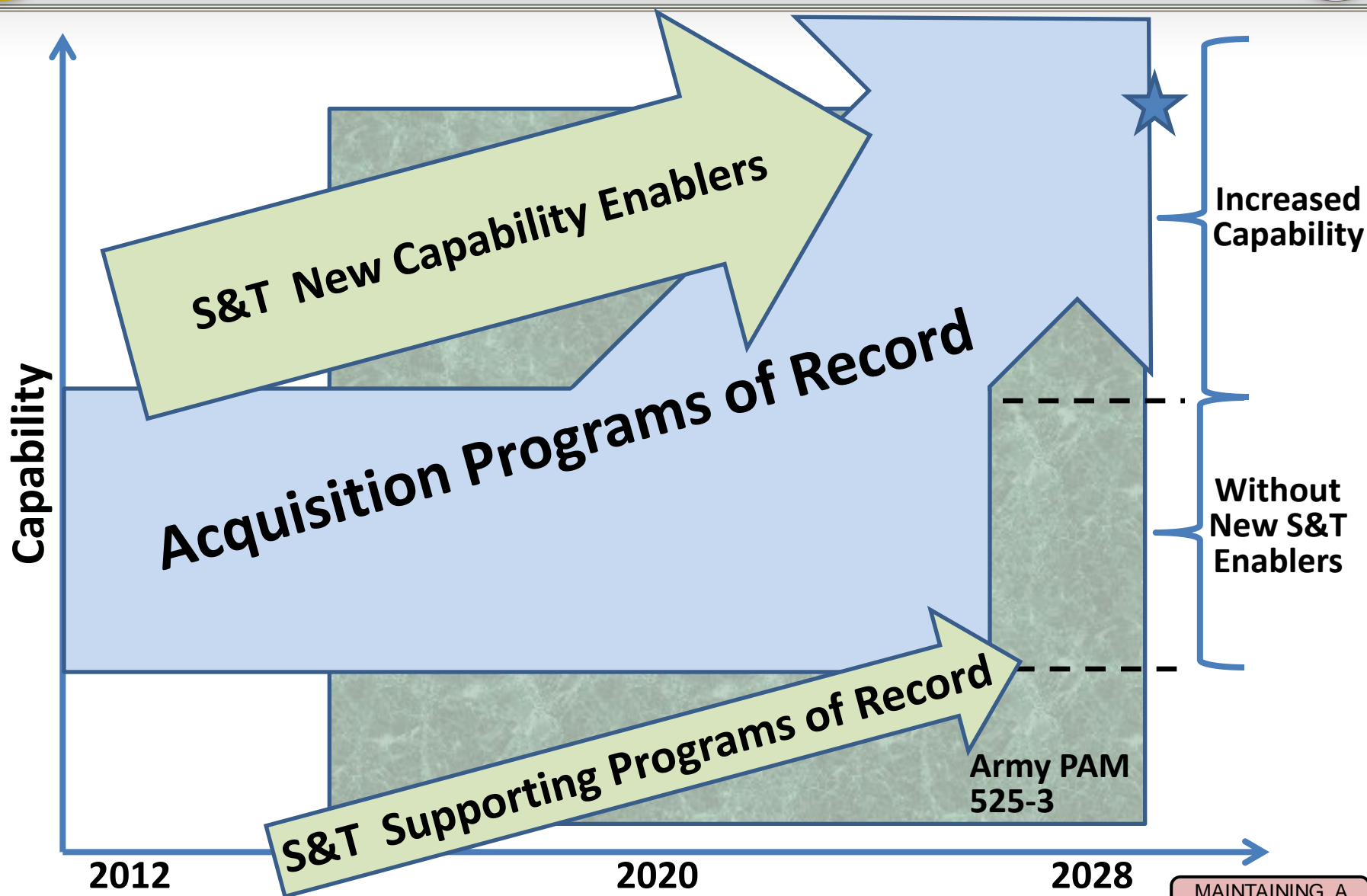
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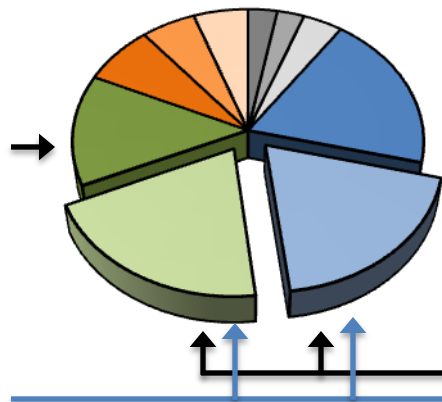


The Rest of the Story Recovered Acquisition Budget



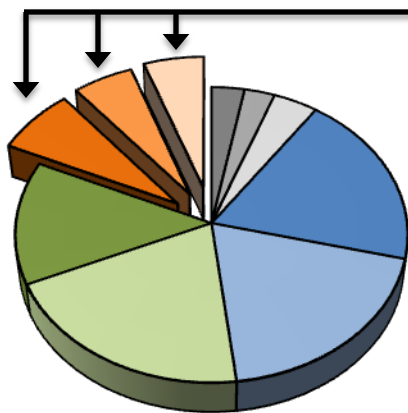


Next Steps



- Get PEO/PM Needs and define a set of programs to meet the highest priority ones

- Identify technologies that have high potential to “Bridge Gaps” or “Leap Ahead” – taking advantage of time when Acquisition programs are slowed down due to constrained budgets – and define a set of programs to meet the highest priority ones



- Define a set of priorities for Basic Research and identify challenge statements against which programs can be proposed and approved





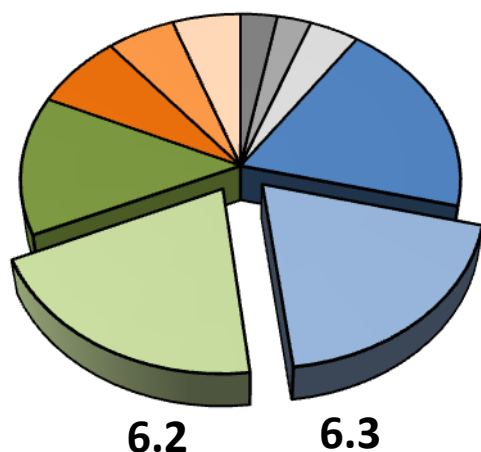
How will we generate Mid-far term S&T Priorities? Programs to Bridge Gaps or Leap Ahead



- Generate ideas for potential leap-ahead, gap filling, and/or disruptive technologies that lead to new or improved Army capabilities

Completed Actions:

- ✓ Drafted and populated initial technology matrix
- ✓ Conducted brainstorming session with SAAL-ZT
- ✓ Structured information to evaluate against criteria



- Obtain support from stakeholders and leadership in validating needs and priorities
- Develop high promise moderate risk programs grounded by knowledge and information gained from the understanding of Army needs and pervasive Army problems and technology opportunities
 - Create stepping stones that solve particular technological challenges by capitalizing on knowledge, data and solution sets that may or may not involve hardware solutions
 - Seek the support of industry and academia in identifying potential technology solutions to high priority capability challenges.
- Execute and monitor status of these programs with the full participation of and in partnership with TRADOC and the Acquisition community in anticipation of potential transition.





In Summary...



- **We are changing the Army S&T business model to be an enduring, sustainable, successful enterprise model**
- **We are aligning our strategic planning to the budget processes so that we are more efficient and able to achieve “top-down” S&T leadership investment focus**
- **We are identifying critical Army problems that we can solve in the near and mid-term, using the best talent and skills wherever they exist**
- **We are enhancing visibility of Army S&T priorities to provide partnering opportunities to jointly solve problems and enhance our Warfighter capabilities**

The better we understand our needs and priorities the better able our enterprise will be to give us capability solutions





Where can you help?



- **Many opportunities and programs available to partner**
 - **Industry**
 - IR&D
 - Army's Rapid Innovation Fund
 - SBIR Program
 - CRADA's
 - **Academia**
 - Grants





For More Information

**Office of the Assistant Secretary of the Army
(Acquisition, Logistics and Technology)**



Army Research & Technology

asaaltaie.wordpress.com



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SOLDIERS AS THE DECISIVE EDGE

MAINTAINING A
LEADING EDGE
IN TECHNOLOGY



Tactical Overmatch – Deliver Decisive Effects



5.a

Problem Statement: At both fixed and mobile sites, Small Units need improved capabilities to detect threats and respond rapidly with precision fires to deliver decisive effects

Challenge: Formulate a S&T program for a system of systems including organic sensors and shooters that will enable the Army to increase the hemispherical protection for Soldiers against dismounted threats and incoming munitions. Program should address capabilities for static and mobile operations



Challenge Boundary Conditions:

Who: Soldiers at fixed and mobile sites in current and future hostile environments

What: Provide an organic capability for hemispherical protection from dismounted threats and incoming fire.

How: Comparing current and future threat detection and targeting capabilities; measure time required to reach operational readiness and required manpower during setup

Objectives:

Near term (FY17): For fixed sites, provide sense/warn and respond capability that automatically provides precise target locations to allow suppression of dismounted threats with precision. Provide the capability to detect and respond to indirect fire weapons.

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IN TECHNOLOGY





Tactical Overmatch – Targeting/Hand-off



5.b

Problem Statement: Small Units require improved lightweight, day/night target acquisition capability to facilitate precision fires, intra-squad fires, call for fires, hand-off of targets to other assets and ability to conduct battle damage assessments.

Challenge: Formulate a S&T program to provide small dismounted units with the tools and training they need to detect, identify, and precisely locate targets without significant Size, Weight, Power or Cost (SWaP/Cost), number of devices, or the need for additional operators.



Challenge Boundary Conditions:

Who: Small Unit in irregular or conventional warfare,

What: Accurate, low SWaP/Cost targeting and hand-off capability

How: Measure impact on collateral damage, target location accuracy, unit lethality, speed/ accuracy, and probability of first shot hit target handoff measured against non-organic fires success for irregular warfare operations (2011 baseline).

Objectives:

Near term (FY17): In 2 years, provide faster*, more reliable/accurate target handoff between mounted and dismounted and intra-squad elements day and night. Provide significant increase in first hit probability at extended range.

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Army Science & Technology



Providing Soldiers Technology Enabled Capabilities

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