



**National and Defense S&T Strategies & Initiatives
DoD/DHS Small Business Innovation Research Workshop
25-26 July 2012**

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12-S-2654



Outline



- **Science & Technology Influence**
- **DoD's Future Science & Technology Strategy (7 S&T Priorities)**
- **DoD Cyber S&T Vision & Strategy**
- **DoD Cyber S&T Community**
- **Closing Remarks**



S&T Influencing the DOD Cyber Landscape

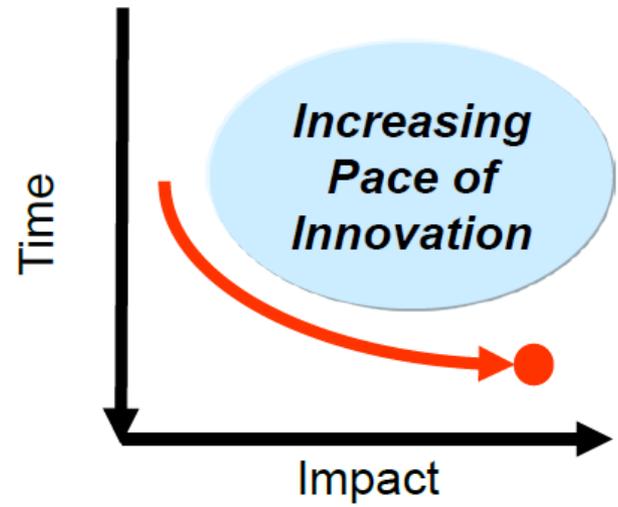
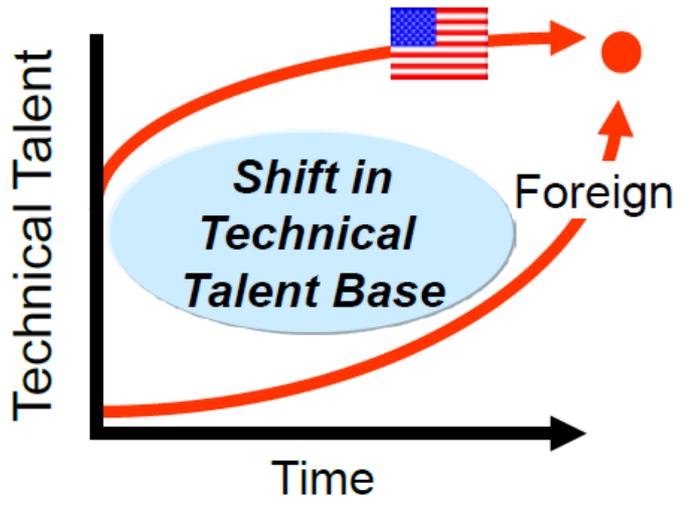
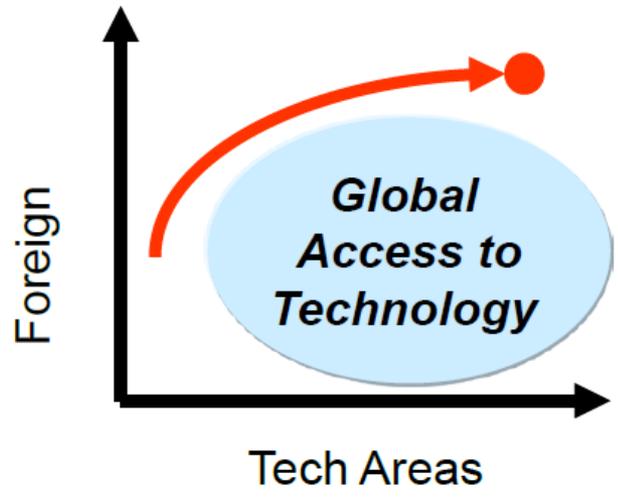
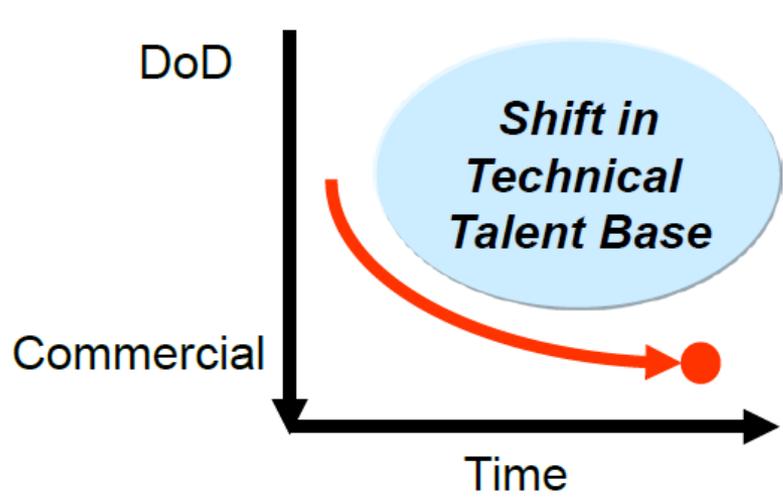


“ Our success in cyberspace depends on a robust public/private partnership. The defense of the military will matter little unless our civilian critical infrastructure is also able to withstand attacks.” ~ Bill Lynn





Key Challenges to our Technical Base





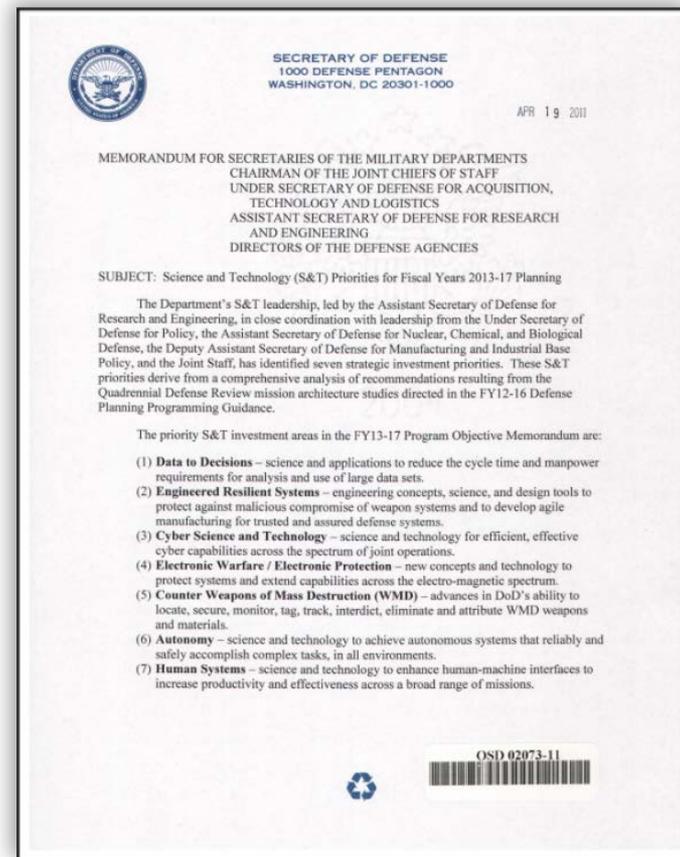
7 S&T Priorities



S&T Priorities for FY13-FY17

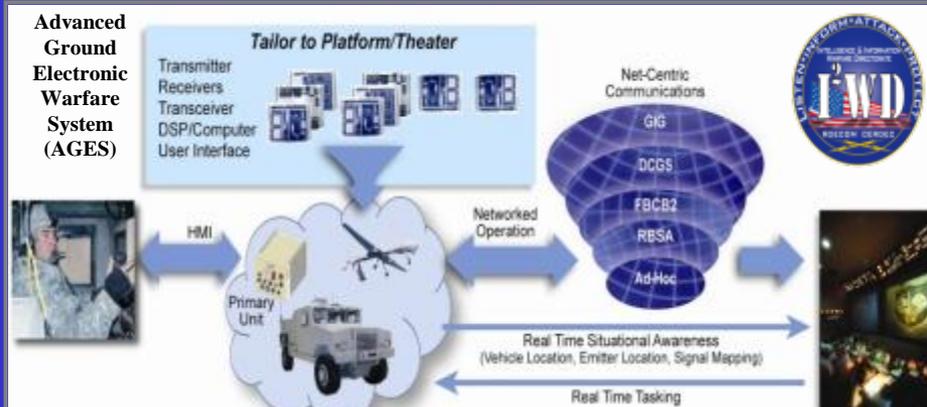
Planning

- **Electronic Warfare/Electronic Protection**
- **Countering Weapons of Mass Destruction**
- **Engineering Resilient Systems**
- **Data to Decisions**
- **Autonomy**
- **Human Systems**
- **Cyber Systems**

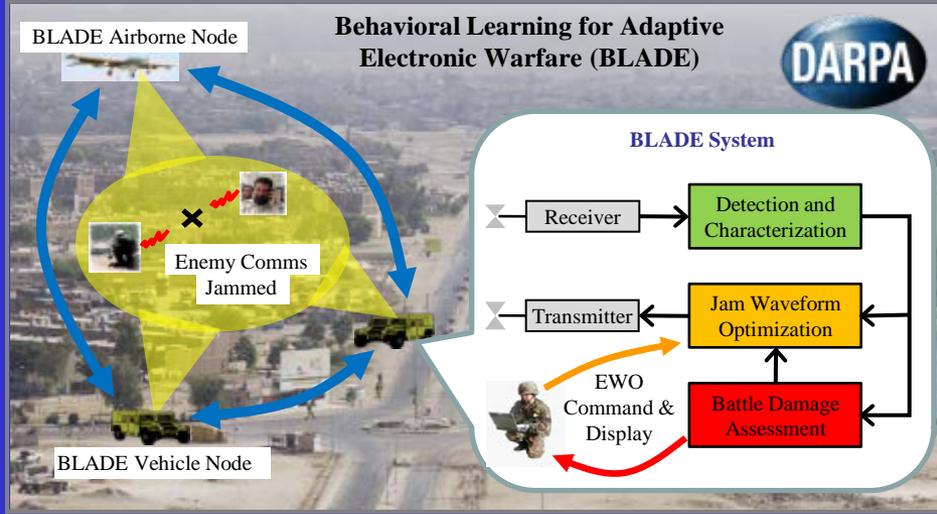
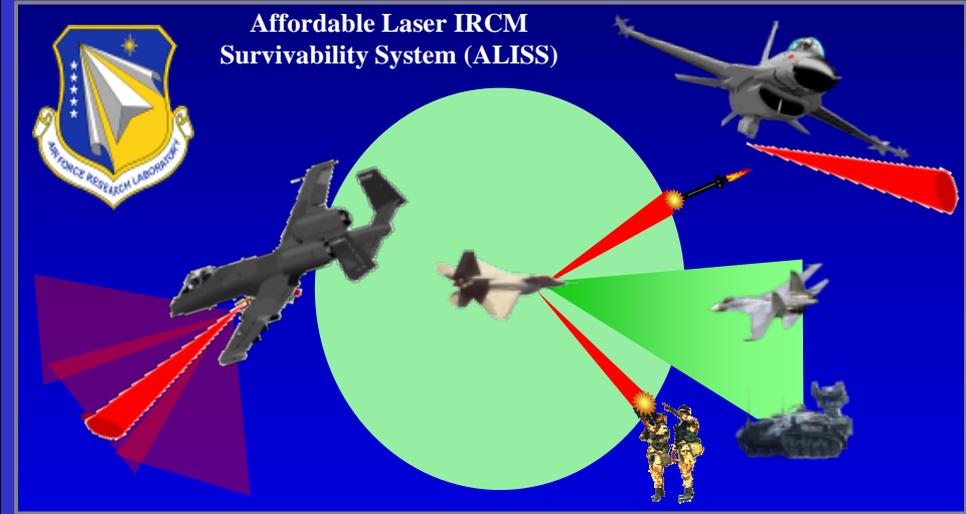




Electronic Warfare / Electronic Protection



New capabilities to dominate the electromagnetic spectrum





Countering Weapons of Mass Destruction



Reduce & Secure



Locate & Monitor

Track



Interdict / Defeat



Tactical Warning

Characterization \ Decision-Making



Hardening



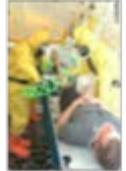
Medical Pretreatment




Medical Treatment



Forensics \ Attribution



Consequence Management



Restoration

- Advanced sensors
- Rapid response capabilities
- Advanced defeat mechanisms

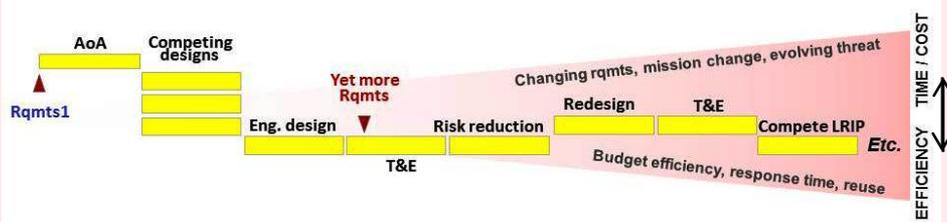


Engineered Resilient Systems (ERS)

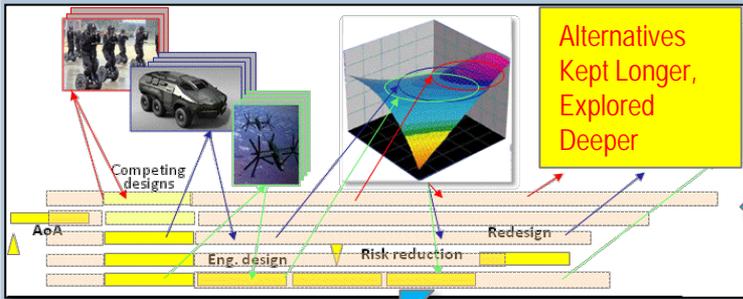
More effective, affordable, adaptable



50 years of process reforms haven't controlled time, cost and performance



- Prematurely reduces alternatives
- Decisions made with incomplete information
- Sequential, slow
- Information lost at every step
- Ad hoc requirements refinement



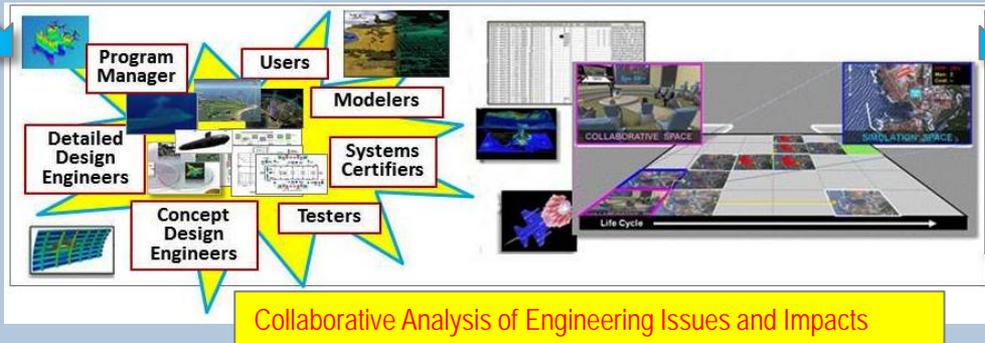
New tools help engineers & users:

- Understand interactions
- Identify implications
- Manage consequences



Effective
• Better informed

Affordable
• Faster engineering



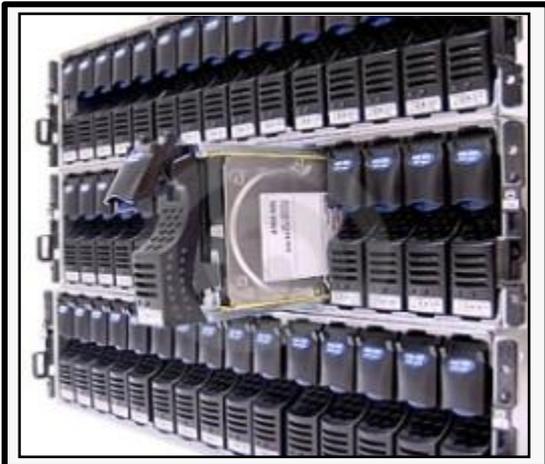
Adaptable
• Wider range of mission contexts

ERS envisions an ecosystem in which a wide range of stakeholders continually cross-feed multiple types of data that inform each other's activities

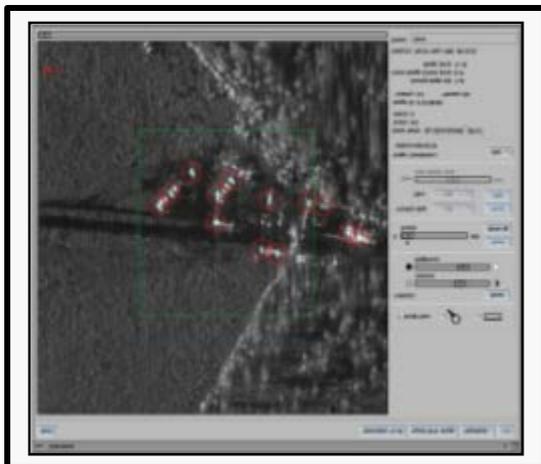


Data-to-Decisions

Data Management Layer



Analytics Layer



User Interaction Layer



- **Investments span all aspects of this challenge with emphasis shifting from imagery to motion and text analytics**
- **Unstructured data analytics is the most challenging and critical component**



Autonomy



Mk18 Mod2 Kingfish



MQ-9 Reaper



MQ-8B Fire Scout



SUGV

- Increasingly important to focus on developing technologies that enable the same or greater mission effectiveness with reduced manpower requirements



Human Systems

System Interfaces

- Strategic Decisionmaking
- Tactical Decision Support
- Autonomous Vehicle Control
- Cyber Operations & Trust
- Adaptive Planning



Personnel & Training

- Adaptive, Tailored Instruction
- Live, Virtual, Constructive Simulation
- Realistic Immersive Training
- Train Partner State Forces



Major Focus of FYDP Planning



Sustaining U.S. Global Leadership: Priorities for 21st Century Defense



SUSTAINING U.S. GLOBAL LEADERSHIP: PRIORITIES FOR 21ST CENTURY DEFENSE

DEFENSE BUDGET PRIORITIES AND CHOICES



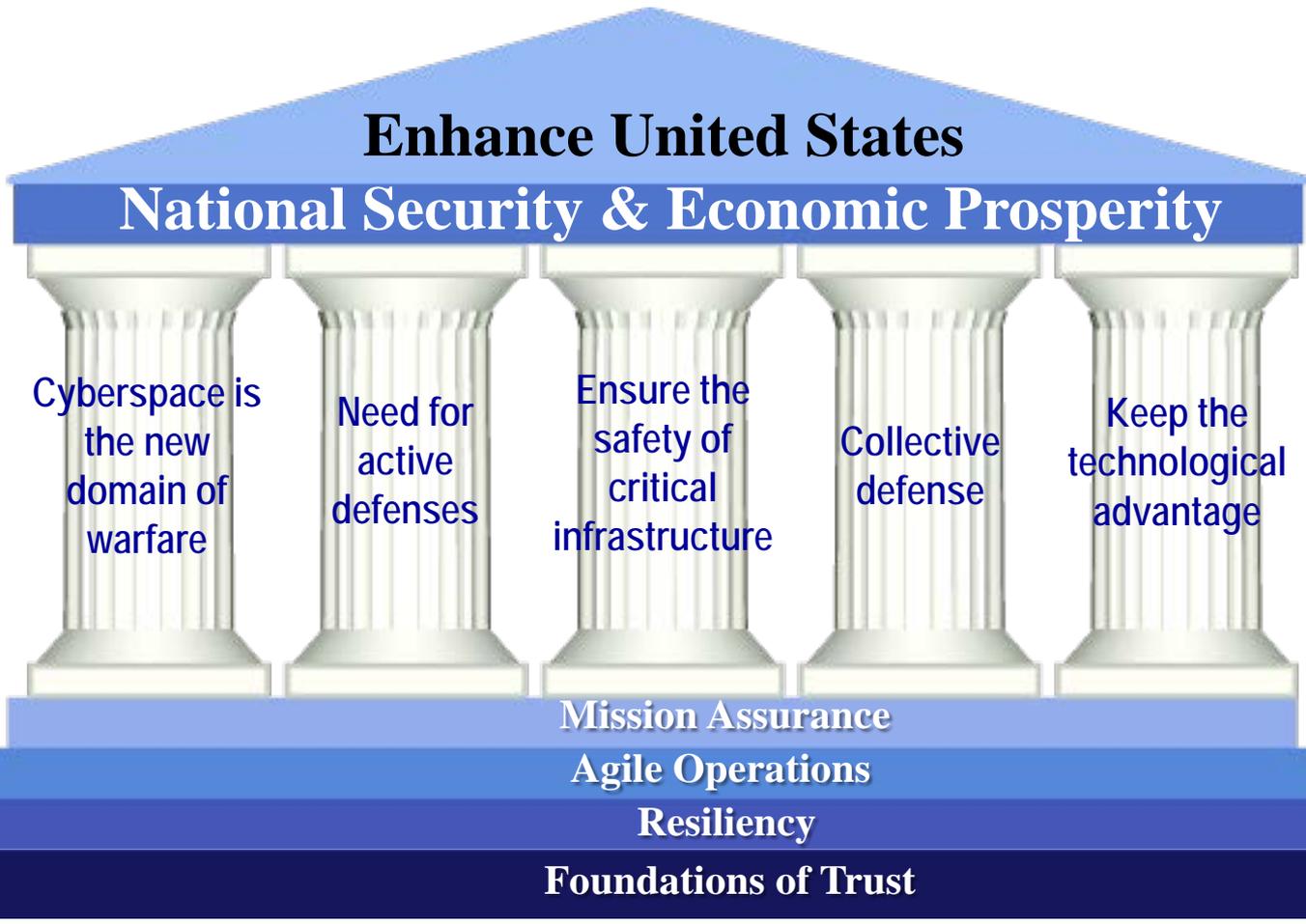
JANUARY 2012

Operate Effectively in Cyberspace and Space. DoD will continue to work with domestic and international allies and partners and invest in advanced capabilities to defend its networks, operational capability, and resiliency in cyberspace and space.

Cyber Operations. The strategic guidance highlights the increasing importance of cyber operations. As a result, cyber is one of the few areas in which we actually increased our investments, including in both defensive and offensive capabilities.



Defense Strategy for Operating in Cyberspace (July 2011)



“Our success in cyberspace depends on a robust public/private partnership. The defense of the military will matter little unless our civilian critical infrastructure is also able to withstand attacks.” ~ Bill Lynn

Foundational DoD S&T Thrusts



Rapid Innovation Fund (RIF)



2011 Defense Authorization Act (Section 1073) – Established the Defense Research & Development Rapid Innovation Fund Program (\$200M appropriated in FY12)

Open Cyber BAA's:

- Army, Navy & OSBP BAAs Issued
- Early to mid-September response for White Papers
- Air Force BAA scheduled for late Oct 2012 release
- Additional details at the Defense Innovations Marketplace website:

<http://www.defenseinnovationmarketplace.mil/RIF2012.html>

RIF-Specific Source Selection Criteria. Projects -

- Resolve operational challenge or critical national security needs and have a demonstration path into an acquisition program
- Is completed within 24 months of award
- Cost is not more than \$3M



**Waiver Authority
Resides with USD(AT&L)**

Selection Preference to Small Business Proposals



Defense Innovation Marketplace



Website devoted to making it easier for you to find out about DoD's S&T and Program Investments

defenseinnovationmarketplace.mil

Links to Relevant DoD Information

- S&T Planning Documents
- Key Briefs from Department Leaders
- Doing Business with DoD, e.g.
 - Broad Agency Announcements
 - Industry Day Announcements
 - Rapid Innovation Fund Information
 - Links to Army, AF, Navy Labs





DoD Cyber S&T Vision



- **End-state goal**

- Safe and secure cyber domain for effective DoD operations
 - Inherent availability
 - Operational flexibility and maximum adaptability
 - Ubiquitous integrity and confidentiality
 - Trustworthiness
- Cyber situation awareness and active defense to maintain freedom of operation

- **S&T Vision**

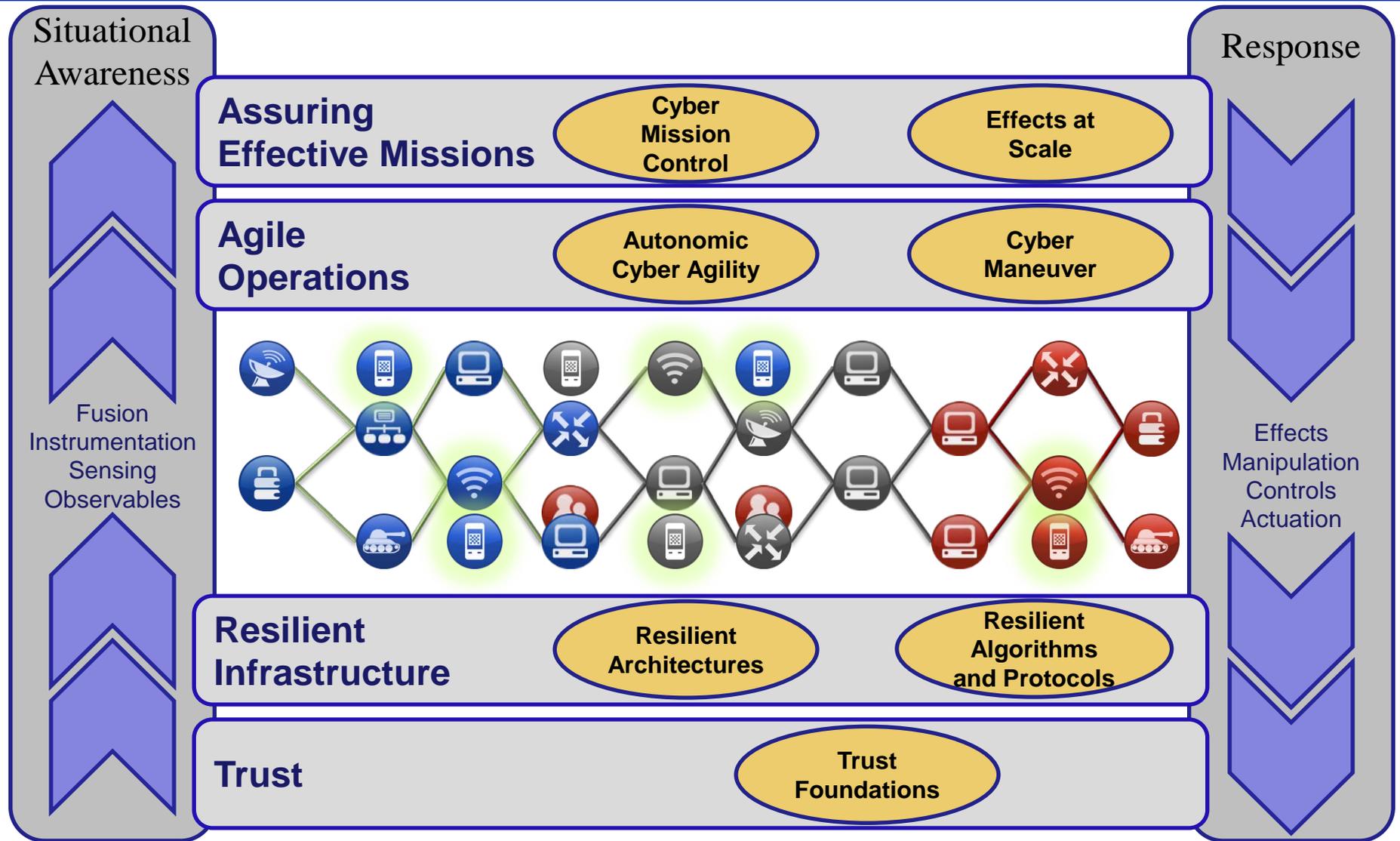
- DoD S&T will provide technology to enable pervasive, measurably safe and secure operations in cyberspace

Recognition of cyber as a new warfighting domain requires a corresponding S&T strategy and vision



Cyber Priority Steering Council

Technology Challenge Summary





ASD(R&E) Cyber Research Program

Future Shaping of the Program (FY13 – FY15)



- **(U) Focus for New Research in FY13-FY15:** Cyber Priority Steering Council recommended research themes from 10-year Research Roadmap:
 - ***(U) Trust***
 - (U) Trust foundations
 - ***(U) Cyber resilience***
 - (U) Resilient architectures
 - (U) Resilient algorithms and protocols
 - ***(U) Cyber agility***
 - (U) Autonomic cyber agility
 - (U) Cyber maneuver
 - ***(U) Assuring effective missions***
 - (U) Cyber mission control
 - (U) Effects at scale
- **(U) Other New Research Focuses**
 - (U) Expand research thrusts to include experimentation to quantify and validate progress
 - (U) Additional research on cyber security metrics
 - (U) As current research matures, focus on transition opportunities and demonstrations



DoD Cyber S&T Community



• Cyber in DoD S&T Organizations

- Each DoD S&T Component conducts research focused on the needs of their own operational elements
- DARPA focuses on breakthrough capabilities, including new platform and network approaches
- NSA focuses on cryptography and trustworthy high assurance systems, large scale, and high speed environments
- OSD funded cyber S&T focuses on joint problems and cross-organizational collaboration



• Multidisciplinary University Research Initiatives (MURI)

- Maintains efforts in basic research in areas of DoD interest
- Engages and utilizes academic sector in DoD priorities
- 16 ongoing projects, \$19 Million in FY 2011



• DoD Small Business Innovative Research (SBIR) program in cyber

- Harness talent of small technology companies to meet U.S. military needs
- Potential for commercialization or transition to DoD of successful research
- 59 ongoing awards, \$13 Million in FY 2011





Closing Remarks

- **The problem is challenging & multifaceted**
 - Rapid change of technology creates new vulnerabilities
 - Domain spans challenges in securing hardware, software, communications, supply chain, & human behavior
- **Collaboration, coordination important**
- **SBIR program makes a valuable contribution**
 - DDR&E SBIR Workshop cited in GAO report as example of success in private/public partnership
 - Products from DoD SBIRs research have transitioned into commercial products & DoD programs
- **Continuing private/public partnership viewed as high importance**