



Affording Defense Capability: An SE-Centric Take on Science and Technology Priorities

Kristen Baldwin
Principal Deputy, Office of the Deputy
Assistant Secretary of Defense for
Systems Engineering

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 05 OCT 2011	2. REPORT TYPE	3. DATES COVERED 00-00-2011 to 00-00-2011			
4. TITLE AND SUBTITLE Affording Defense Capability: An SE-Centric Take on Science and Technology Priorities		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of the Deputy Assistant Secretary of Defense for Systems Engineering, 3030 Defense Pentagon, Room 3C167, Washington, DC, 20301-3030		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES 3rd Annual SERC Research Review (ASRR 2011), 5-6 Oct, Hyattsville, MD.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 15	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Integrated S&T Enterprise

Missions

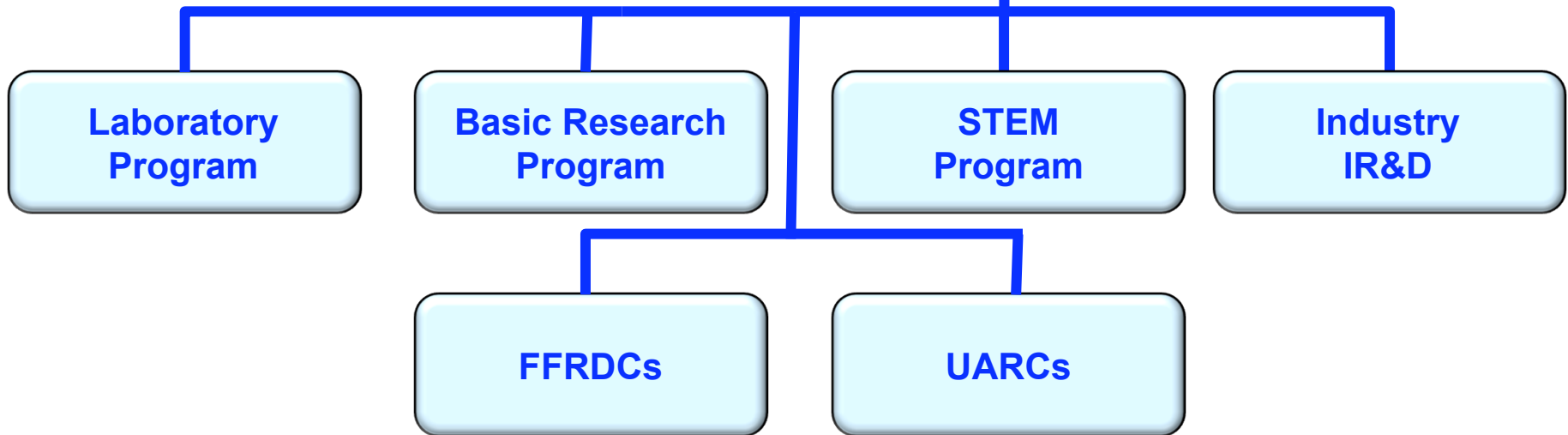
- National Defense Strategy
- Quadrennial Defense Review
- Space Posture Review
- Nuclear Posture Review

Operational Challenge

JUONs, UONs, COCOM
IPL

Objective Architectures

Critical Capabilities Enabling Technologies

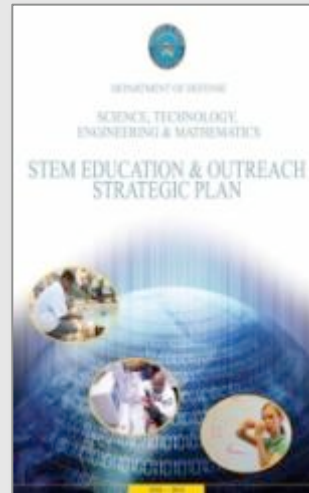




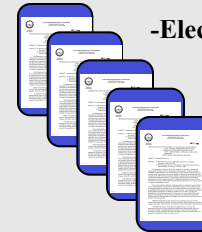
Assistant Secretary of Defense Research and Engineering Imperatives



1. Accelerate delivery of technical capabilities to win the current fight.
2. Prepare for an uncertain future.
3. Reduce the cost, acquisition time and risk of our major defense acquisition programs.
4. Develop world class science, technology, engineering, and mathematics capabilities for the DoD and the Nation.



Fast Track Studies



- Electronic Warfare
- Computer Science
- Cyber Operations
- Energy & Water
- Rapid Capability Tool Kit

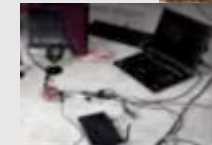
Task Forces



Helo Survivability



Base Protection



Tag, Track, Locate



C-IED SIG Support

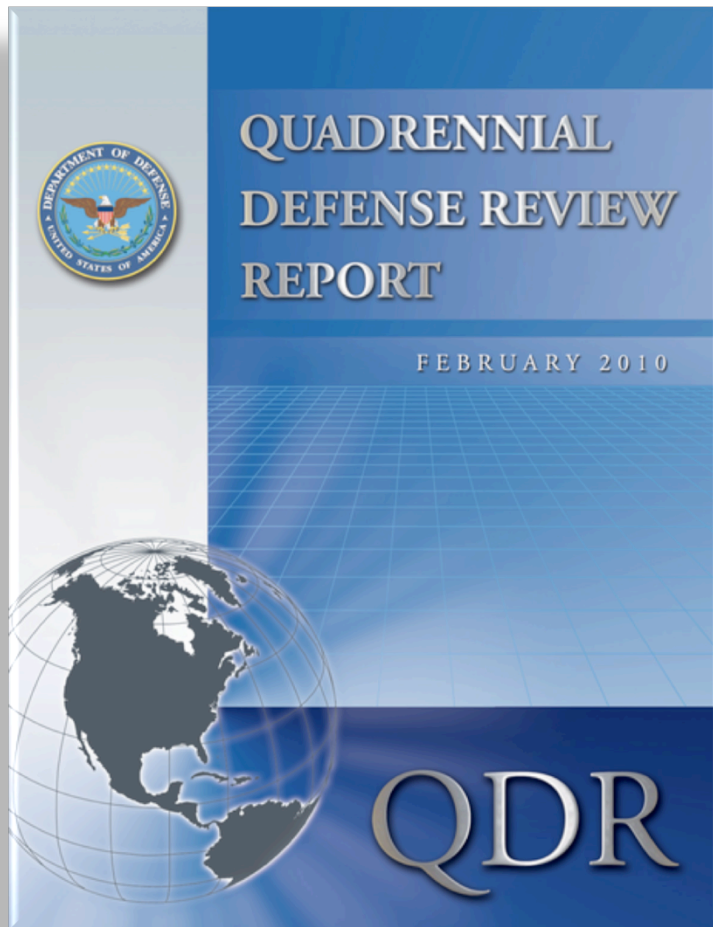


QDR Missions Architectures





Quadrennial Defense Review Mission Set

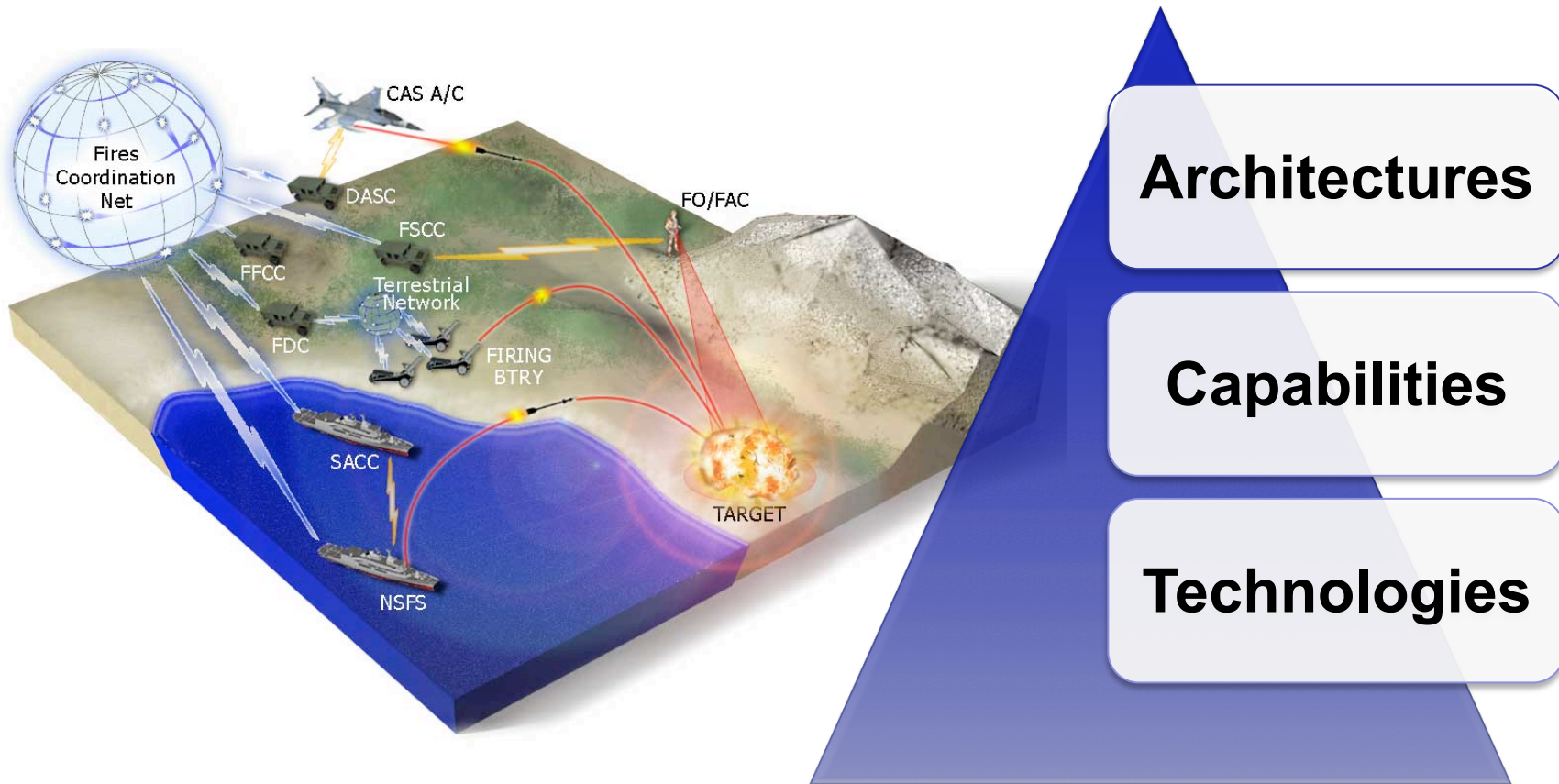


1. Defend the United States and Support Civil Authorities at Home
2. Succeed in Counterinsurgency, Stability, and Counterterrorist Operations
3. Build the Security Capacity of Partner States
4. Deter and Defeat Aggression in Anti-Access Environments
5. Prevent Proliferation and Counter Weapons of Mass Destruction
6. Operate Effectively in Cyberspace.

<http://www.defense.gov/DefenseReviews/>



Architecture – Technology Trade Space



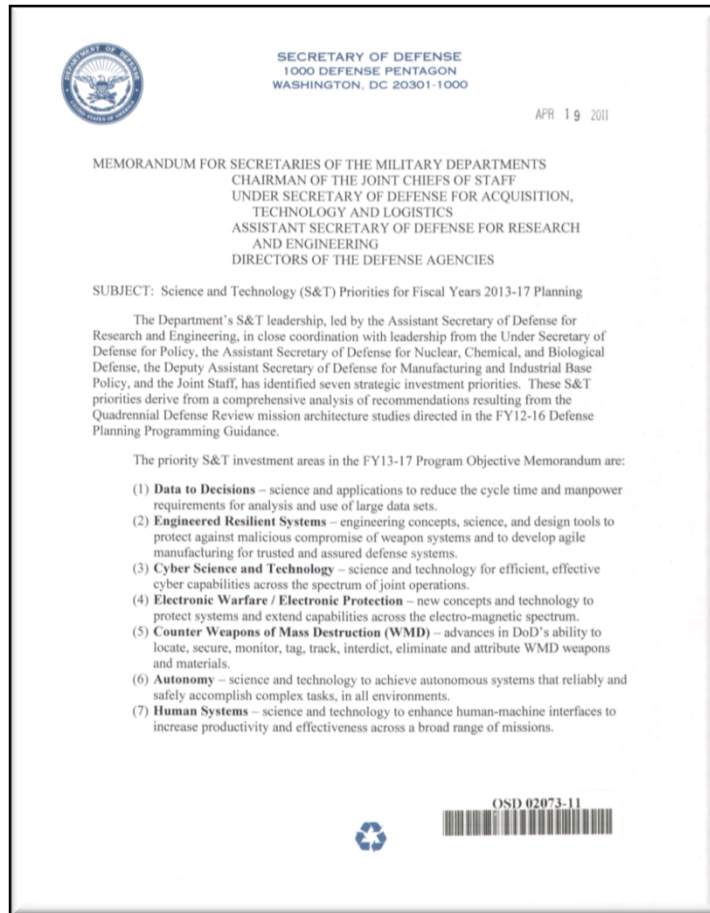
Architectures Drive Technologies
Technologies Inform Architectures



DoD S&T Focus Areas



SECDEF Guidance



19 April 2011

Complex Threats

Electronic Warfare / Electronic Protection

Cyber Science and Technology

Counter Weapons of Mass Destruction

Force Multipliers

Data-to-Decisions

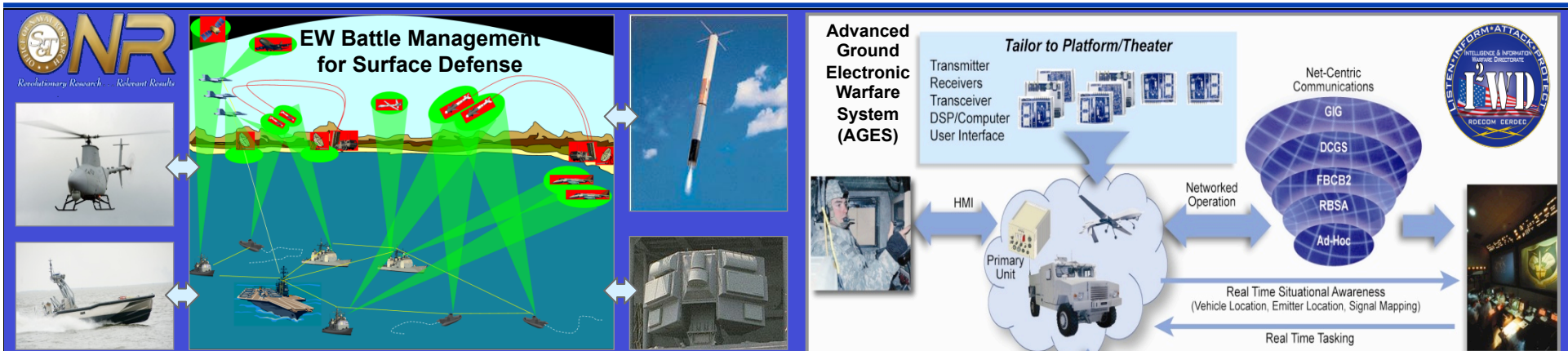
Human Systems

Autonomy

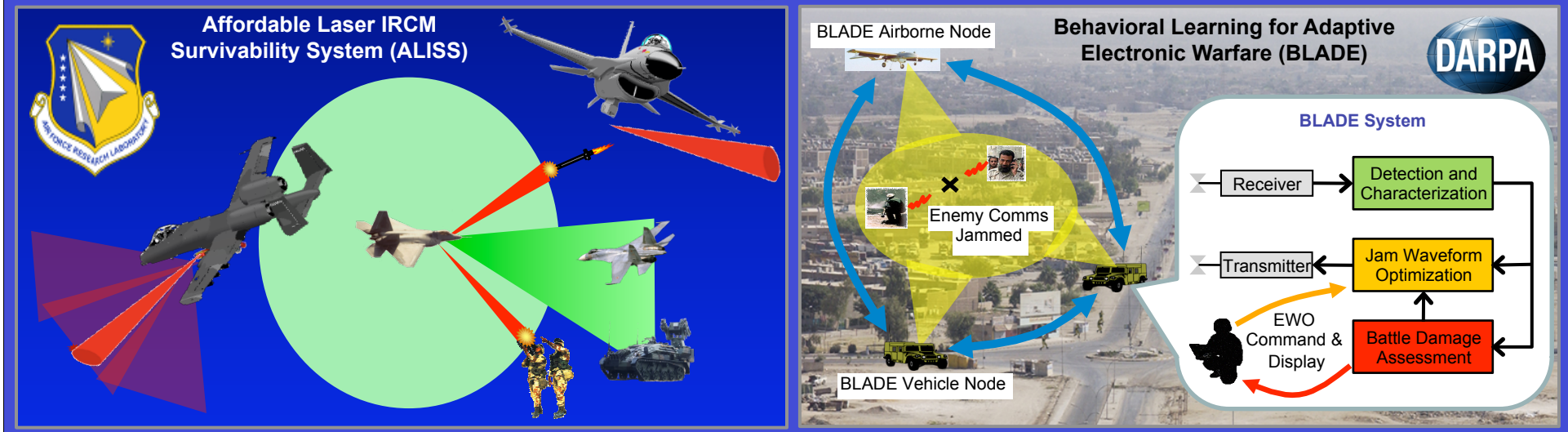
Engineered Resilient Systems



Electronic Warfare / Electronic Protection

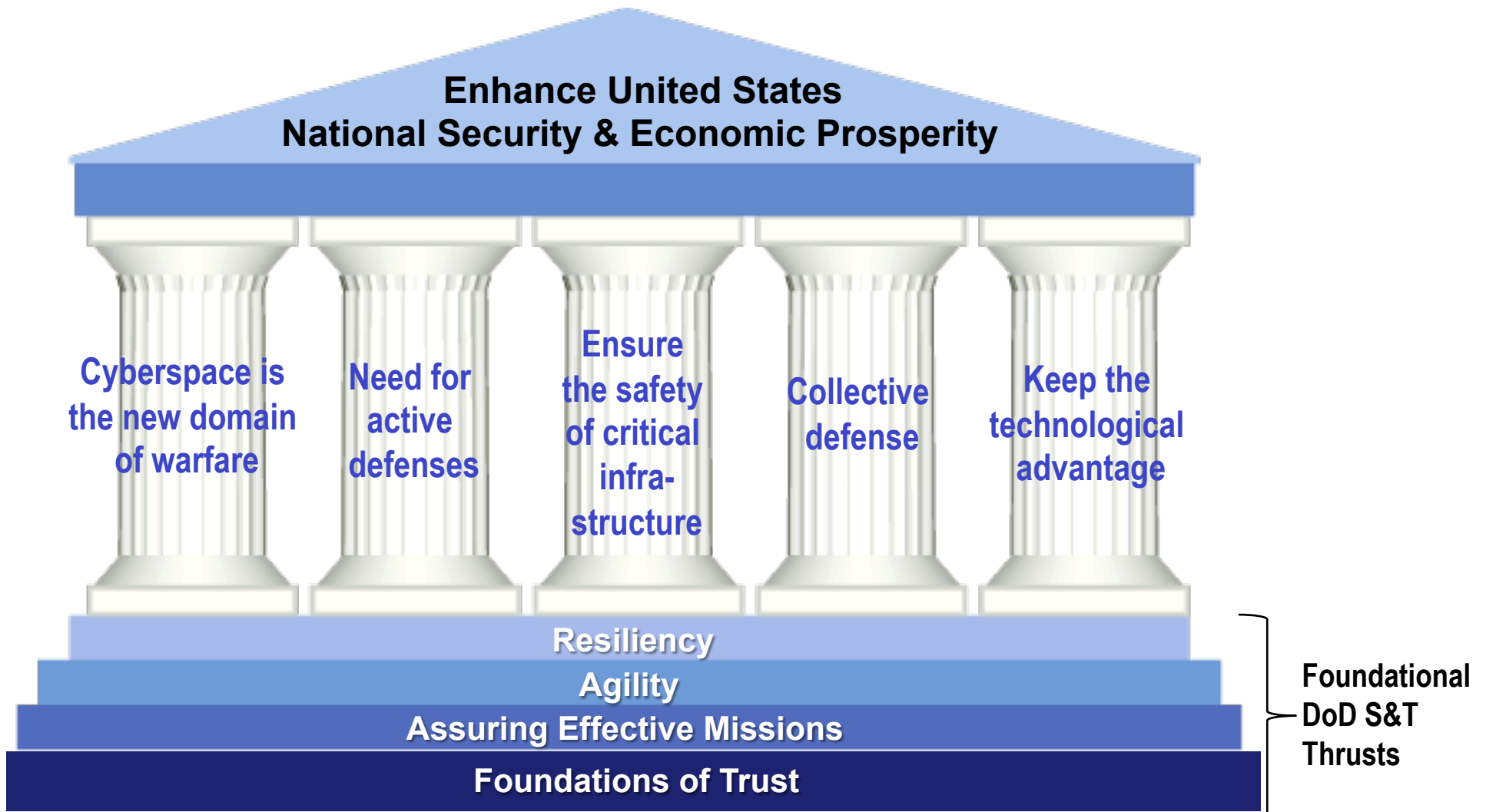


New capabilities to dominate the electromagnetic spectrum





Cyber: Architecture for S&T Investments





Countering Weapons of Mass Destruction




Reduce & Secure



Locate & Monitor

Track



Interdict / Defeat



Tactical Warning

Characterization \ Decision-Making



Hardening




Medical Pretreatment

- Advanced sensors
- Rapid response capabilities
- Advanced defeat mechanisms




Medical Treatment



Forensics \ Attribution



Consequence Management



Restoration



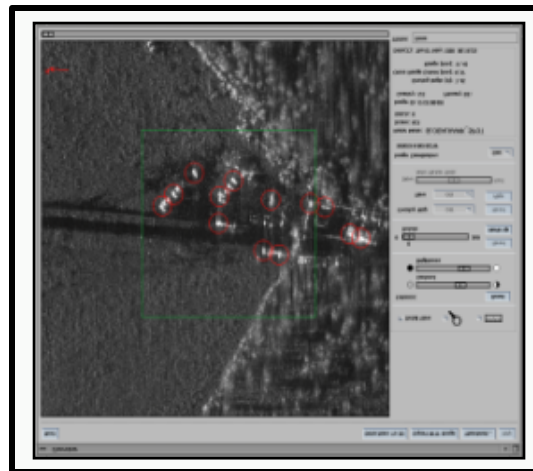
Data-to-Decisions



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**



Human Systems



Personnel & Training



- Realistic, immersive training
- Adaptive, tailored instruction
- Train partner state forces

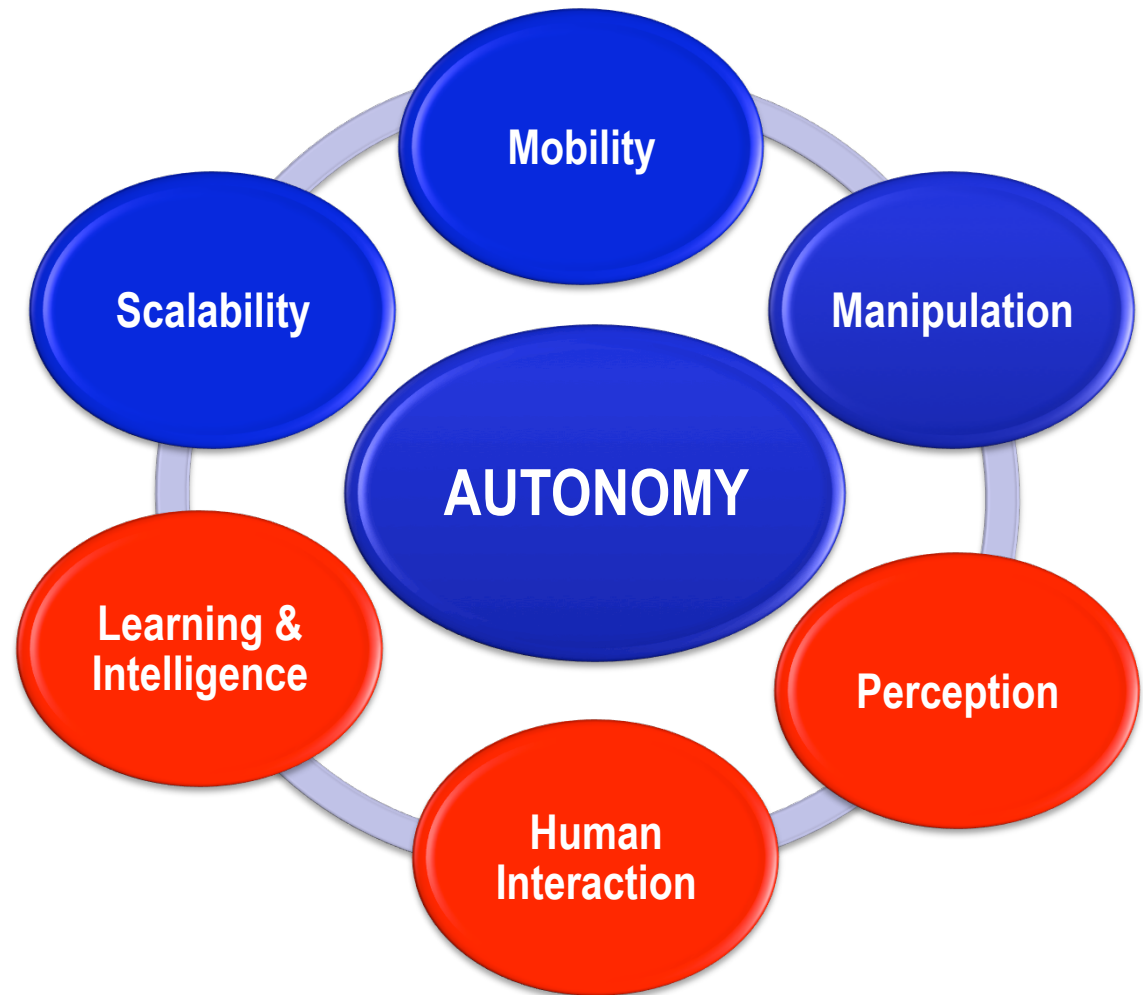
Strategic Decision Support



- Battle management
- Autonomous system control



Autonomy



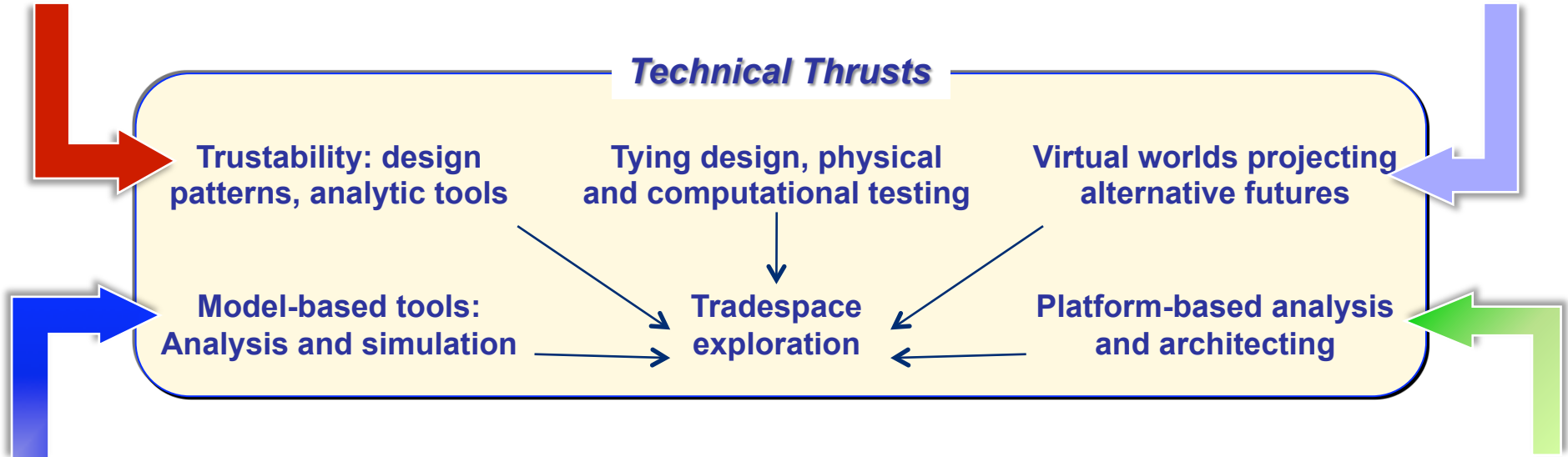


Engineered Resilient Systems Complex Systems Design



Trustworthy Systems Design

Conceptual Engineering



Model Based Engineering

Platform Based Engineering





Some Final Thoughts

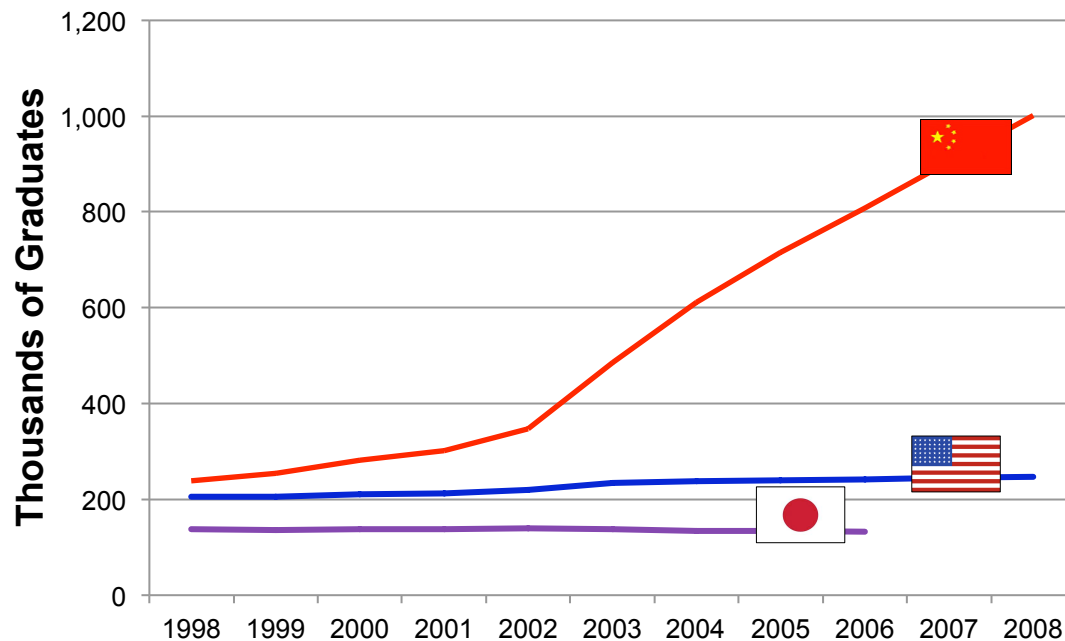


- **How will we get there?**
- **Systems Engineering Research can contribute to many of the cross cutting DoD S&T priorities**
 - We are placing priority for the SERC on Engineered Resilient Systems
 - Today's panel will kick this off!



And, while you're at it...

First Degrees in Natural Sciences and Engineering by Country



Source: National Science Board, S&E Indicators, 2010; SDO Analysis

Give us the workforce we need to execute in the 21st Century!