



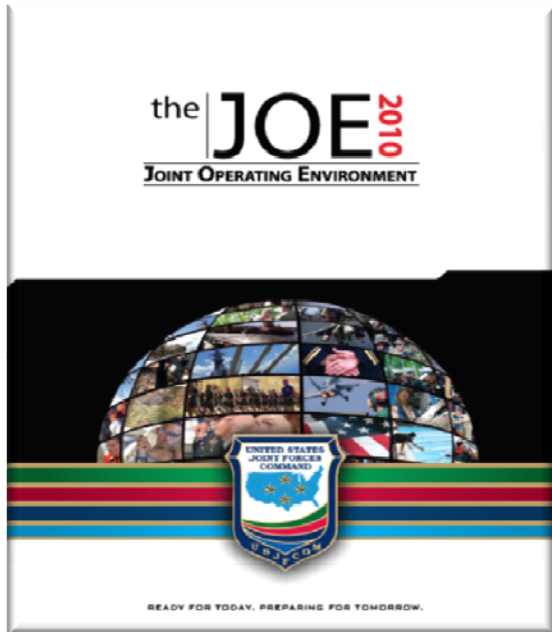
DoD S&T Enterprise

9 August 2011

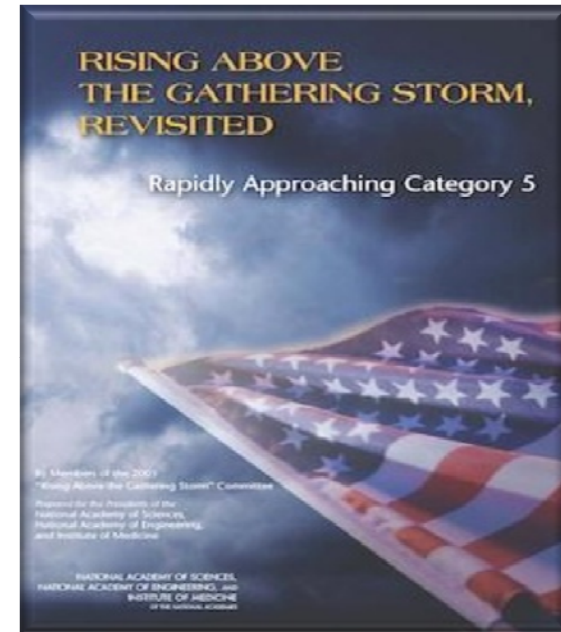
**The Honorable Zachary J. Lemnios
Assistant Secretary of Defense for
Research and Engineering**



Global Shifts → Global Challenges



Shift in World Demographics
Technology Globalization
Shifting Global Economics
Limited World Energy Resources
Challenges to Existing State Structures
WMD proliferation



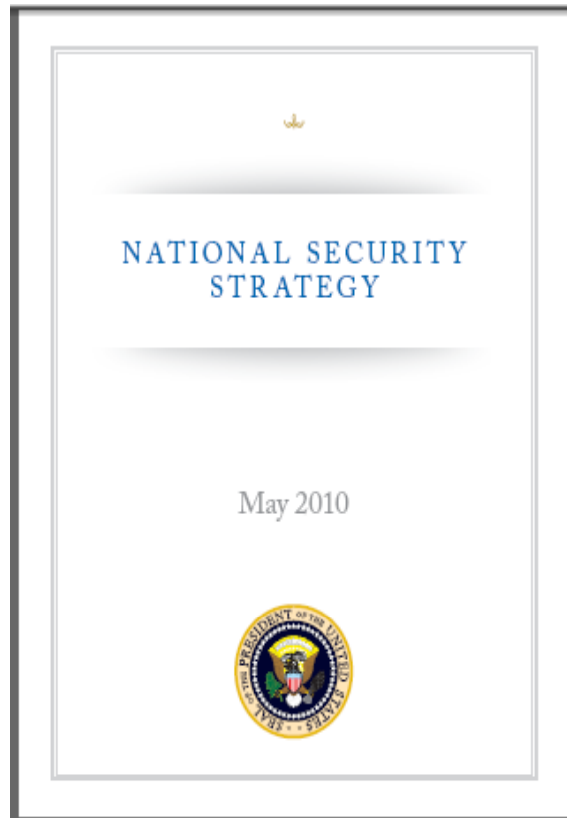
Innovation & Competitiveness
Knowledge Capital
Human Capital
Creative “Ecosystem”



S&T Investment Drivers

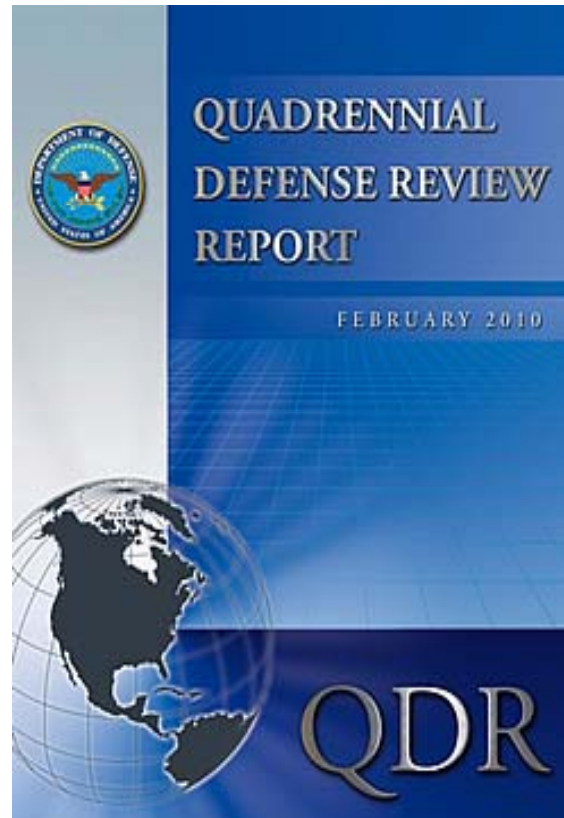


President's National Security Strategy



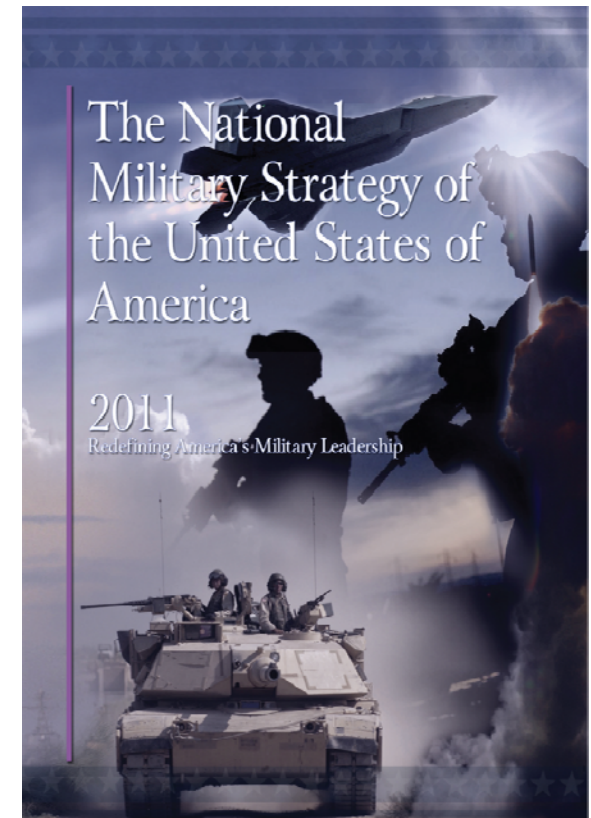
May 2010

SECDEF's Quadrennial Defense Review



February 2010

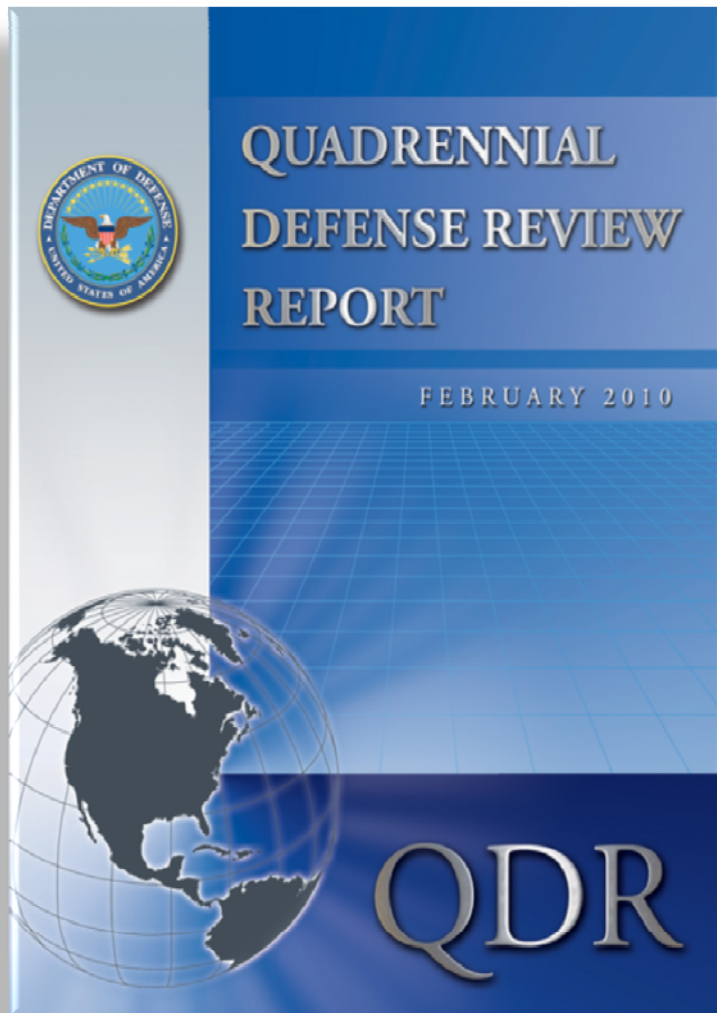
CJCS' National Military Strategy



February 2011



QDR Missions Require New Capabilities



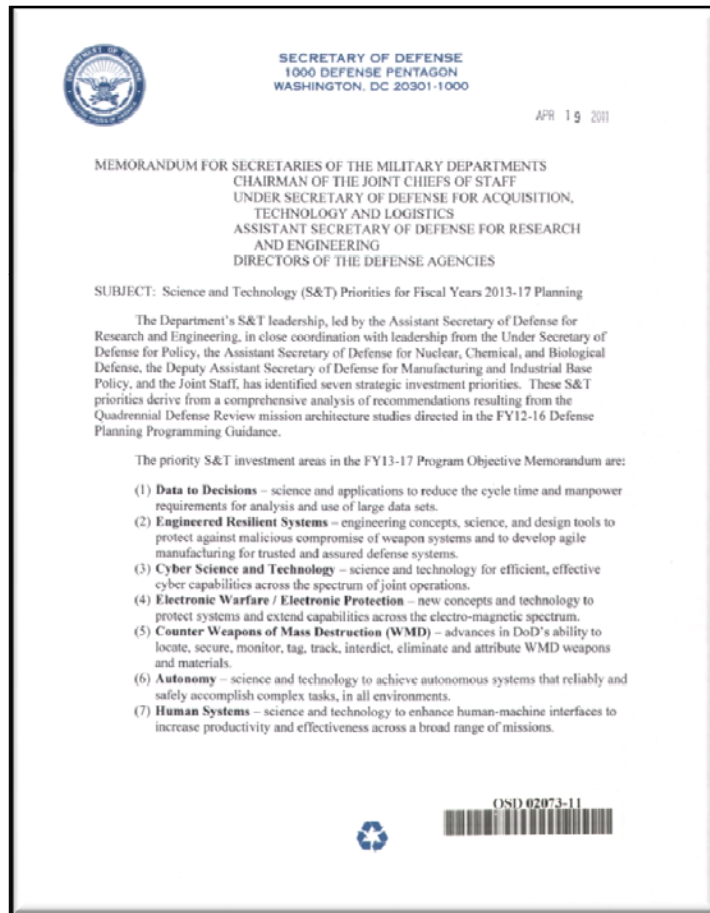
1. **Defend the United States and Support Civil Authorities at Home**
2. **Succeed in Counterinsurgency, Stability, and Counterterrorist Operations**
3. **Build the Security Capacity of Partner States**
4. **Deter and Defeat Aggression in Anti-Access Environments**
5. **Prevent Proliferation and Counter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



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

Autonomy

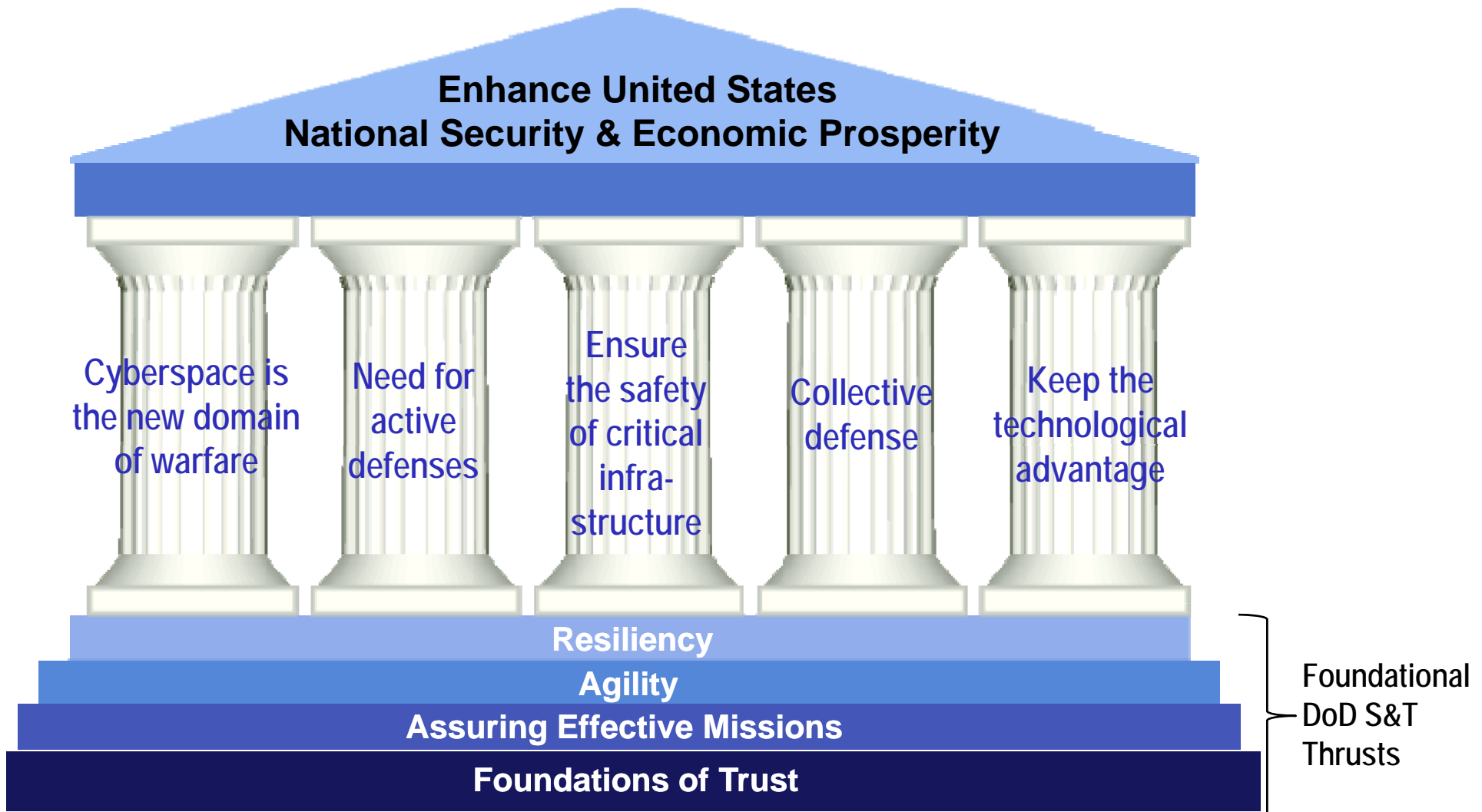
Engineered Resilient Systems

Data-to-Decisions

Human Systems



Cyber: Architecture for S&T Investments





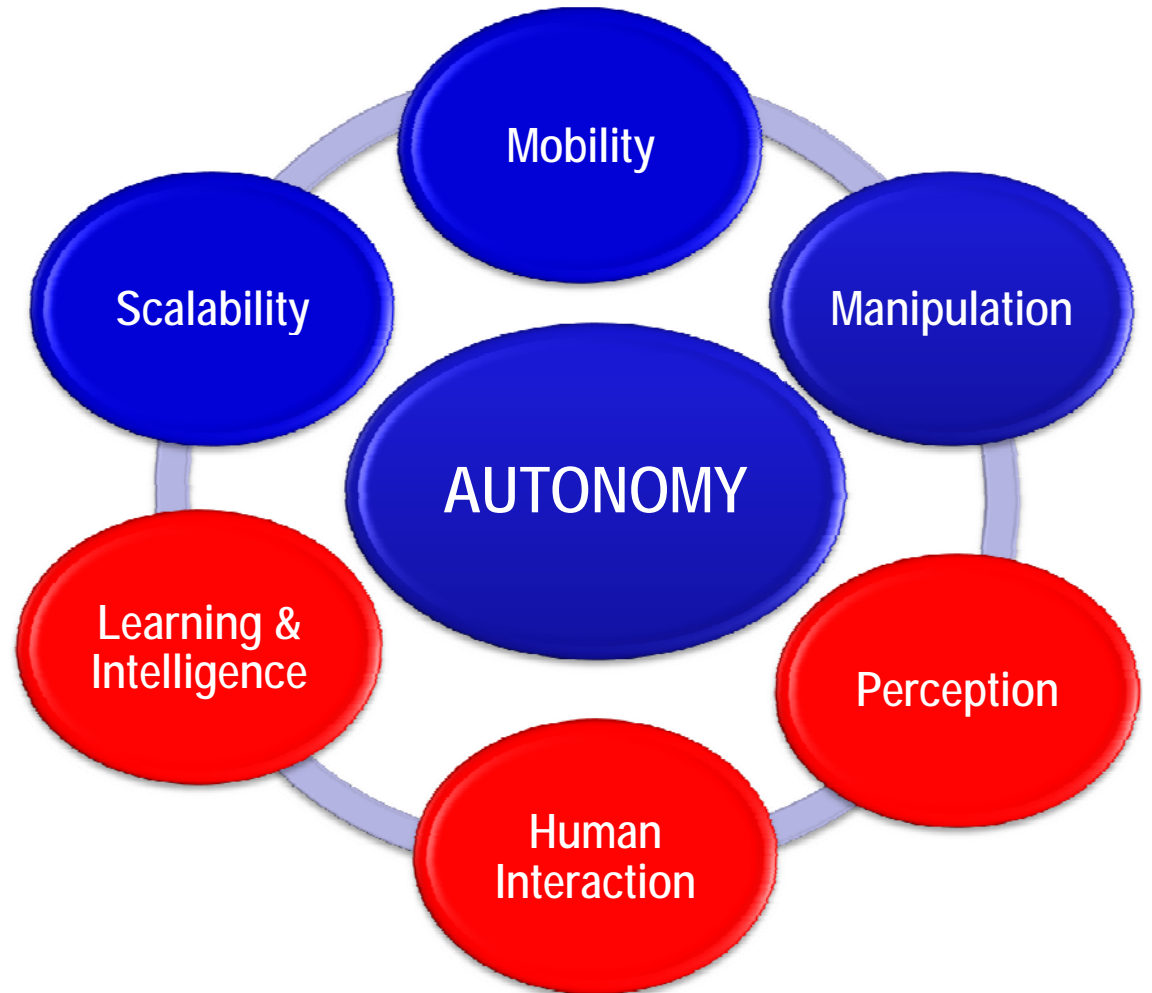
Countering Weapons of Mass Destruction



- Advanced sensors
- Rapid response capabilities
- Advanced defeat mechanisms



Autonomy



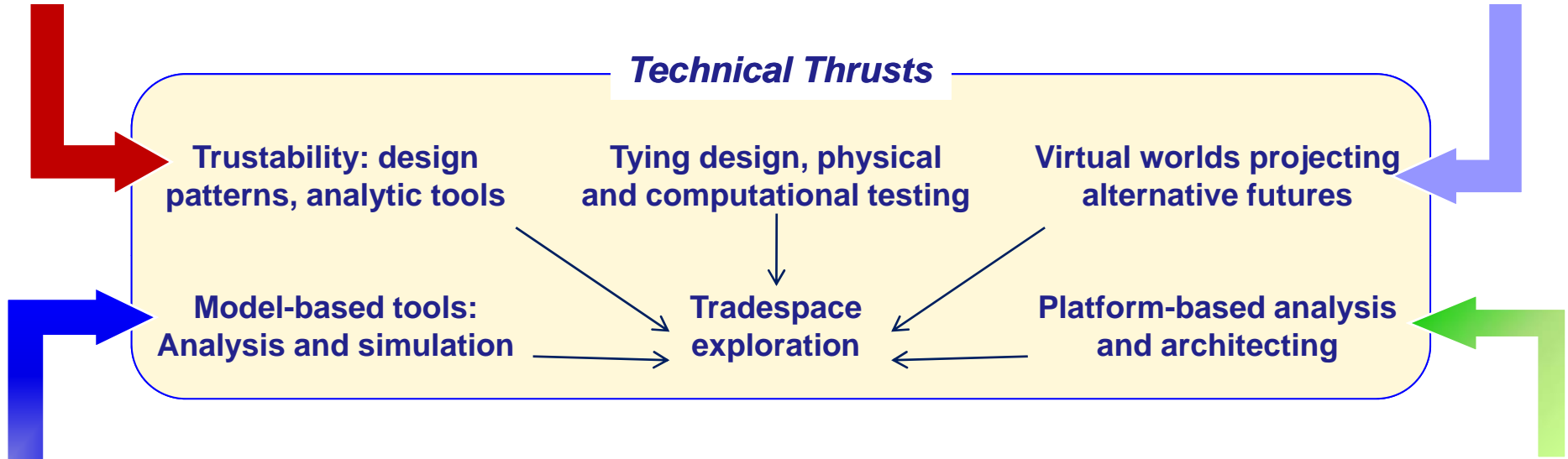


Engineered Resilient Systems Complex Systems Design



Trustworthy Systems Design

Conceptual Engineering



Model Based Engineering

Platform Based Engineering





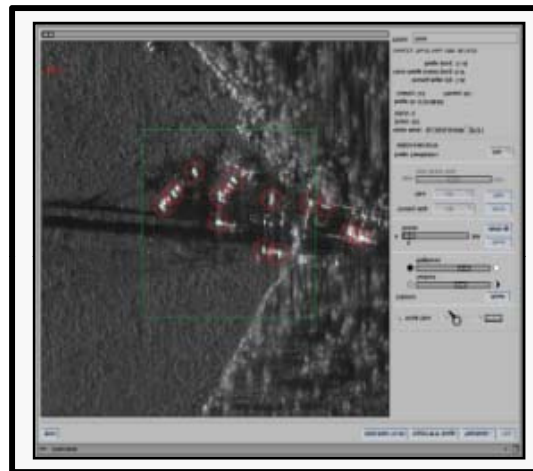
Data-to-Decisions



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



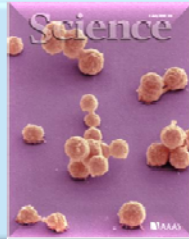
New Frontiers



High Interest Basic Science Areas



Synthetic Biology



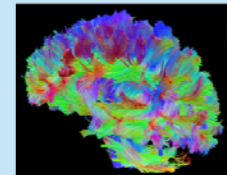
Modeling of Human Behavior



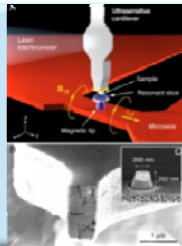
Engineered Materials



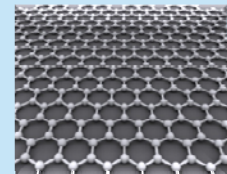
Cognitive Neuroscience



Quantum Systems



Nano Science and Engineering





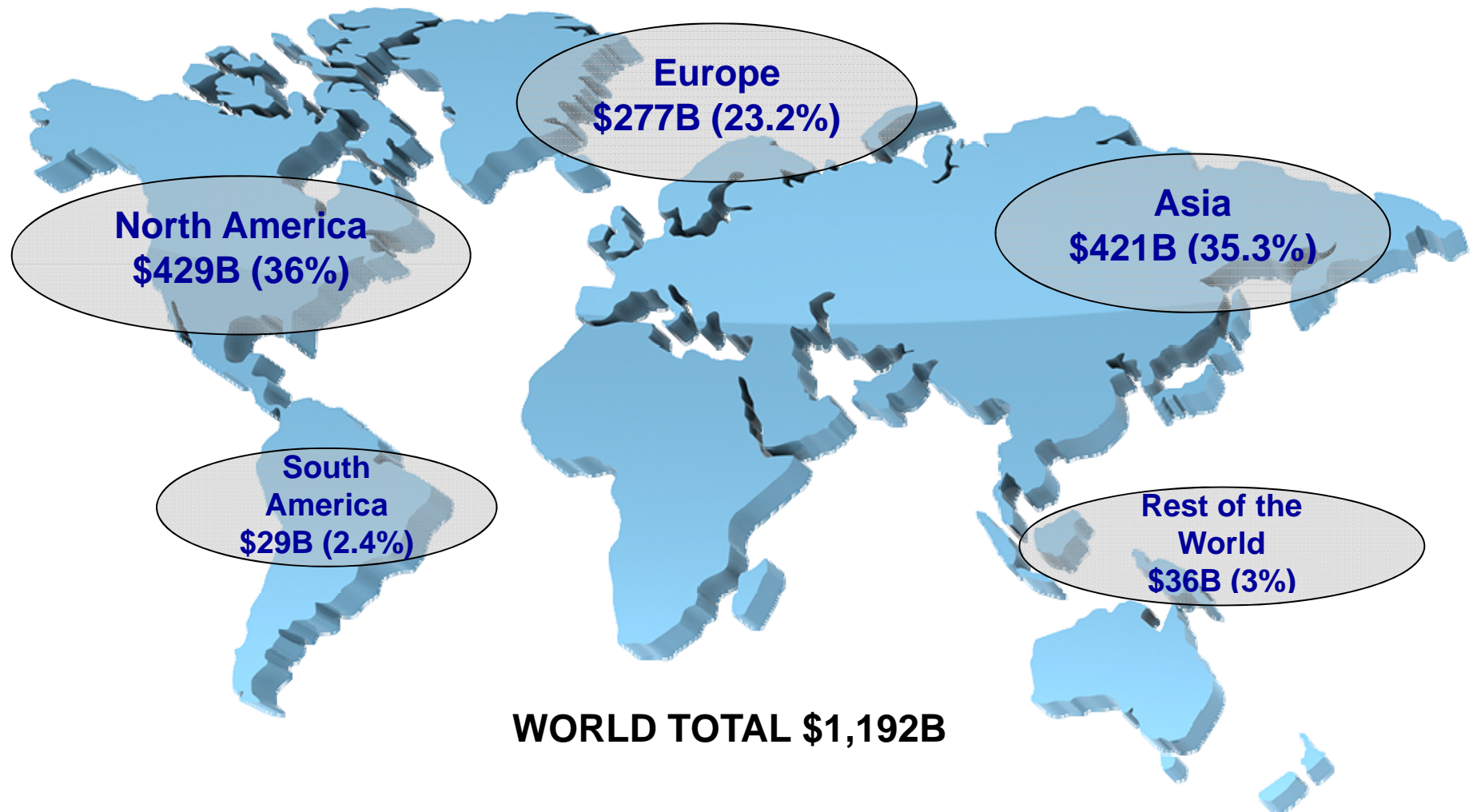
Key Challenge:

Ensuring DoD's S&T Talent Edge



R&D Investments: 2011

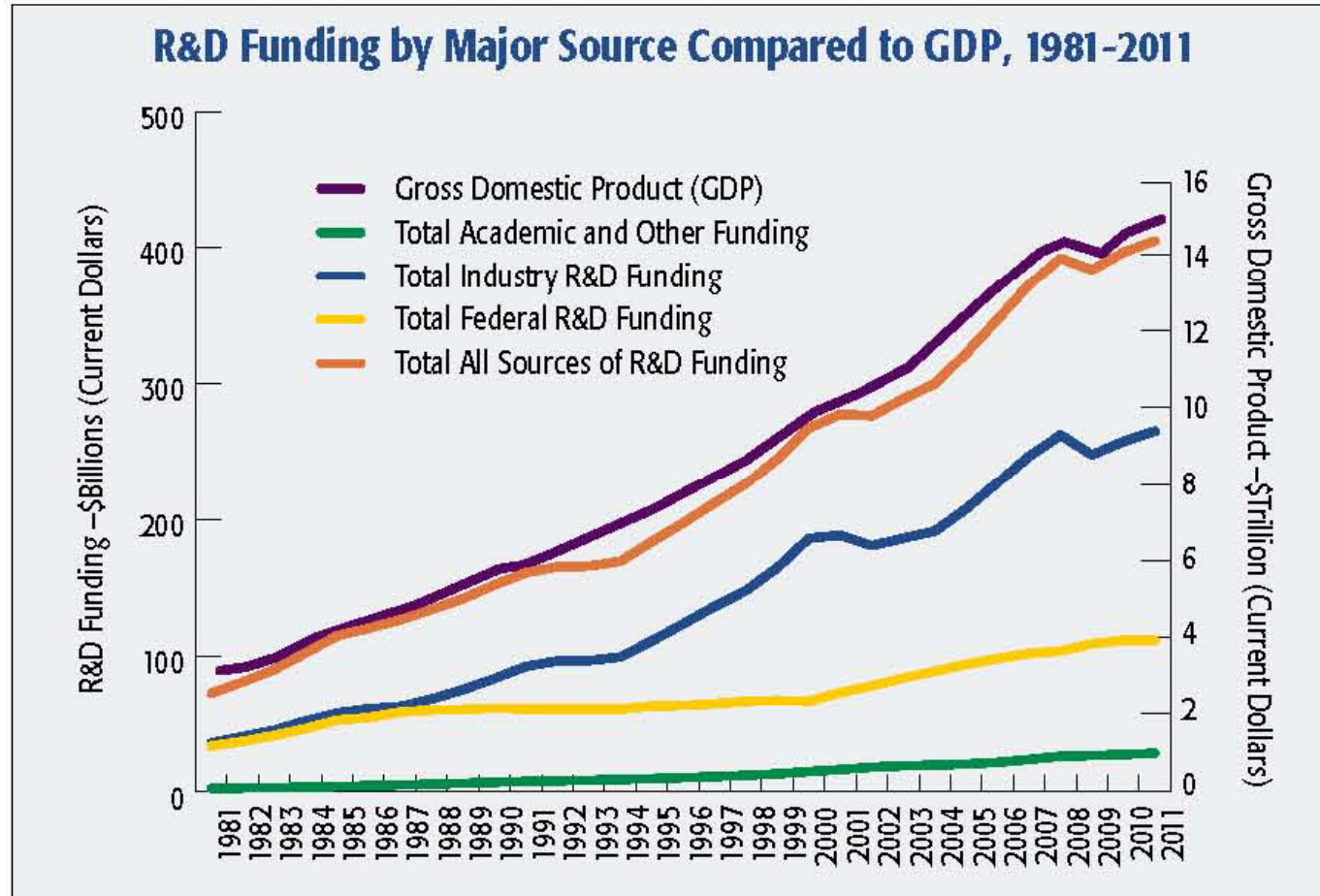
Increasing Global Competition for S&T Talent



Source: www.rdmag.com "2011 Global R&D Funding Forecast" Battelle



R&D Funding by Source



Source: NSF National Patterns of R&D Expenditures Data, Battelle/*R&D Magazine* Analysis, Estimates, and Forecasts



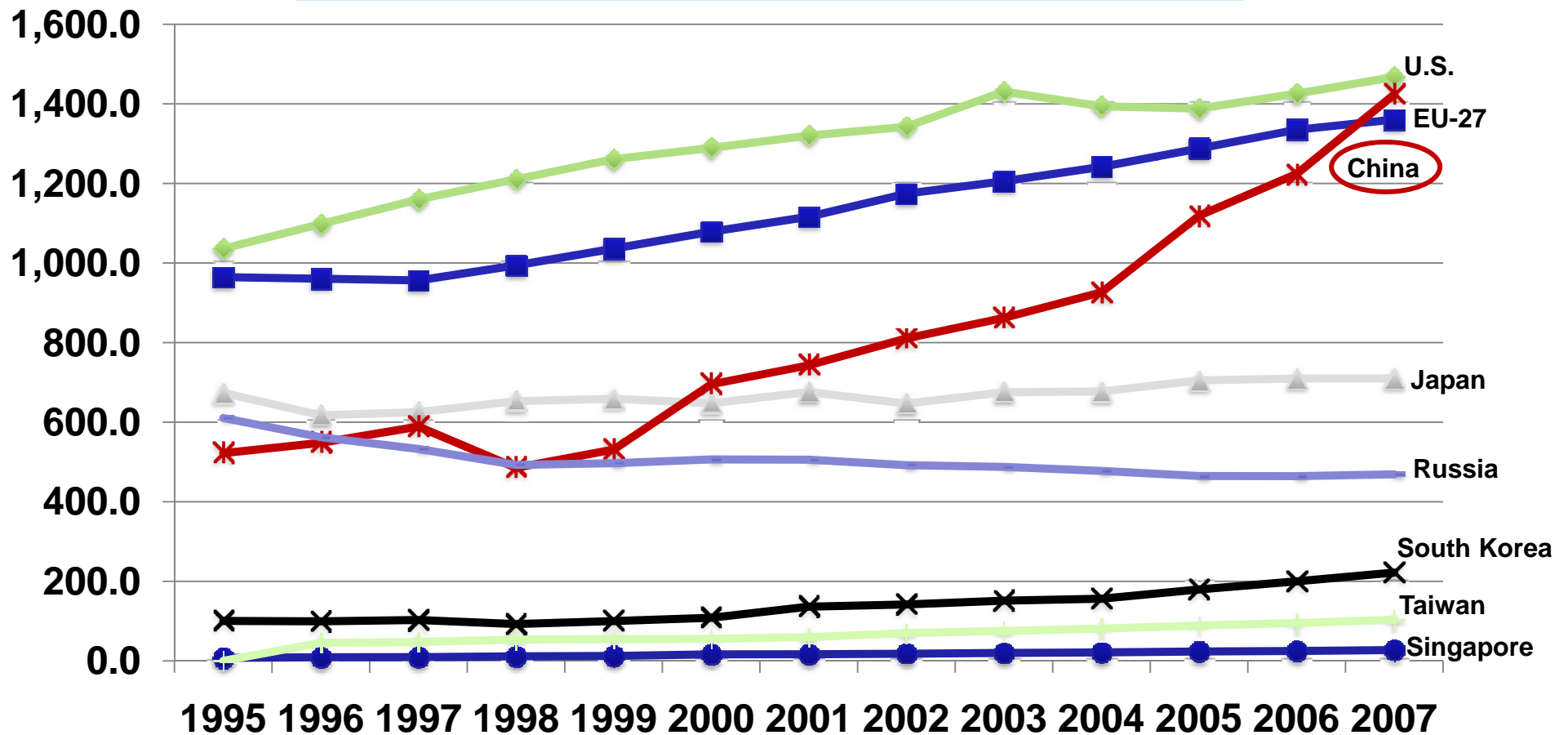
Global R&D: Increasing Competition



Estimated number of researchers in selected regions/countries/economies: 1995-2007

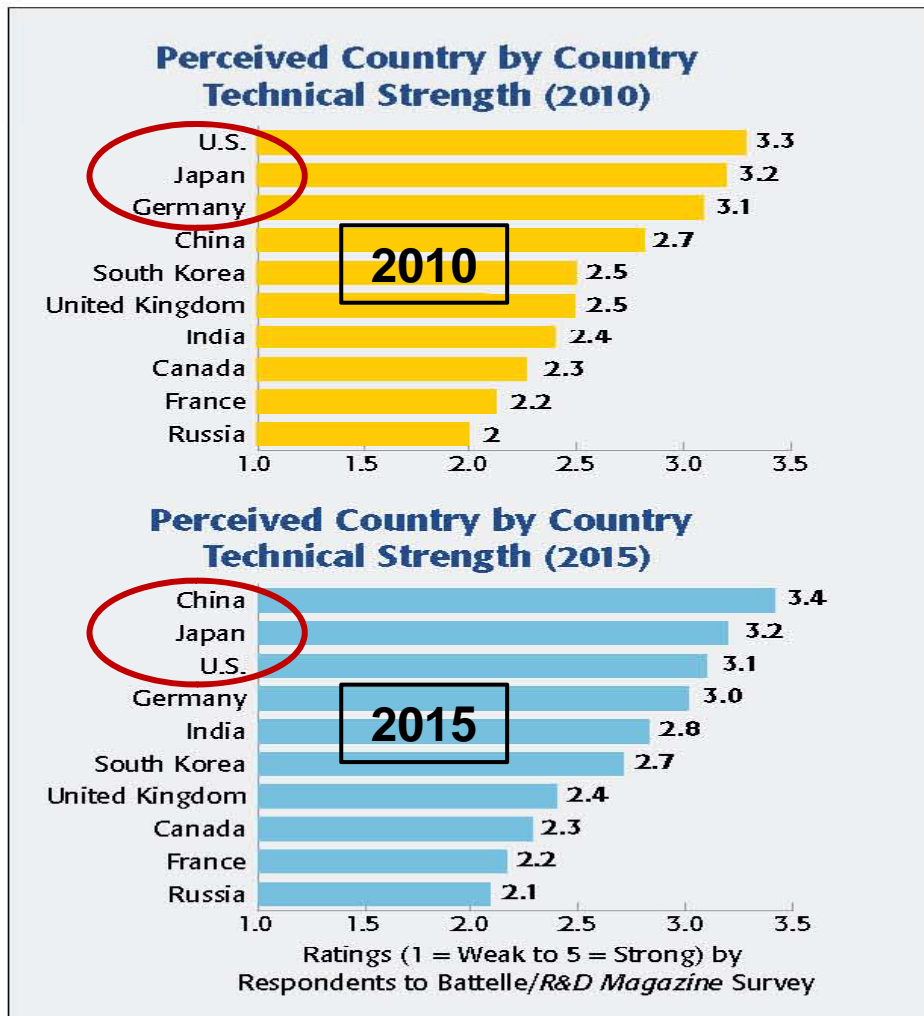
Source: Science and Engineering Indicators 2010

(Thousands)





Battelle's 2011 Global R&D Funding Forecast

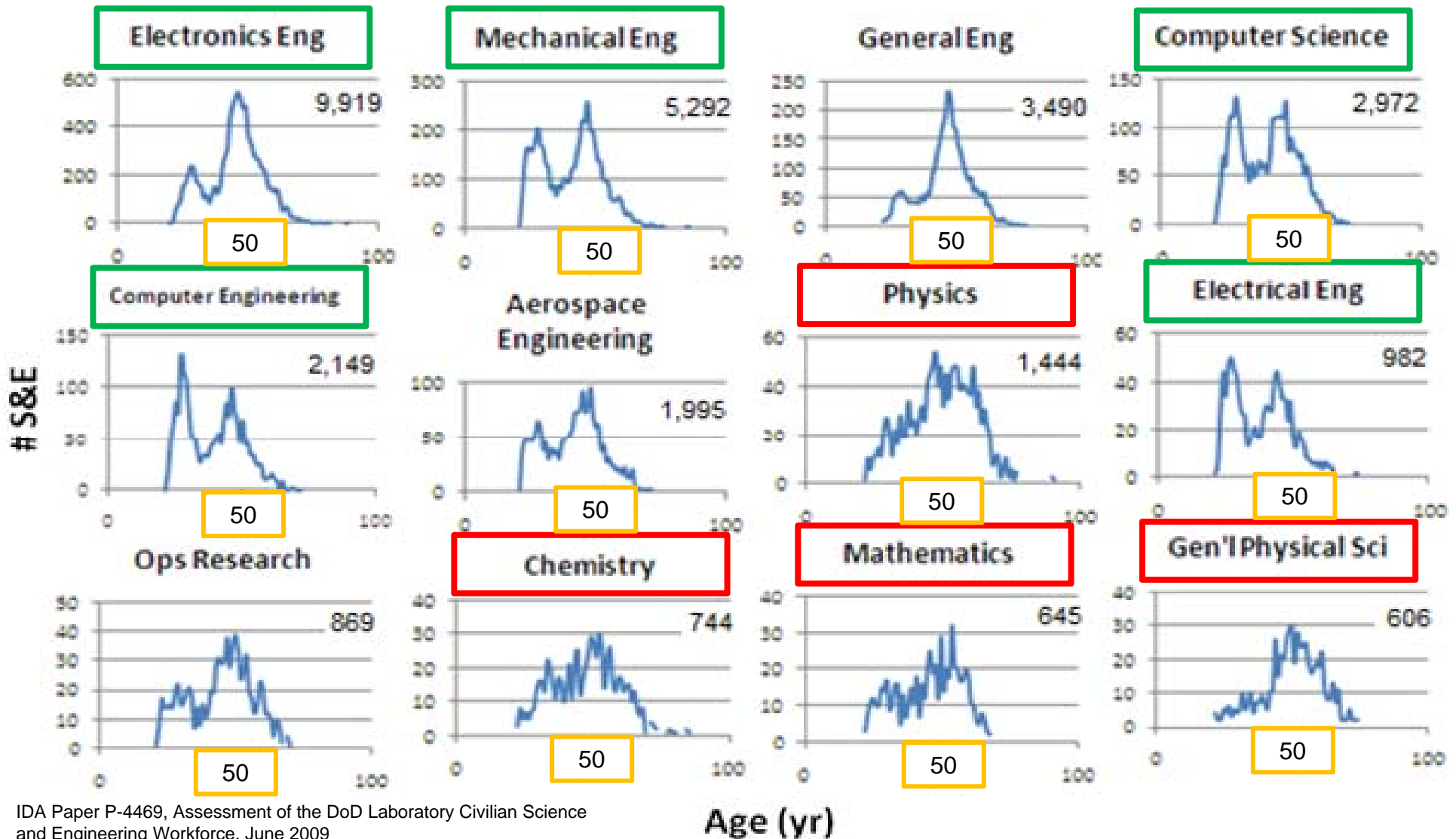


Perceived Country-by-Country Technical Strength

Given existing trends, R&D leaders believe that by 2015, China's technical strength will be greater than that of the US.



DoD's Aging Workforce




IDA Paper P-4469, Assessment of the DoD Laboratory Civilian Science and Engineering Workforce, June 2009

Age (yr)



DoD Science, Technology, Engineering & Math Strategy



PRE-K & ELEMENTARY	JUNIOR HIGH	HIGH SCHOOL	BACHELORS	MASTERS	DOCTORAL	FACULTY		
K-12 INFORMAL EDUCATION								
 <p>130 STEM Initiatives</p> <ul style="list-style-type: none"> •Over 1,700,000 K-12 students •11,000 undergraduate and graduate students •Approximately 23,000 teachers and 300 faculty 			ASSURE					
			SE CAPSTONE					
			SMART					
			HBCU / MSI PROGRAM					
						BASIC RESEARCH		
							NDSEG	
						NSSEFF		
					PECASE			
Programs								



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

