



# **Maintaining Our Technological Advantage in an Era of Uncertainty: Scarce Resources, Agility & Innovation**

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**Acting Assistant Secretary of Defense for  
Research and Engineering**

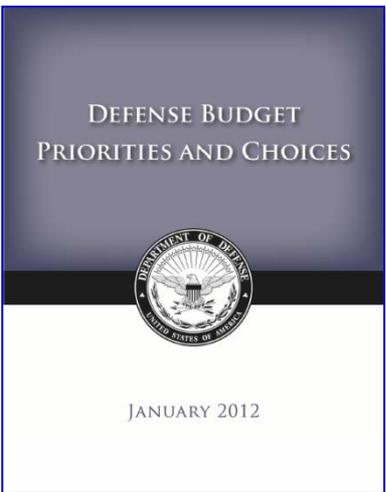
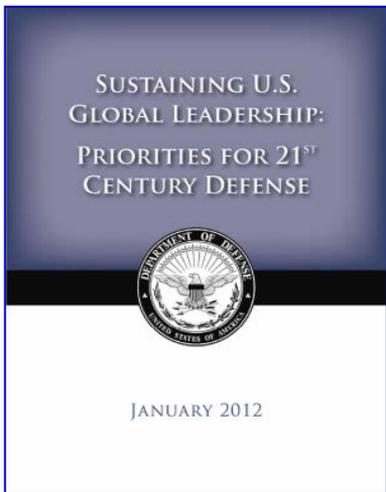
**16th Annual NDIA Systems Engineering Conference  
Arlington, VA | October 29, 2013**



# Key Elements of Defense Strategic Guidance



- The military will be smaller and leaner, but it will be agile, flexible, ready and technologically advanced.
- Rebalance our global posture and presence to emphasize Asia-Pacific regions.
- Build innovative partnerships and strengthen key alliances and partnerships elsewhere in the world.
- Ensure that we can quickly confront and defeat aggression from any adversary – anytime, anywhere.
- Protect and prioritize key investments in technology and new capabilities, as well as our capacity to grow, adapt and mobilize as needed.





# 2013 DoD Leadership Focus: Challenges, Choices, Opportunities



**Chuck Hagel**  
24<sup>th</sup> Secretary of Defense  
Sworn in February 27, 2013

- The challenges posed by a changing strategic landscape and new budget constraints;
- The choices we have in responding to these challenges, and;
- The opportunities that exist to fundamentally reshape the defense enterprise to better reflect 21st century realities.



# Strategic Choices and Management Review

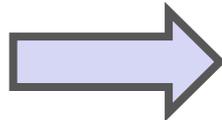
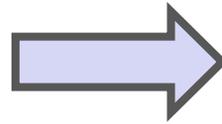


## Two Strategic Choices

Larger force with diminished capability

**or**

Smaller force with technologically dominant capability



## RDT&E Response

Incremental > Innovative

Innovative > Incremental

DoD depends on a strong education system...domestic infrastructure...scientific breakthroughs funded by research and development grants and a strong manufacturing base to maintain our decisive technological edge. –Secretary Hagel Statement on Strategic Choices and Management Review

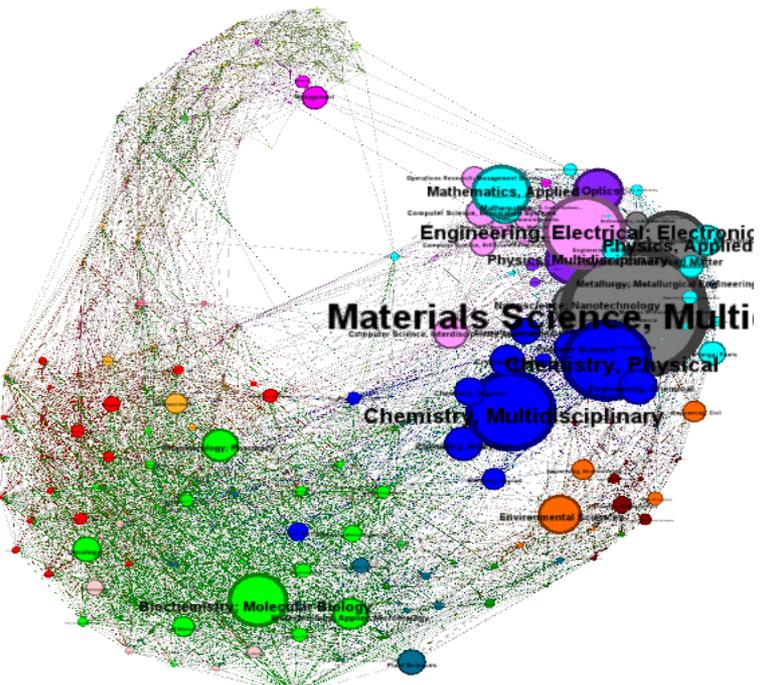


# Complexities of Our National Security Environment



- Global environment is ever changing and uncertain
- Future is hard to predict

China 2010 Science Map



- Spread of free markets and open societies has accelerated globalization
- Our next conflict could be an unconventional conflict against a highly asymmetrical threat

Ability to Operate in the Commons will be Critical



***“We are out of money.  
Now we must think!”***



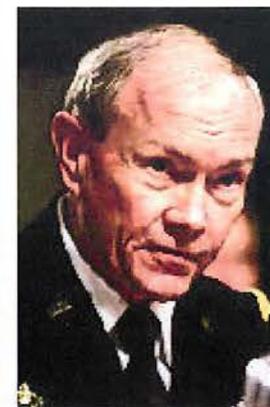
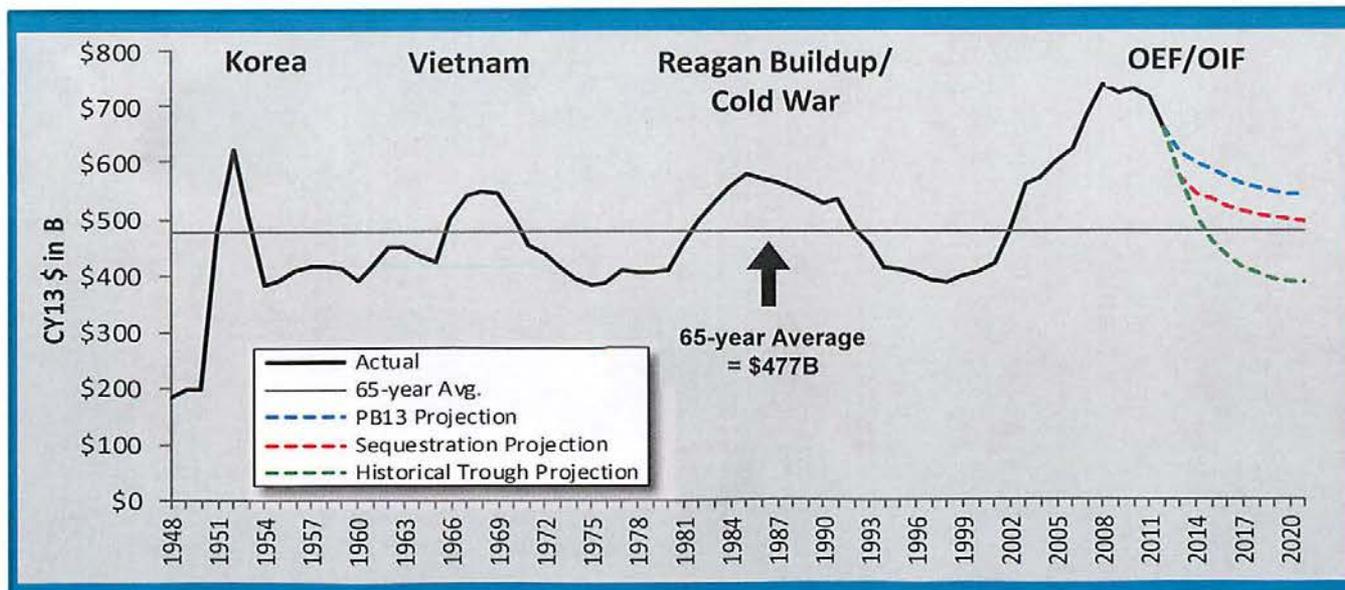
Winston Churchill to  
Parliament during World War II  
*(Stolen from Ernest Rutherford)*



# The Reality....

*“Our current security challenges are more formidable and complex than those we faced in downturns following Korea, Vietnam, and the Cold War. There is no foreseeable “peace dividend” on our horizon.”*

GEN DEMPSEY, CJCS  
Testimony to SASC, 12 Feb 2013



UNCLASSIFIED



# Defense Strategy



## 1. Mitigate new and emerging capabilities

- Electronic Warfare
- Counter Space
- Cyber
- Counter-WMD

## 2. Affordably enable new or extended capabilities in existing military systems

- Systems Engineering
- Engineered Resilient Systems
- Data Reuse
- Developmental Test & Evaluation

## 3. Develop technology surprise through science and engineering

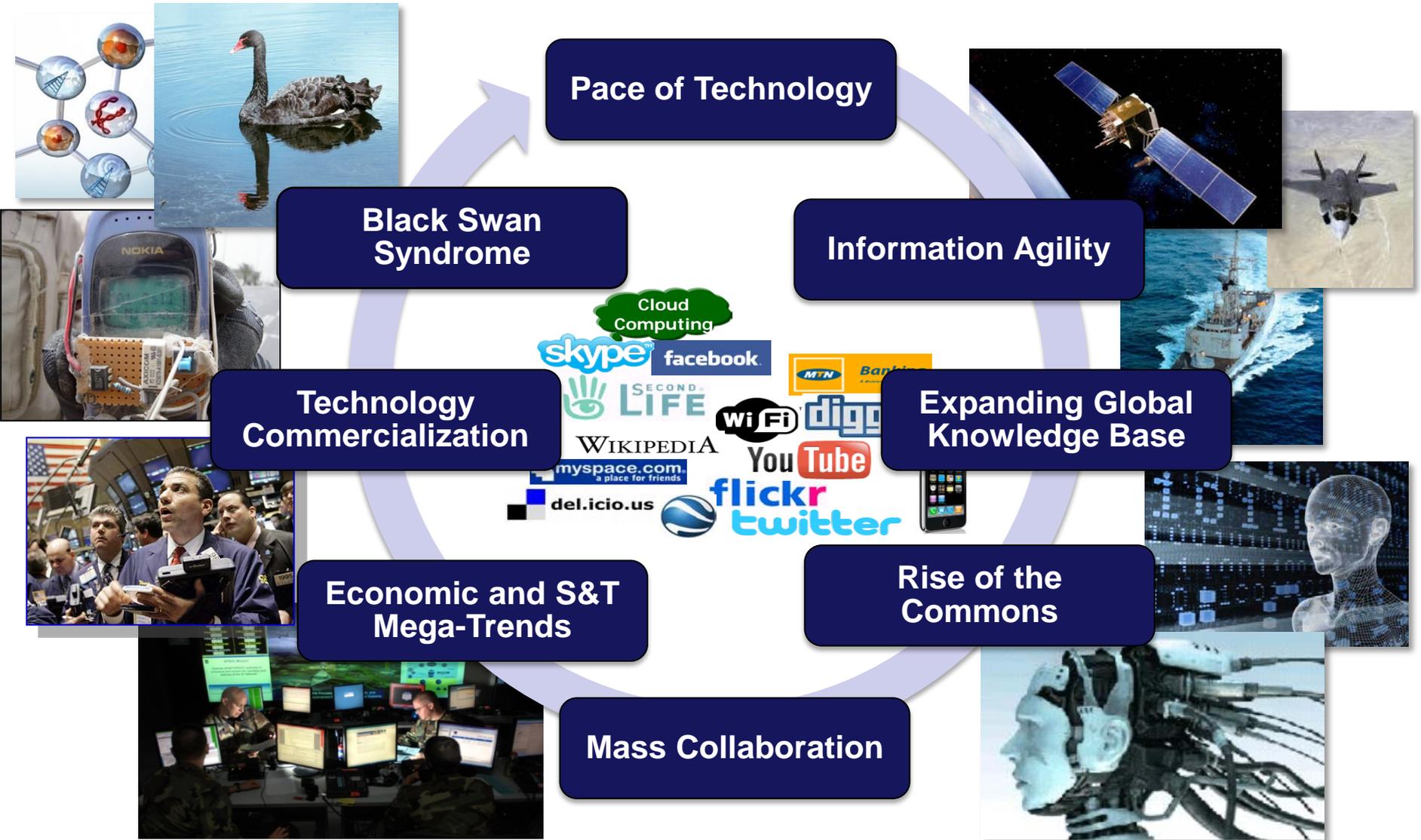
- Autonomy
- Data-to-Decisions
- Basic Research
- Human Systems

## Technology Needs

- Middle East Instability
- North Korean Nuclear Ambitions
- Anti-Access/Area Denial
- Cyber Attacks
- Electronic Warfare



# A New Reality: Global Dimensions Affect DoD S&T

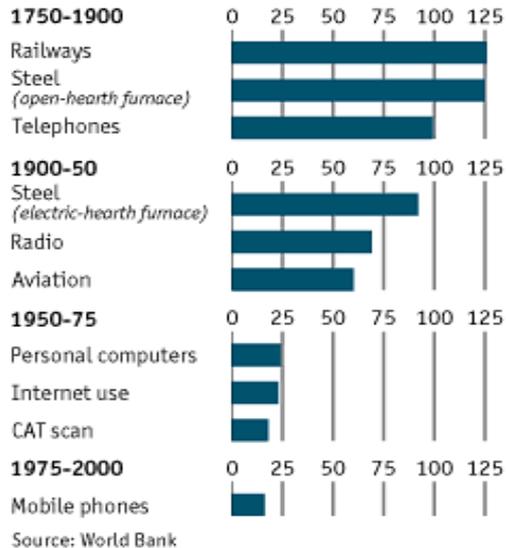




# Pace of Technology

## High-tech leapfrog

Number of years after invention for selected technologies to reach 80% country coverage

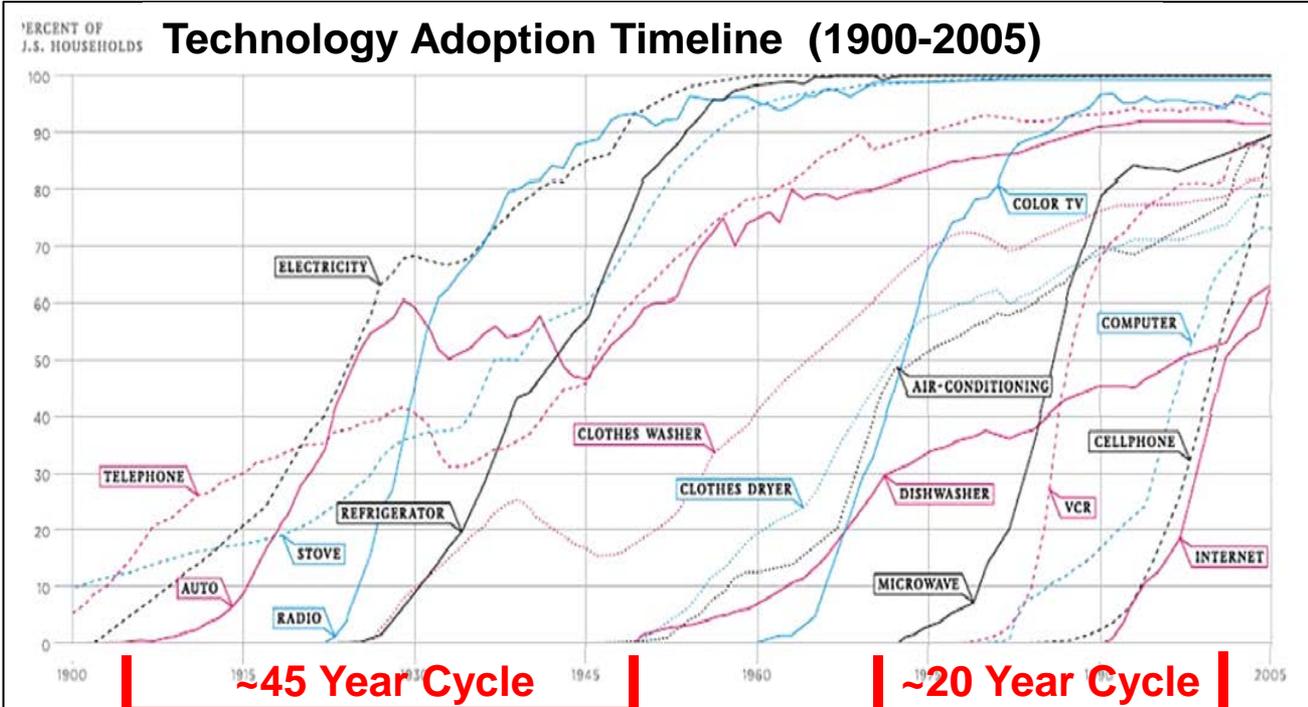


The Economist, Feb. 9, 2008

It took 23 years to go from modeling germanium semiconductor properties to a commercial product

The carbon nanotube was discovered in 1991; recognized as an excellent source of field-emitting electrons in 1995, and commercialized in 2000

The Pace of Technology Development and Market Availability is Exceeding the Pace of Acquisition

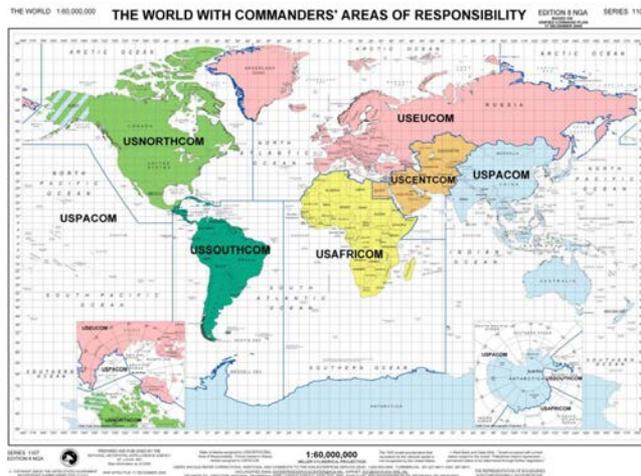




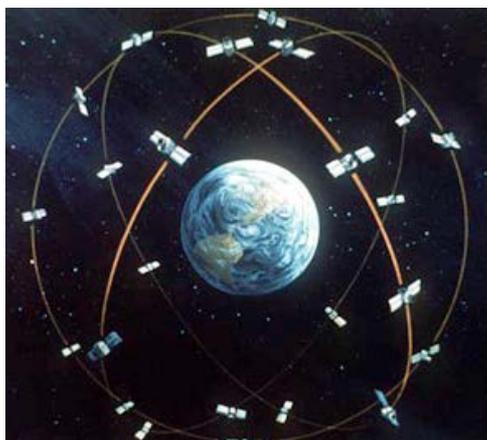
# Rise of the Commons



**Electronic Warfare**



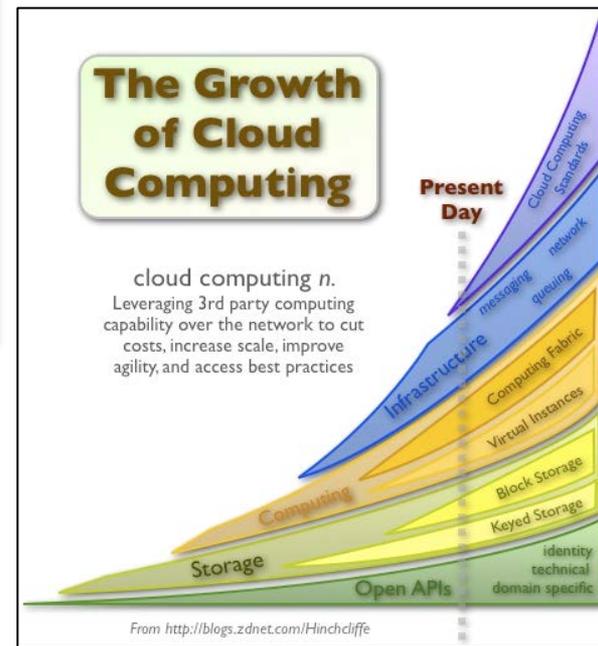
**Oceans**



**Space**



**Cyber**



**Ubiquitous Data**

**Military Operations Increasingly Depend on Being Able to Operate in Places “No One Owns” – *The Enablers***



# Engineering Challenges



- Lay solid foundations...create opportunities
- Envision multiple futures...enable flexible choices
- Design and build systems with focus on lifecycle cost
- Protect our critical defense “intellectual property”
- Focus on “**3 Ps**” of the DoD Engineering Enterprise:  
**P**olicy, **P**ractice and, most importantly, **P**eople



# Prototypes

The Department can cost-effectively drive innovation in aviation, space, maritime and ground combat systems through prototyping

Proof of Concept: "X"- Plane Prototyping

Prototype Development Programs have expanded the state of the possible in military aviation without each necessarily driving a follow-on procurement activity





# USD(AT&L) Six Priorities



Frank Kendall  
USD (AT&L)  
Confirmed  
May 24, 2012

Supporting Current Operations

Mandating Affordability Requirements

Improving Efficiency in Acquisition

Better  
Buying  
Power

Strengthening the Industrial Base

Strengthening the Acquisition Workforce

Protect the Future



# Better Buying Power 2.0

- Achieve Affordable Programs
- Control Costs Throughout the Product Lifecycle
- Incentivize Productivity and Innovation in Industry and Government
- Eliminate Unproductive Processes and Bureaucracy
- Promote Effective Competition
- Improve Tradecraft in Acquisition of Services
- Improve the Professionalism of the Total Acquisition Workforce

Better Buying Power: <http://bbp.dau.mil/>



# Ensuring Confidence in Defense Systems



- **Threat:** Nation-state, terrorist, criminal, or rogue developer who:
  - Gain control of systems through supply chain opportunities
  - Exploit vulnerabilities remotely
- **Vulnerabilities**
  - All systems, networks, and applications
  - Intentionally implanted logic
  - Unintentional vulnerabilities maliciously exploited (e.g., poor quality or fragile code)
- **Traditional Consequences:** Loss of critical data and technology
- **Emerging Consequences:** Exploitation of manufacturing and supply chain
- Either can result in corruption; loss of confidence in critical warfighting capability

*Today's acquisition environment drives the increased emphasis:*

## Then

Stand-alone systems

Some software functions

Known supply base

CPI (technologies)

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## Now

Networked systems

Software-intensive

Prime Integrator, hundreds of suppliers

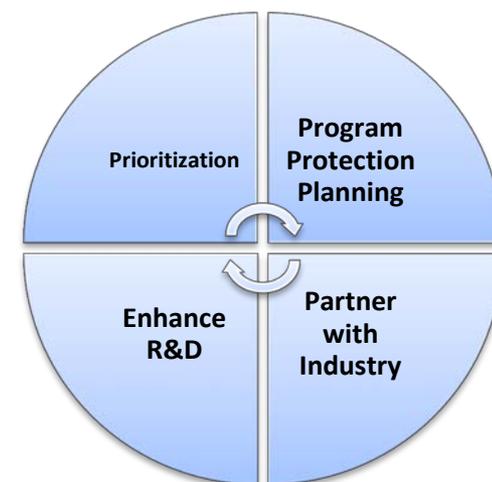
CPI and critical components



# Trusted Defense Systems Strategy Basic Tenets



- **Prioritization:**
  - Focus security requirements on mission critical systems
  - Within systems, identify and protect critical components, technology, information
- **Comprehensive Program Protection Planning**
  - Early lifecycle identification of critical components
  - Provide PMs with analysis of supply chain risk
  - Protect critical components through trusted suppliers, or secure systems design
  - Assure systems through advanced vulnerability detection, test and evaluation
  - Manage counterfeit risk through sustainment
- **Partner with Industry**
  - Develop commercial standards for secure products
- **Enhance capability through R&D**
  - Leverage and enhance vulnerability detection tools and capabilities
  - Technology investment to advance secure software, hardware, and system design methods





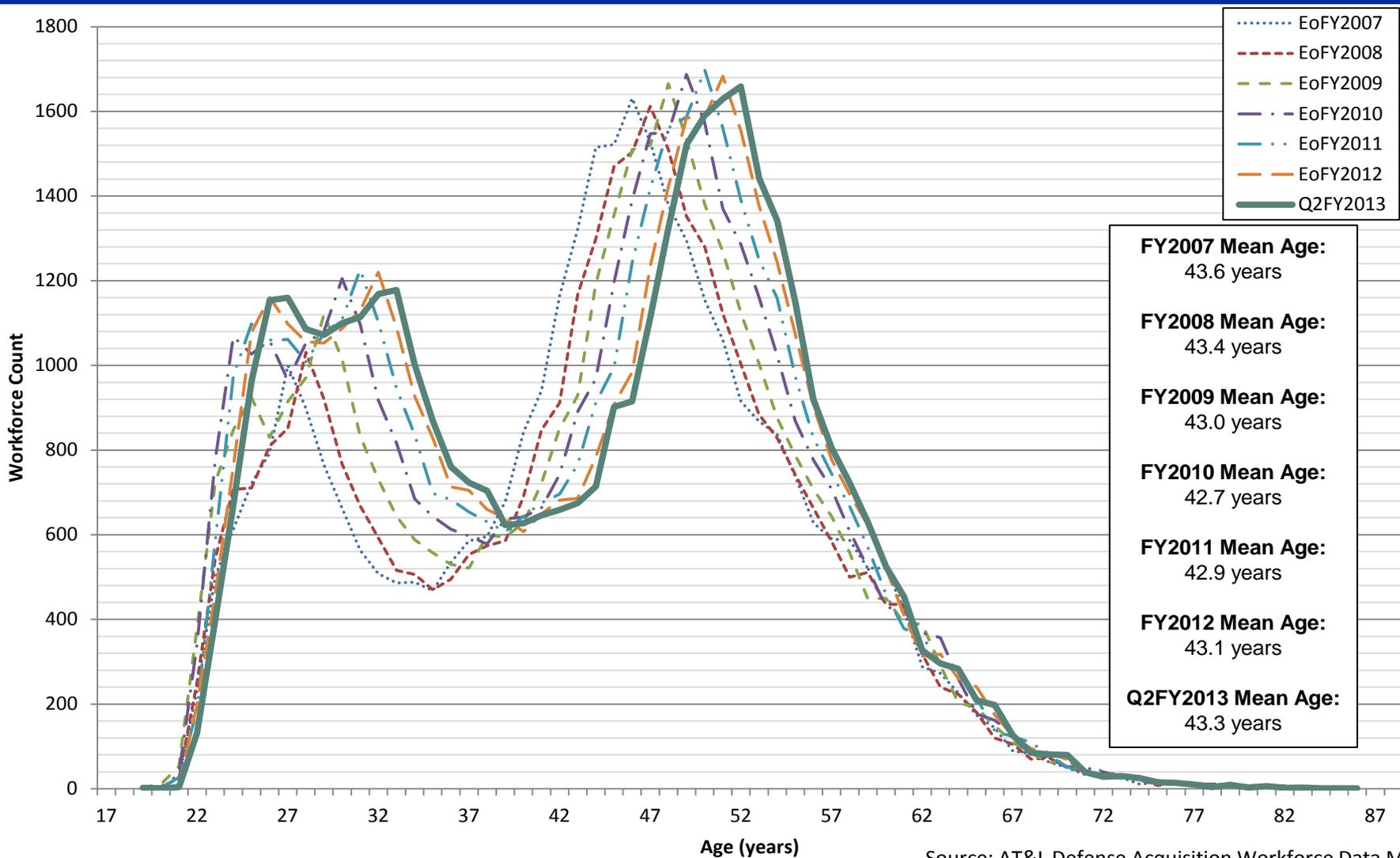
# Data Vulnerability (DVTT)



- **Significant impact of cyber intrusions/espionage into unclassified industrial base networks**
  - Significant losses of sensitive unclassified information are occurring.
  - Losses represent “DoD’s Intellectual Property.” Losses translate to years of DoD technology investments, and US capability advantage.
- **AT&L led a Tiger Team which identified recommended mitigations:**
  - Mandate contractor protection of sensitive unclassified information
  - Apply higher classification/protections for mission critical DoD information
  - Synchronize acquisition technical expertise with intelligence community resources to determine consequences of information losses and inform acquisition, requirements and programmatic decision making



# ENG Age Demographics by Fiscal Year



Source: AT&L Defense Acquisition Workforce Data Mart



# Systems Engineering: Critical to Defense Acquisition



***Innovation, Speed, Agility***

<http://www.acq.osd.mil/se>