



PACOM S&T Conference

5 March 2013

Al Shaffer

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

Report Documentation Page

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



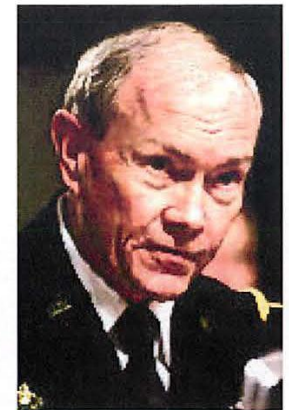
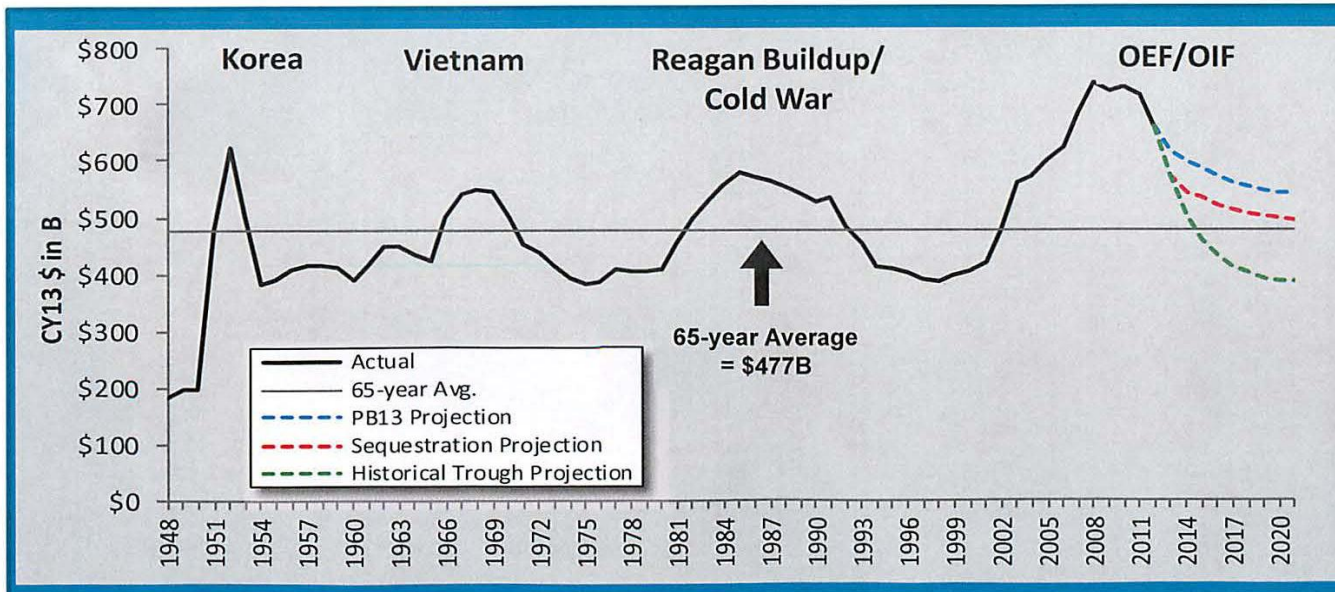
Winston Churchill to
Parliament during World War II



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



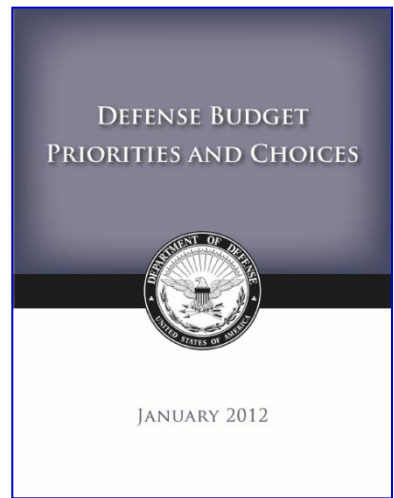
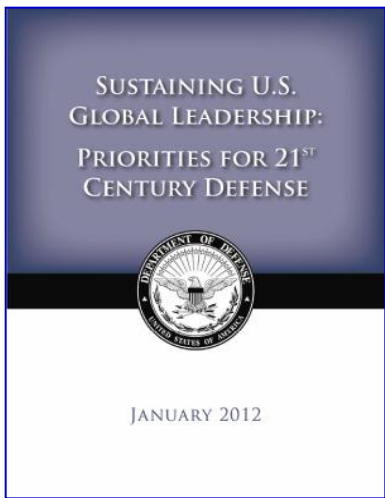
UNCLASSIFIED



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 and the Middle East.
- 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.





Defense S&T Drivers

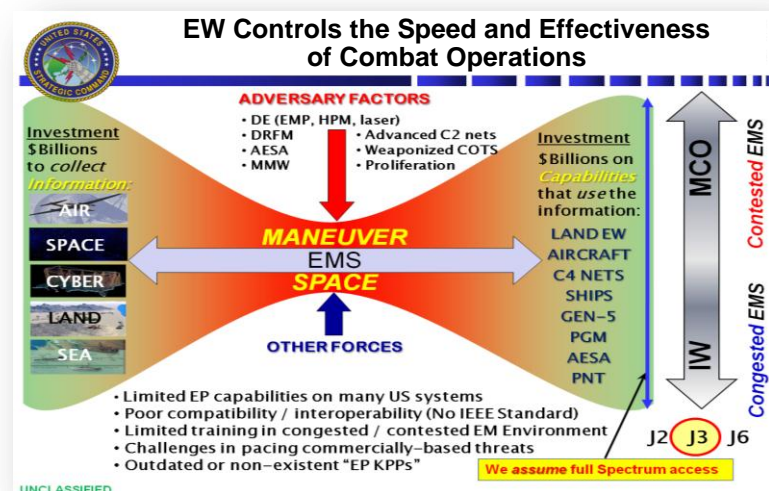


In time of budget uncertainty, need to reevaluate the purpose of Defense S&T:

- **Mitigate emergent threats, e.g.**
 - Electronic Warfare and Digital radio frequency memory (DRFM)
 - Missile defense
 - Cyber

- **Build / engineer affordability / interoperability in the acquisition chain**
 - Multi-service platforms pass data /info
 - Extend life and capabilities of existing systems

- **Create technology surprise, e.g.**
 - Quantum information systems
 - Synthetic biology, etc

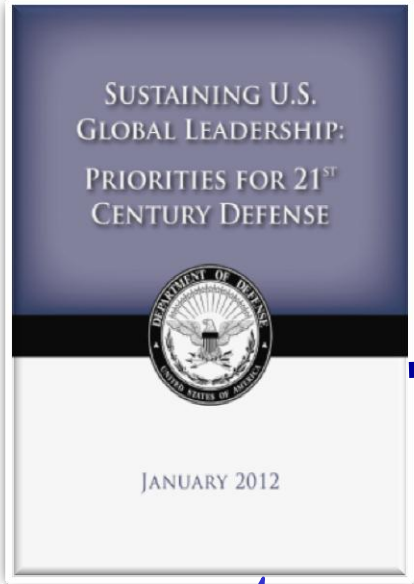




Priorities for 21st Century Defense



Primary Missions of the U.S. Armed Forces



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



S&T Focus Areas

DoD S&T Priorities

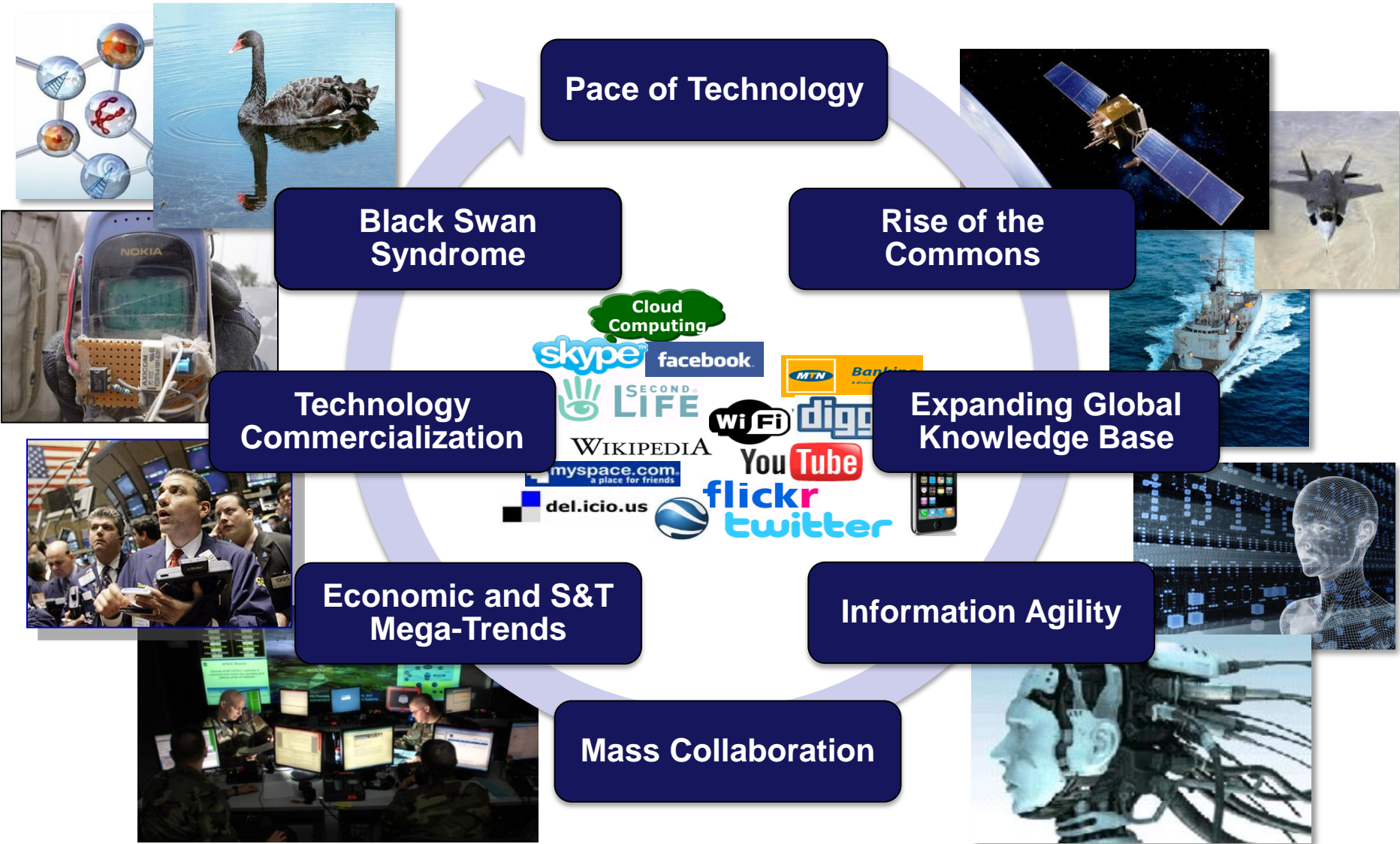
<p>SECDEF Guidance</p>	<p>Complex Threats</p> <ul style="list-style-type: none"> Electronic Warfare / Electronic Protection Cyber Science and Technology Counter Weapons of Mass Destruction <p>Force Multipliers</p> <ul style="list-style-type: none"> Engineered Resilient Systems Data-to-Decisions Human Systems Autonomy
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NSA SC Conference
Distribution Statement A: Further dissemination only as directed by ASD(R&E) (26 October 2011) or higher DoD authority.

- Counter AA/AD capabilities
- Tailored and adaptive capabilities
- Low-cost, Small-footprint operations
- Developing and integrating partnership capabilities



A New Reality: Global Dimensions Affect DoD S&T

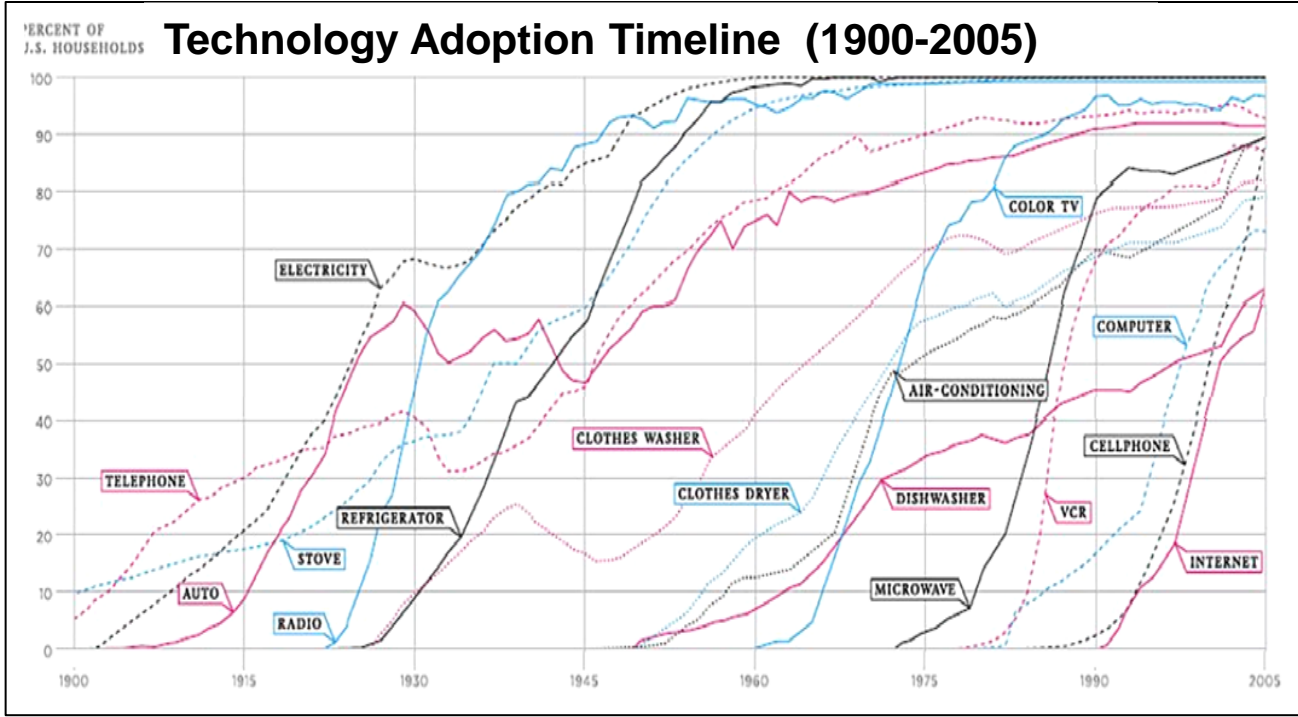
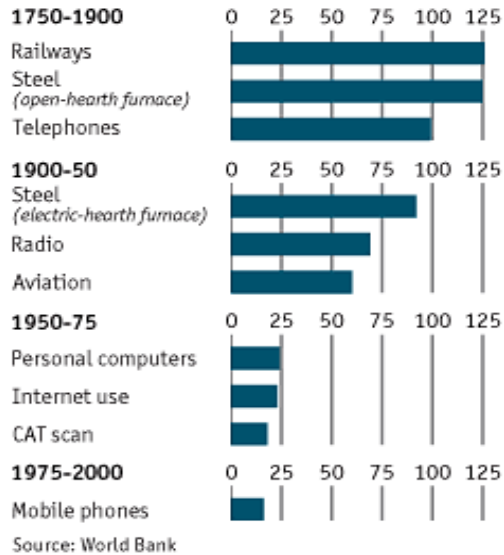




Pace of Technology

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

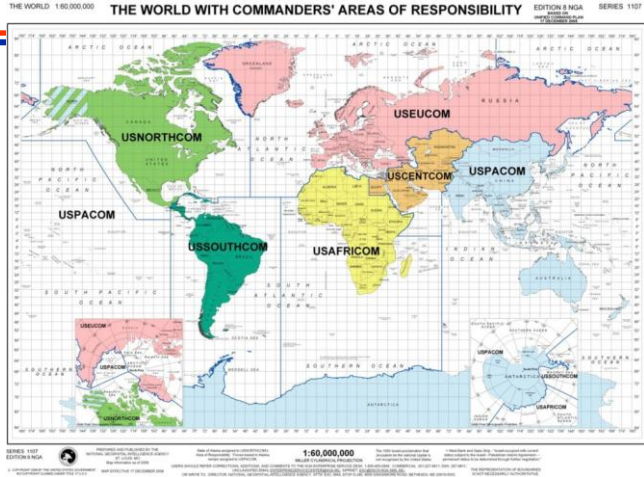
The Pace of Technology Development and Market Availability is Exceeding the Pace of Acquisition



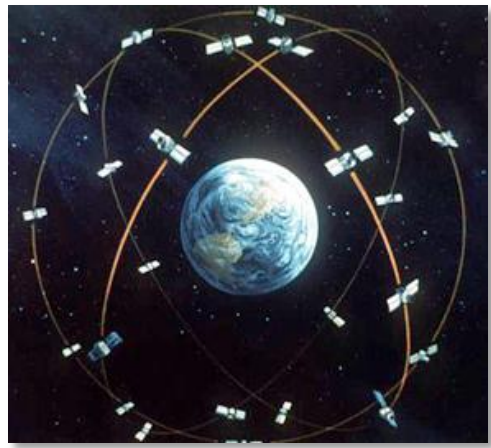
Rise of the Commons



Electronic Warfare



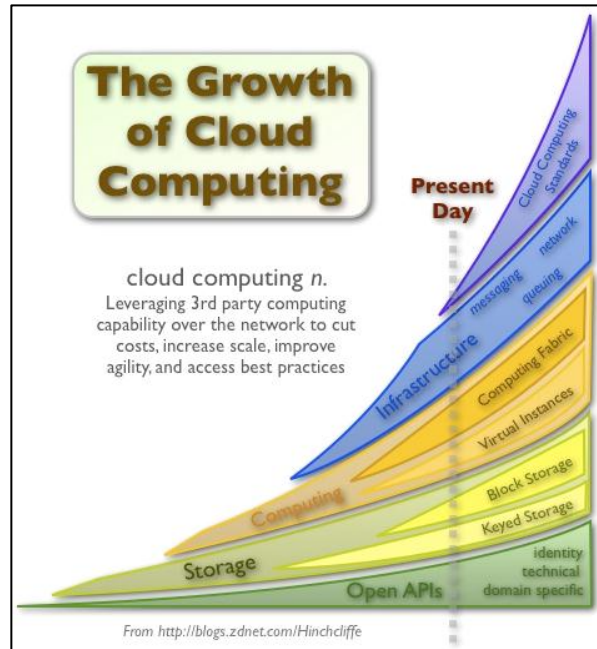
Oceans



Space



Cyber



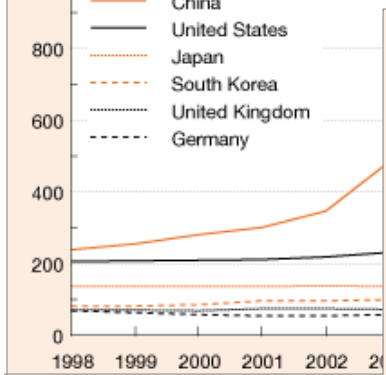
Ubiquitous Data

Military Operations Increasingly Depend on Being Able to Operate in Places "No One Owns" – *The Commons*

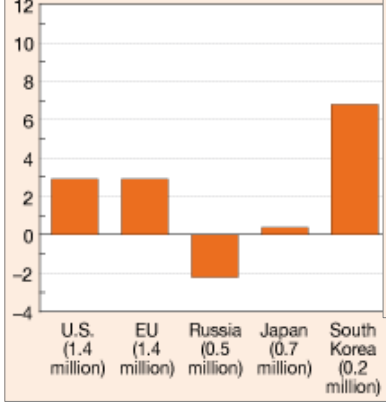


Expanding Global Knowledge Base

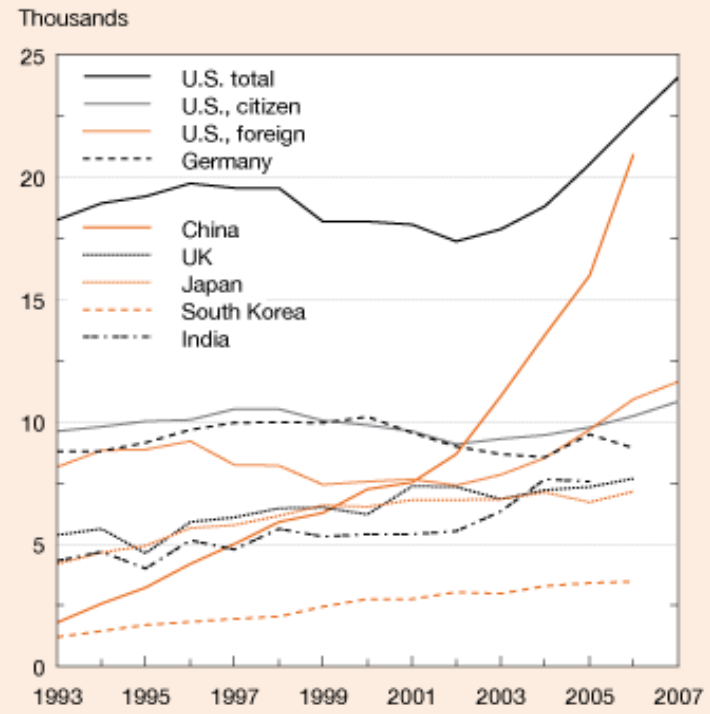
First university degrees in natural sciences and engineering, selected countries: 1998-2006
Thousands



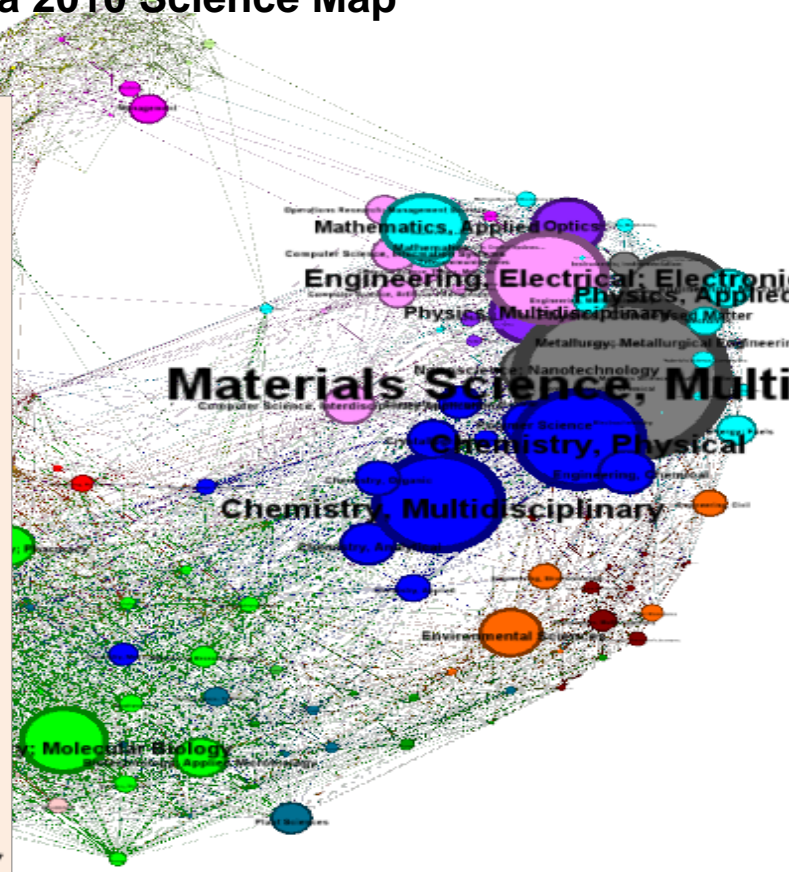
Average annual growth in number of selected regions/countries/economies
Percent



Doctoral degrees in natural sciences and engineering, selected countries: 1993-2007
Thousands



China 2010 Science Map

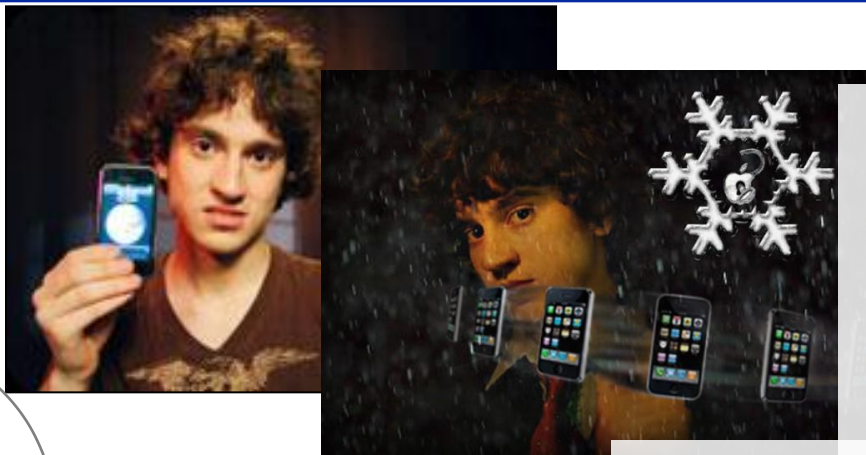


The Research Talent Base is Growing and Shifting at an Accelerating Rate

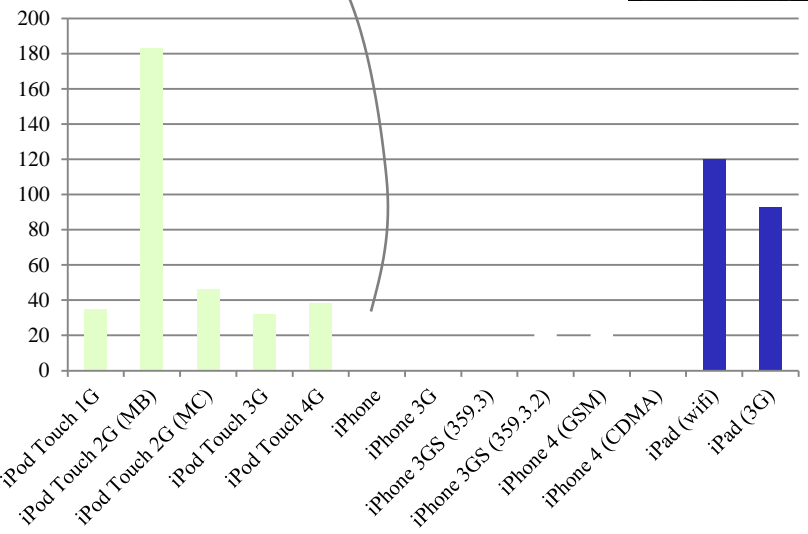


Information Agility

Apple and AT&T released the iPhone on 29 June in an exclusive agreement. Hotz spent ~500 hours working on his "summer project" and the hack was available in July.



Days to Break



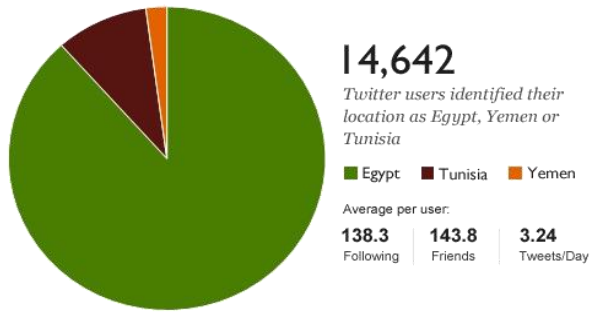
Today's adversaries are light and agile, and rapidly react and innovate in response to US actions.

This is the New Asymmetry—Victory Goes to the Agile and Innovative

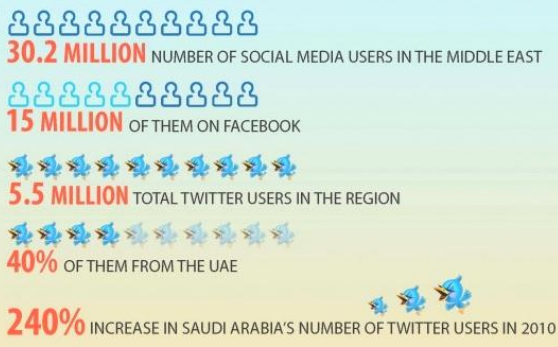
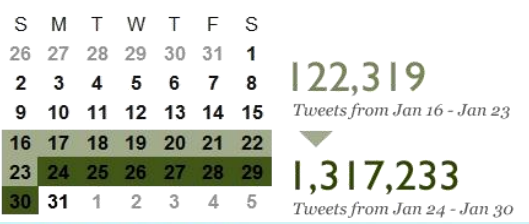


Mass Collaboration

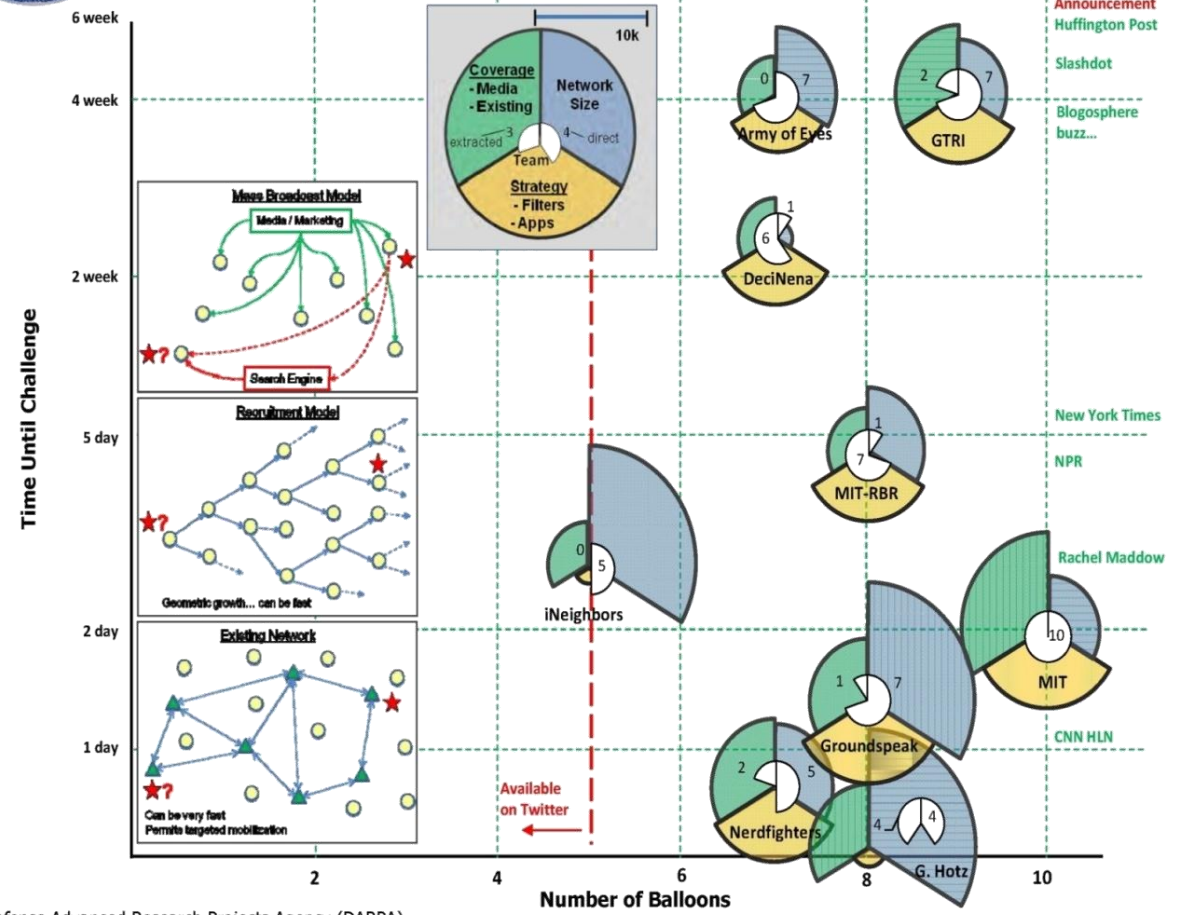
Crisis in Egypt, Tunisia & Yemen



Rise of crisis related tweets



DARPA Network Challenge Team Performance



Defense Advanced Research Projects Agency (DARPA) 2009 Network Challenge

Ad-hoc Groups Can Quickly Solve (or Create) Massively-Complex Problems



The Span of DoD R&E



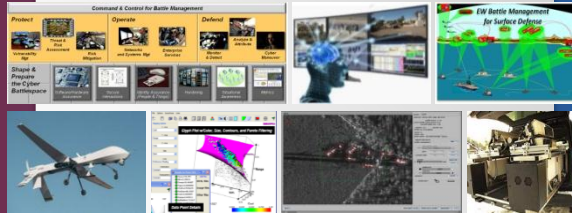
Near Term

Specific potential adversary system performance



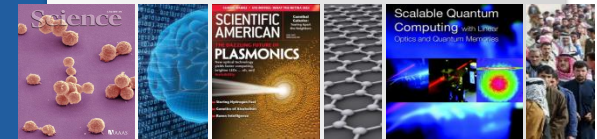
Mid Term

Strategic force development plans



Far Term

Understanding investment in research coupled with assessment of potential adversary capabilities



Prepare for an Uncertain Future

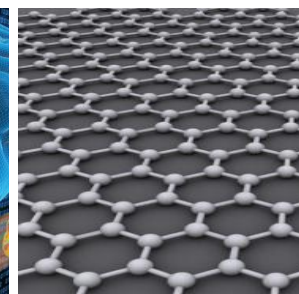
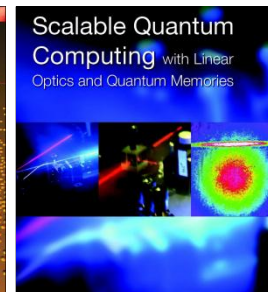


Basic Research Program



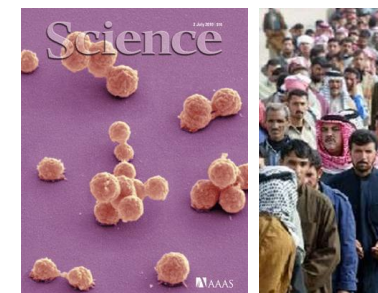
High Priority S&T areas for DoD

- Metamaterials and Plasmonics
- Quantum Information Science
- Cognitive Neuroscience
- Nanoscience and Nanoengineering
- Synthetic Biology
- Understanding Human and Social Behavior



Trends in basic research are identified and judged through a variety of interactions, including:

- Publications, university site visits, conference attendance
- Future Directions Workshops (identifying emerging areas for investment and International Centers of Excellence for collaborative opportunities)
- Engage expert panels (JASONS, National Academy of Sciences, etc...)



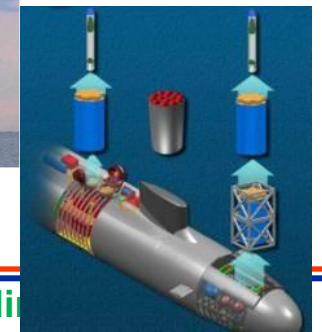
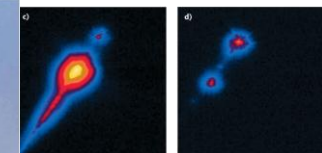
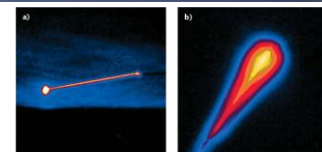
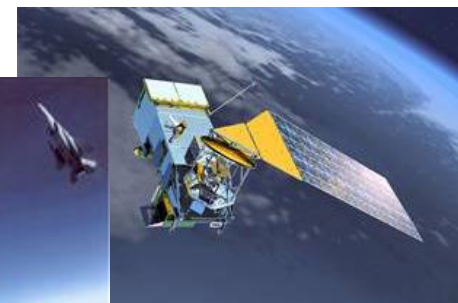
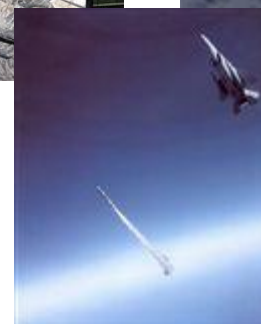
Understanding and Creating the Cutting Edge



Anti-Access/ Area Denial Current A2/AD Priorities

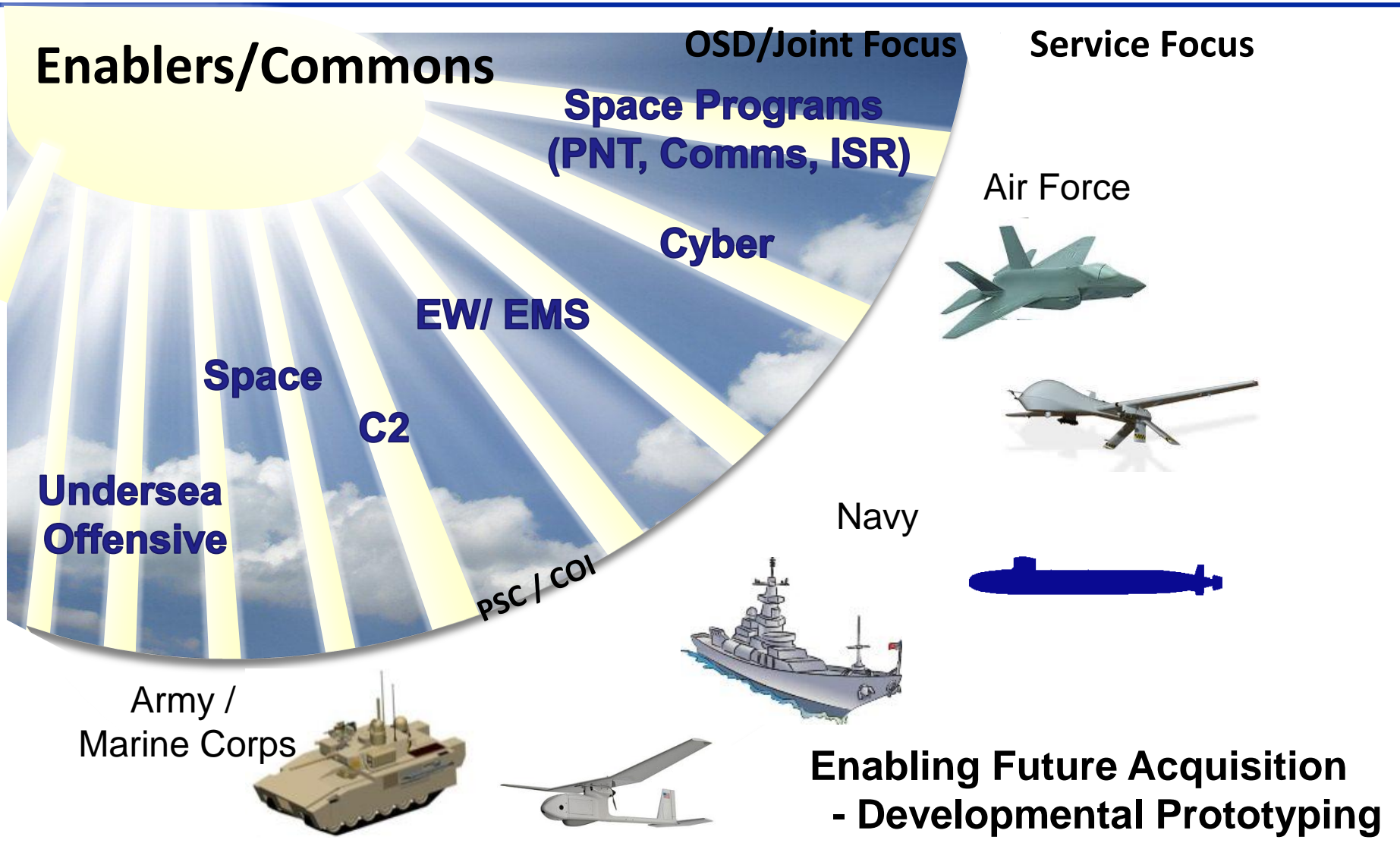


- **Electronic Attack / Electronic Protection**
- **Cyber Operations**
- **Space / Counter Space**
- **Undersea Operations**
- **Counter Missile / Missile Defense**
- **Counter Integrated Air Defense Systems**





DoD S&T Budget Focus



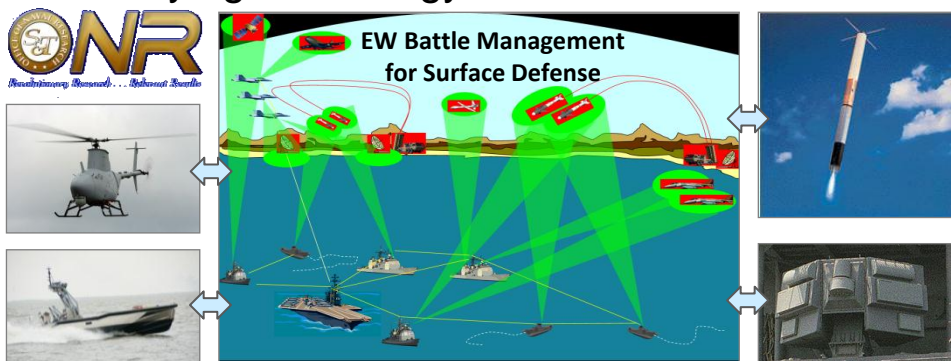


DoD S&T Complex Threats



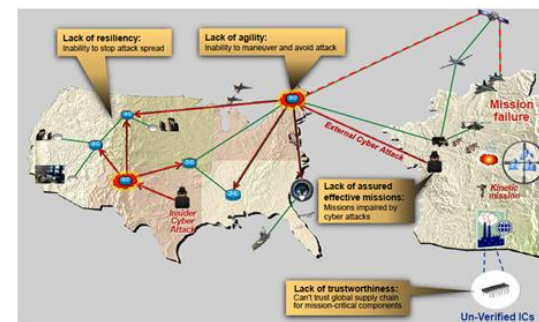
Electronic Warfare & Protection

- RF/Mixed Signal Component Technologies
- EO/IR Component Technologies
- Underlying technology enablers



Cyber Science and Technology

- Assuring Effective Missions
- Resilient Infrastructure Trust
- Cyber Experimentation & Measurement
- Agile Operations



Counter Weapons of Mass Destruction

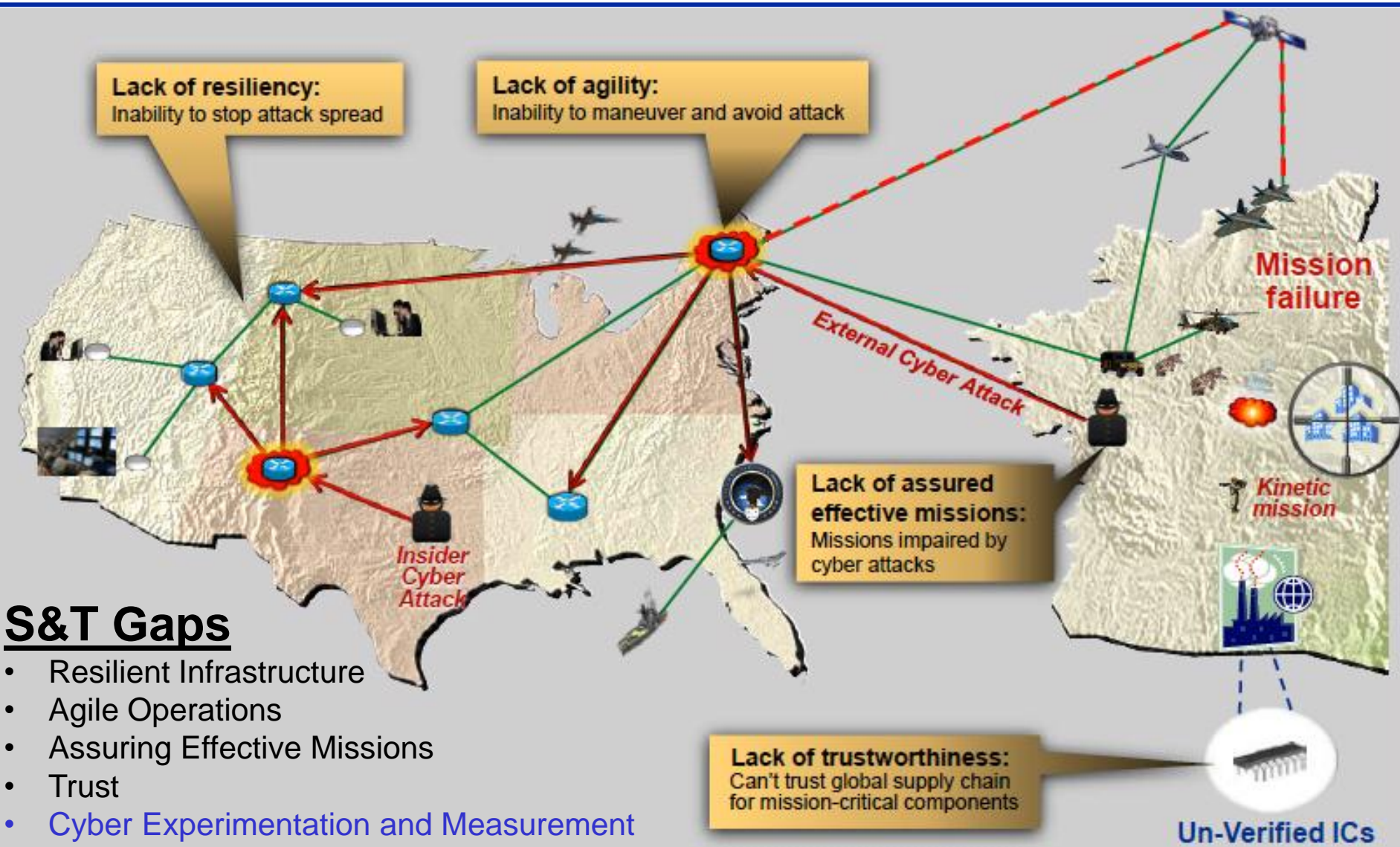


New concepts and technology for remote identification of nuclear, chemical, and biological material, and to assist in mitigation, containment, and attribution of the materials

- Broad Area Search
- Persistent Monitoring
- Tagging and Tracking



Cyber PSC – Problem Statement



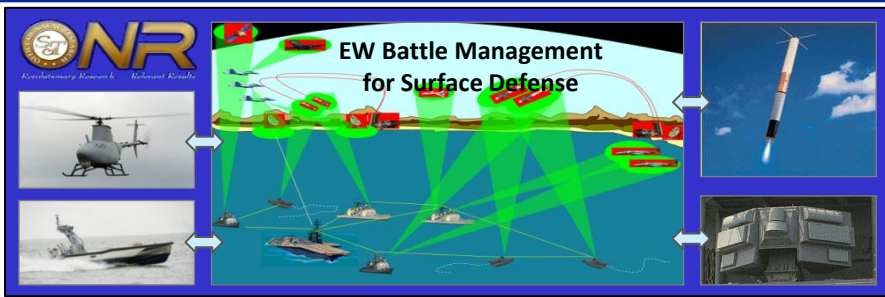
S&T Gaps

- Resilient Infrastructure
- Agile Operations
- Assuring Effective Missions
- Trust
- Cyber Experimentation and Measurement

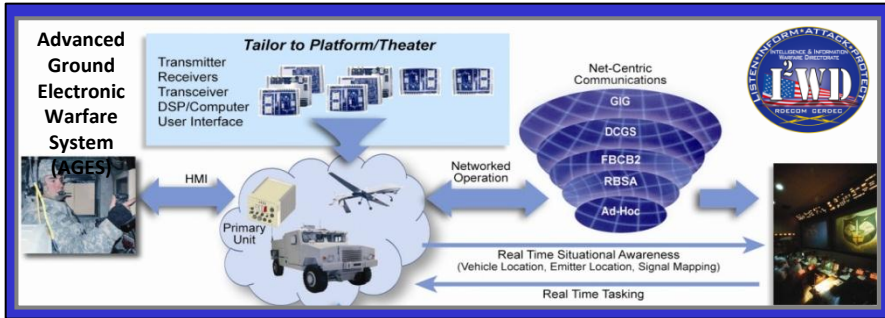


Electronic Warfare Vision

Electromagnetic Spectrum Dominance

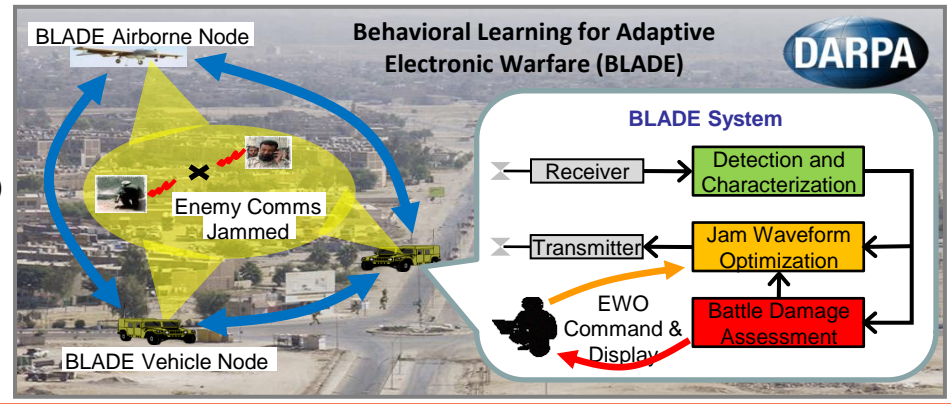


The Goal of Electronic Warfare is to Advantage U.S. and Coalition Force Operations by “Shaping” the Electromagnetic Spectrum (EMS)



S&T Gaps

- **RF/Mixed Signal Component Technologies**
 - Agile, high dynamic range receiver electronics
 - Agile, wideband transmitter electronics
 - Affordable/modular agile beam antennas
- **EO/IR Component Technologies**
 - Next generation multispectral IR Focal Plane Arrays (FPAs)
 - Multispectral, high power lasers
 - Multispectral optics & optical phase control
- **Underlying technology enablers**
 - Nitride semiconductor family (GaN/InN/AlN)
 - Ultra-precision clocks/oscillators (nsec → psec → fsec)





Defense Innovation Marketplace



DEFENSE INNOVATION MARKETPLACE

HOME INDUSTRY RESOURCES FAQs NEWS ABOUT IR&D CONTACT US

Connecting Industry with Government Customers

The Defense Innovation Marketplace is a centralized online resource to better connect industry with government customers to invigorate innovation.

For Industry, the Marketplace is the place to learn about Department of Defense investment priorities and capability needs, and comply with the new Defense Federal Acquisition Supplement (DFARS) rule.

For Government, the Marketplace will provide new search tools to assess and then leverage industry technology projects for current and future programs.

NEW IN THE MARKETPLACE

S&T Strategic Documents	Doing Business with DoD	News & Events
<ul style="list-style-type: none"> Sailing the Great Green Fleet 21st Century Naval Amphibious Capability Administration Priorities for Science, Technology & Innovation 2012 Army Strategic Planning Guidance 	<ul style="list-style-type: none"> Navy Information Army Information Armored Multi-Purpose Vehicle S&T Emphasis Area Solicitations DoD Placing a Big Bet on Big Data 	<ul style="list-style-type: none"> 2012 SWE S&T Industry Day Expansion of Voluntary Cybersecurity Information Sharing Activities ASD(R&E) S&T Weekly Bulletin

Updated June 6

defenseinnovationmarketplace.mil

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

DEFENSE INNOVATION MARKETPLACE

HOME INDUSTRY RESOURCES FAQs NEWS ABOUT IR&D CONTACT US

The Defense Innovation Marketplace is your one-stop source for Department of Defense (DoD) science and technology (S&T) planning, acquisition resources, funding and financial information.

Strategic S&T Overview

S&T FY13 Testimony

- ASD(R&E)
- Army
- Navy
- Air Force
- DARPA

Service S&T Priorities

- DoD Defense Budget Priorities
- Army S&T Strategic Direction
- Naval S&T Strategic Plan
- USAF S&T Strategic Plan
- Missile Defense Program Strategic Plan
- US Special Operations Command S&T Strategic Plan
- Unmanned Systems Integrated Roadmap
- Strategic Direction to the Joint Forces

S&T Emphasis Area Roadmaps

- Autonomy
- Cyber
- Countering Weapons of Mass Destruction
- Data-to-Decisions
- Engineered Resilient Systems (ERS)
- Electronic Warfare / Electronic Protection (EW/EP)
- Human Systems

General Service Strategy Documents

- Army Equipping Strategy
- USAF Force Structure Changes
- IEDDO Strategic Plan
- IEDDO Future R&D Capabilities Gaps
- TRADOC Capability Manager (TCM)

DoD Financial Documents

Doing Business with DoD

Small Business Innovation Research Awards

- SBIR (Small Business Innovation Research) Awards
- Army SBIR Website
- Navy SBIR Awards

Open Solicitations

Army BAAs

- Army Corps of Engineers Engineer Research and Development Center Contracting Office
- Army Research Laboratory/Army Research Office

Navy BAAs

- Naval Research Laboratory Contracting Division
- Office of Naval Research

Air Force BAAs

- Air Force Office of Scientific Research
- Air Force Research Laboratory

DoD Agency BAAs

- Defense Threat Reduction Agency
- Defense Advanced Research Projects Agency
- Missile Defense Agency
- Joint Program Executive Office for Chemical and Biological Defense

Other Government Funding Sources

- FedBiosOpps

Request For Information (RFIs)

- Medium Range Precision Strike System (SIOCOP)
- Small Business Rocket (SBR)

Industry Day Presentations

Industry Days are held to inform industry about opportunities to work with the Department of Defense.

Navy

- Maritime Tactical Command and Control (11/9/2011)
- Air Vehicle Modification and Instrumentation (11/9/2011)
- Shipboard Automated Landing Technology Innovation Program (11/22/2011)
- Demonstration System Development for Advanced Shipboard Desalination FNC (2/9/2011)
- ONR Electronic Warfare S&T (1/6/2011)

USMC

- Marine Personnel Carrier (MPC) SCOW
- MPC Technology Readiness Levels

Defense Advanced Research Projects Agency

- System F0 Technology Package (11/22/2011)
- FAB Foundry/FANS (11/16/2011)
- Warrior Web (10/22/2011)
- Visual Media Reasoning (8/31/2011)
- Automated Program Analysis for Cyber Security (8/26/2011)
- Content-Based Mobile Edge Networking (8/13/2011)
- Broad Operational Language Translation (4/12/2011)

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



And Other DoD Agencies

HOME

RESOURCES

FAQs

NEWS

ABOUT IR&D

CONTACT US



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For Government, the Marketplace will provide new search tools to assess and then leverage industry technology projects for current and future programs.

NEW IN THE MARKETPLACE

S&T Strategic Documents

- [Active Denial Technology \(ADT\)](#)
- [Joint Non-Lethal Weapons Program Overview](#)
- [DoD Mobile Device Strategy](#)

Doing Business with DoD

- [Army, Navy, & OSBP FY12 Rapid Innovation Fund BAAs Announced](#)
- [Air Force Information](#)
- [Other DoD Agencies Information](#)
- [Navy Information](#)

[More...](#)

News & Events

- [Updated FAQs and Answers Added](#)
- [2011 Rapid Innovation Fund Awards](#)
- [S&T Bulletin](#)

[More...](#)

Updated July 25

Resources

Useful DoD and Service information for business and program planning [here](#)

Industry

Market Your Innovation to DoD Customers [here](#)

Government

Find Details about Industry's Innovation Projects [here](#)



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Summary



- **DoD S&T aligned to meet priorities for a 21st Century security environment**
- **DoD Strategic Framework..... lays the foundation for S&T commitments – 7 Priority S&T Areas**
- **Federal Deficit Reduction will impact; S&T remains steady priority**
- **Asia-Pacific rebalance is the foundation of our R&E strategy**



Backup Slides