DoD Strategic Technology Capability Thrusts: Opportunities to Fuel Hawai'i's Innovation Economy

13 January 2011

Secretary Gates' Priorities

1. Take care of our people

2. Rebalancing the military

3. Reforming what and how we buy

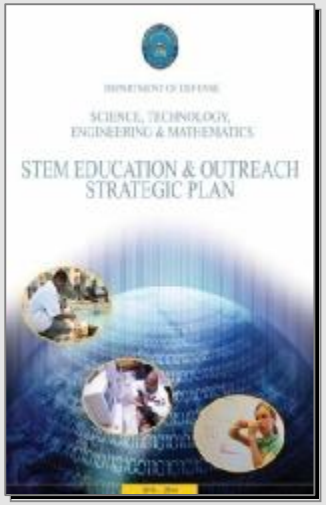
4. Supporting our troops in the field

Secretary of Defense, HASC Budget Rollout Brief, February 2010

All Suggest New Vectors for Support

Director, 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

Helicopter Alert & Threat Termination-Acoustic (HALTT-A)

Stiletto

MRAP-ATV

PGSS

DDR&E Imperatives

1. Accelerate delivery of technical capabilities to win the current fight.
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Bringing Capabilities to the Fight

Helicopter Alert and Threat Termination-Acoustic (HALTT-A)

Threat sensors mounted to fuselage exterior

Stiletto

MRAP-ATV

PGSS

DDR&E Imperatives

1. Accelerate delivery of technical capabilities to win the current fight.

2. Prepare for an uncertain future.

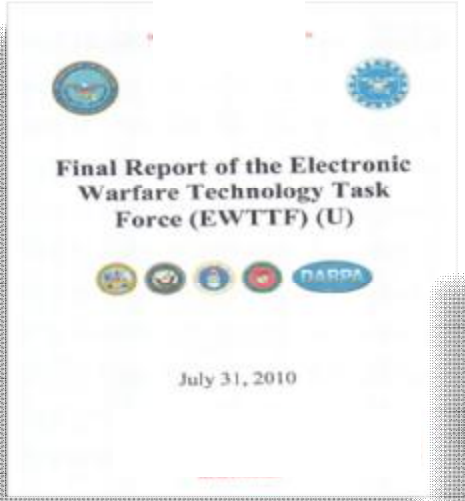
3. Reduce the cost, acquisition time and risk of our major defense acquisition programs.

4. Develop world class science, technology, engineering, and mathematics capabilities for the DoD and the Nation.

Environment and Context

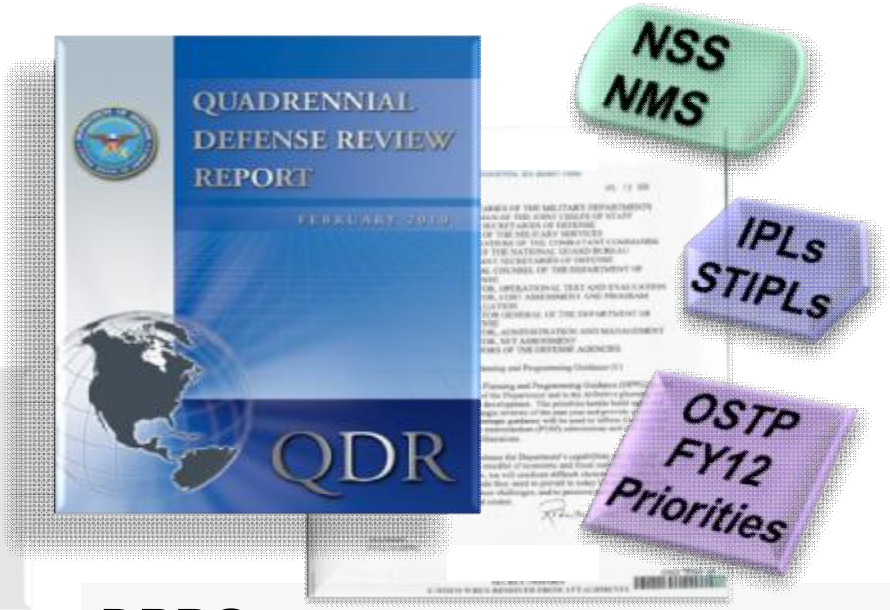
Defense Science Board
2008 Summer Study

Capability Surprise



21st Century Strategic Technology Vectors

JASON Study on Assuring Space-delivered Capabilities

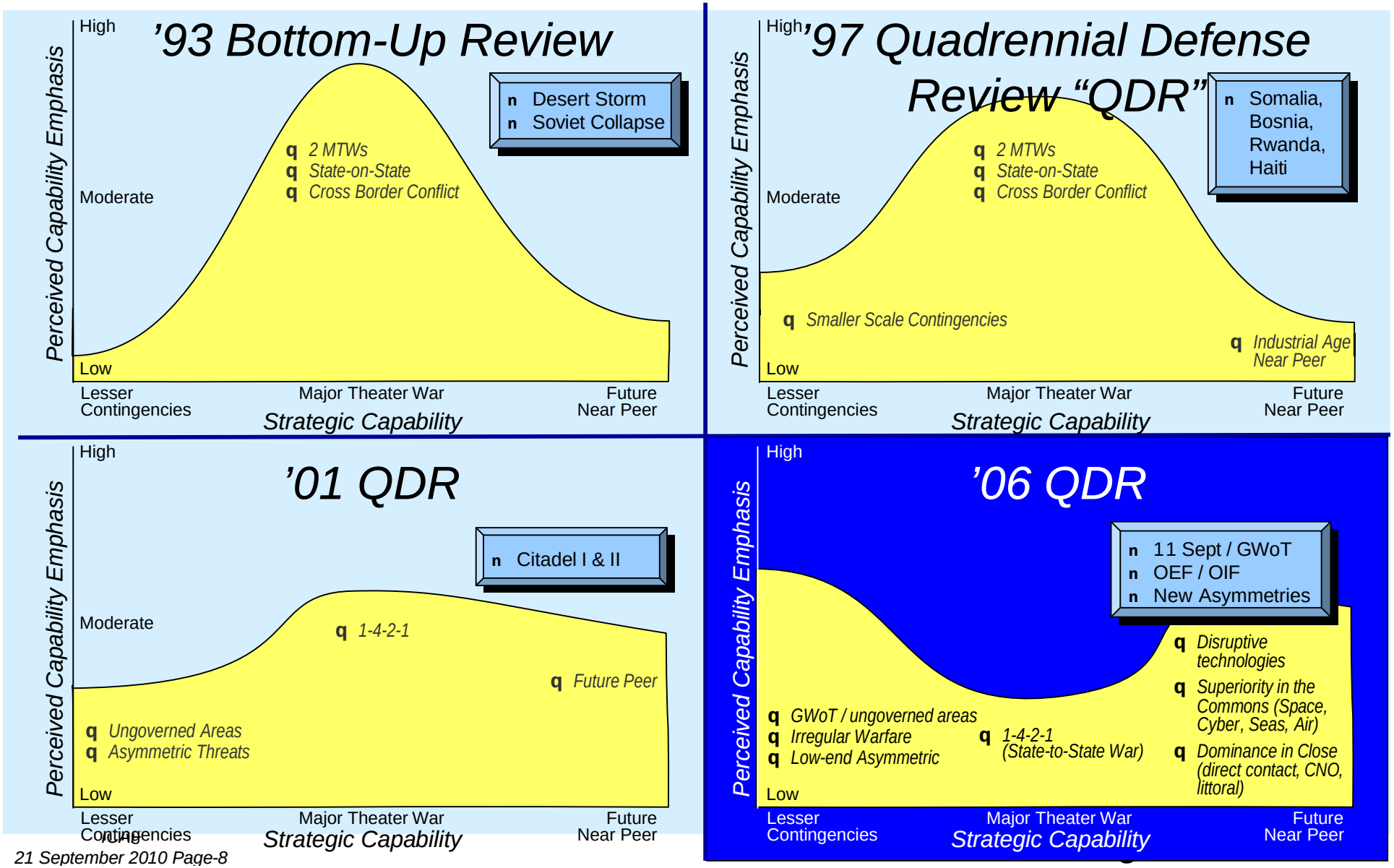


DPPG

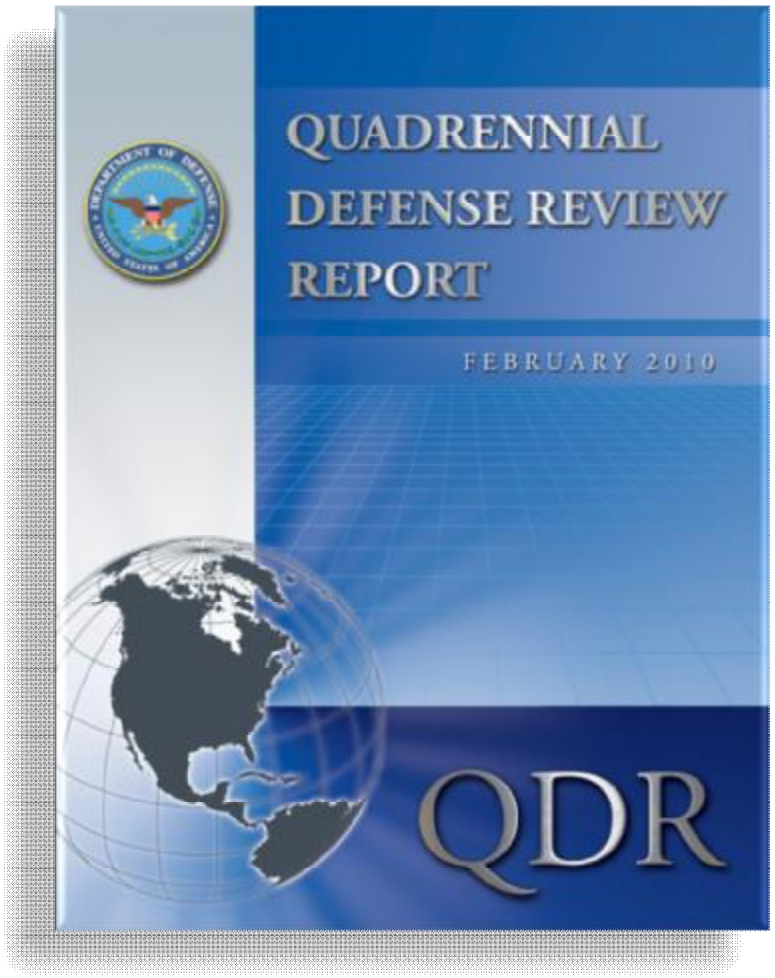
- *QDR KMA S&T Studies*
- *Systems 2020*
- *Data to Decisions*
- *Application of Technical S&T Intel*

Biggest issue is deciding which challenges to act upon … and to what degree

Decade of Strategic Evolution

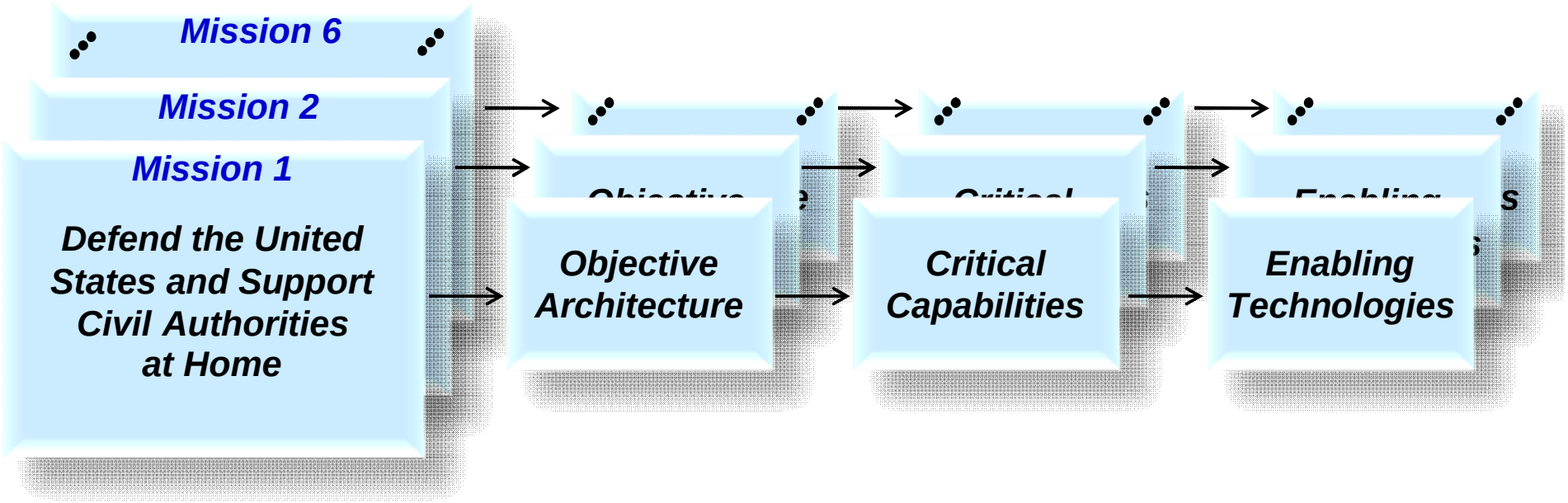


Quadrennial Defense Review Missions Require New Capabilities



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.***

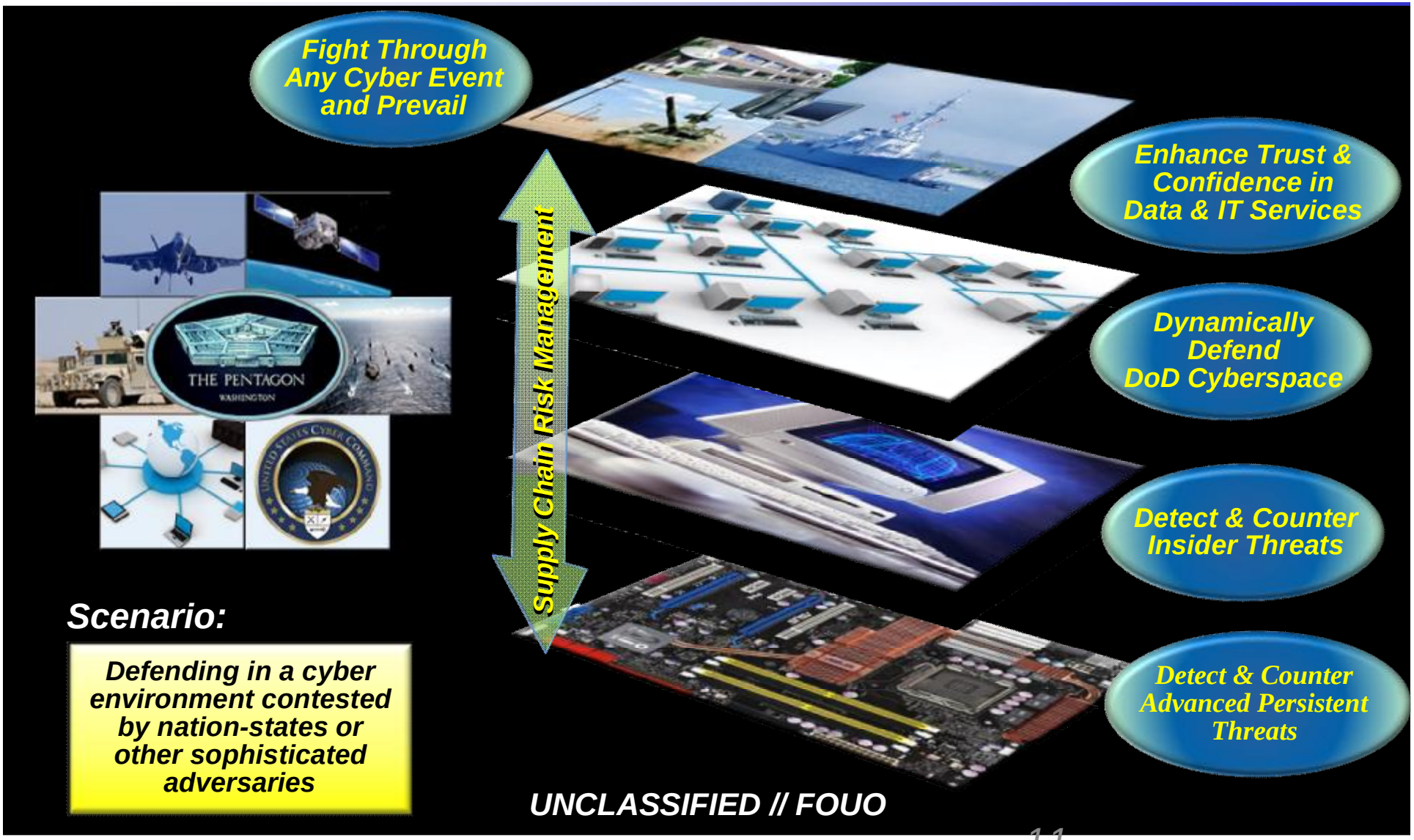
Approach



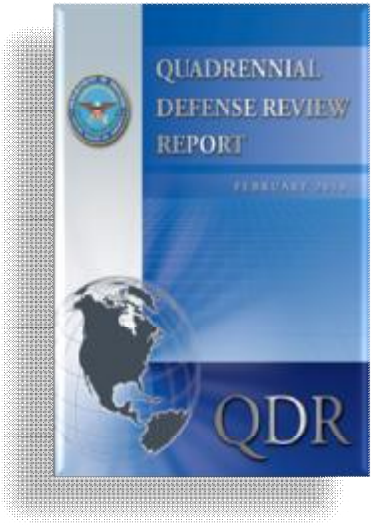
Strategy-focused, QDR-scoped, capability-driven front-end technologies

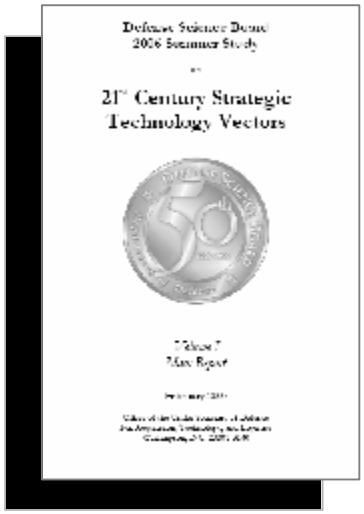
Operate Effectively in Cyberspace

(OV-1: High Level Operational Concept)



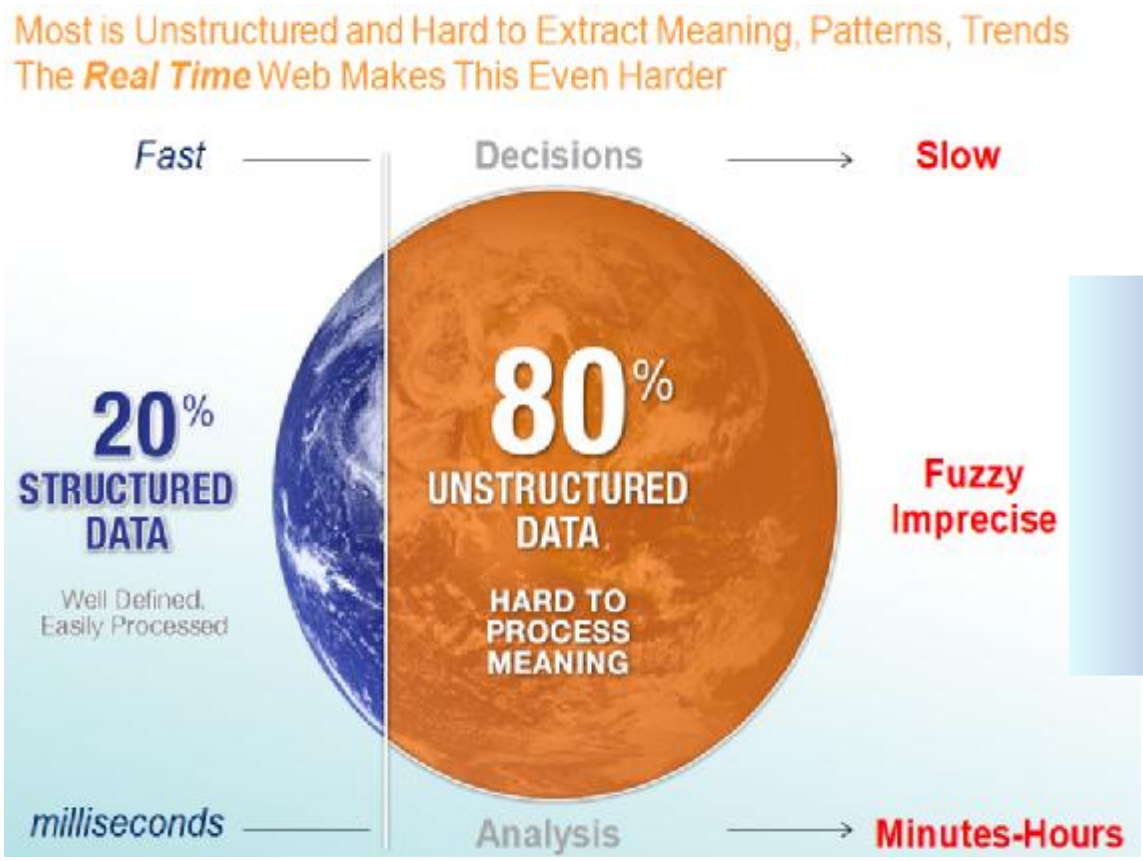
Critical Capabilities That Evolve from Architectural





1. **Decision Support (Data to Decisions)**
2. **Autonomy for Standoff, Speed and Scale**
3. **Trusted Cyber and Cyber-Physical Systems**
4. **Immersive Training**
5. **Human Terrain Preparation**
6. **Ubiquitous Observation**
7. **Contextual Exploitation**
8. **Rapidly Tailored Effects**

Data to Decisions



Source: TTI Vanguard Conference - Psydex

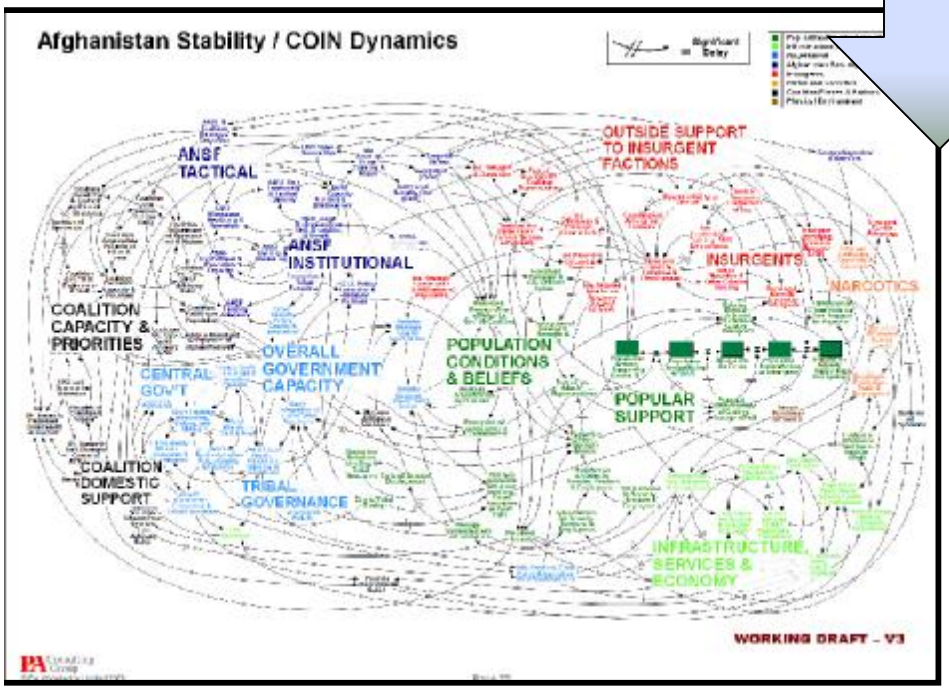
RESEARCH TOPICS

- *Data Structure*
- *Anomaly detection*
- *Embedded algorithms*
- *Context*
- *Prediction*

Systems 2020

NEW INTELLIGENT TOOLS & APPROACHES

- Engineering Design
- Test
- Construction



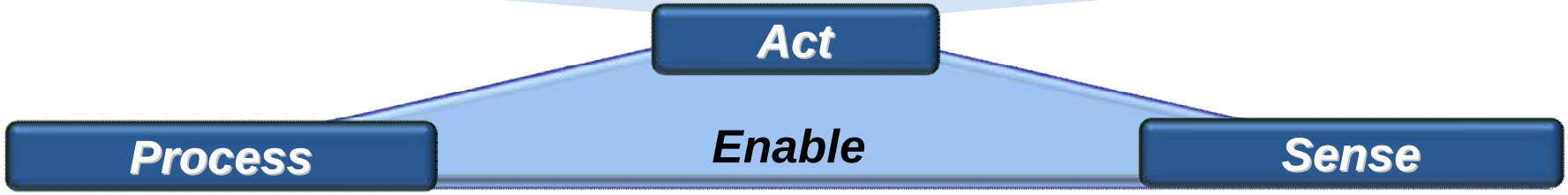
Key Technical Challenges

- ***Trusted & Assured Systems with components of unknown pedigree***
- ***Advanced M&S (Synthesis)***
- ***Scaleable and open architectures***
- ***Integrated / interoperable design algorithms***

Trusted – Assured – Reliable - Interoperable

Cross-cutting Technology Areas

Defend the U.S. & Support Civil Authorities at Home	Succeed in Counterinsurgency, Stability, & Counterterrorism Operations	Build the Security Capacity of Partner States	Deter and Defeat Aggression in Anti-Access Environments	Prevent Proliferation and Counter Weapons of Mass Destruction	Operate Effectively in Cyberspace



- *Knowledge and info management*
- *Automatic target recognition*
- *Decision support and analytical tools*

- *Modeling & simulation technologies; live virtual constructive (LVC)*
- *Communications and networking*
- *Access to and sharing of DoD / Government -wide databases*
- *Adaptive planning, war-gaming, and tactical decision aids*
- *Collaborative planning and assessment tools*

- *Wide-area surveillance of land, sea, and air-based targets in non-permissive areas coupled with rapid data analysis and dissemination*
- *Biometric and forensic data collection, including rapid biometric data processing and analysis, as well as sharing with interagency and coalition partners*

Cross-cutting KMA: Operate effectively in cyberspace

Cross-cutting Tech Areas (post-study reviews): Training, D2D

Overall Priority Enabling Technology Areas

- Information Systems Technologies; Knowledge and Information Management / Battle Command (K&IM)
- Access to and Sharing of Critical DoD and Government Information/Databases
- Alternatives to GPS for Providing Position, Navigation, and Timing (PNT)
- Dynamic Electromagnetic Spectrum Management
- Locate, Monitor and Track – Operationally Significant CBRN Standoff Detection
- Cyber – Foundations of Trust
- Immersive, Adaptive Training and Planning

Integrated S&T Enterprise

Missions

NDS, **QDR**, SPR, NPR

1. Defend the United States and Support Civil Authorities at Home
2. Succeed in Counter insurgency, 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.

Operational Challenge

JUONs, UONs, COCOM IPL

Objective Architectures

Critical Capabilities

Enabling Technologies

Laboratory Program

DoD internal research in areas where:

- DoD must retain technical leadership.
- DoD must have an assured long term captive capability.

Basic Research Program

DoD external research to create:

- New approaches to Missions & Operational Challenges.
- Long term enabling technologies in the defense Industrial base.

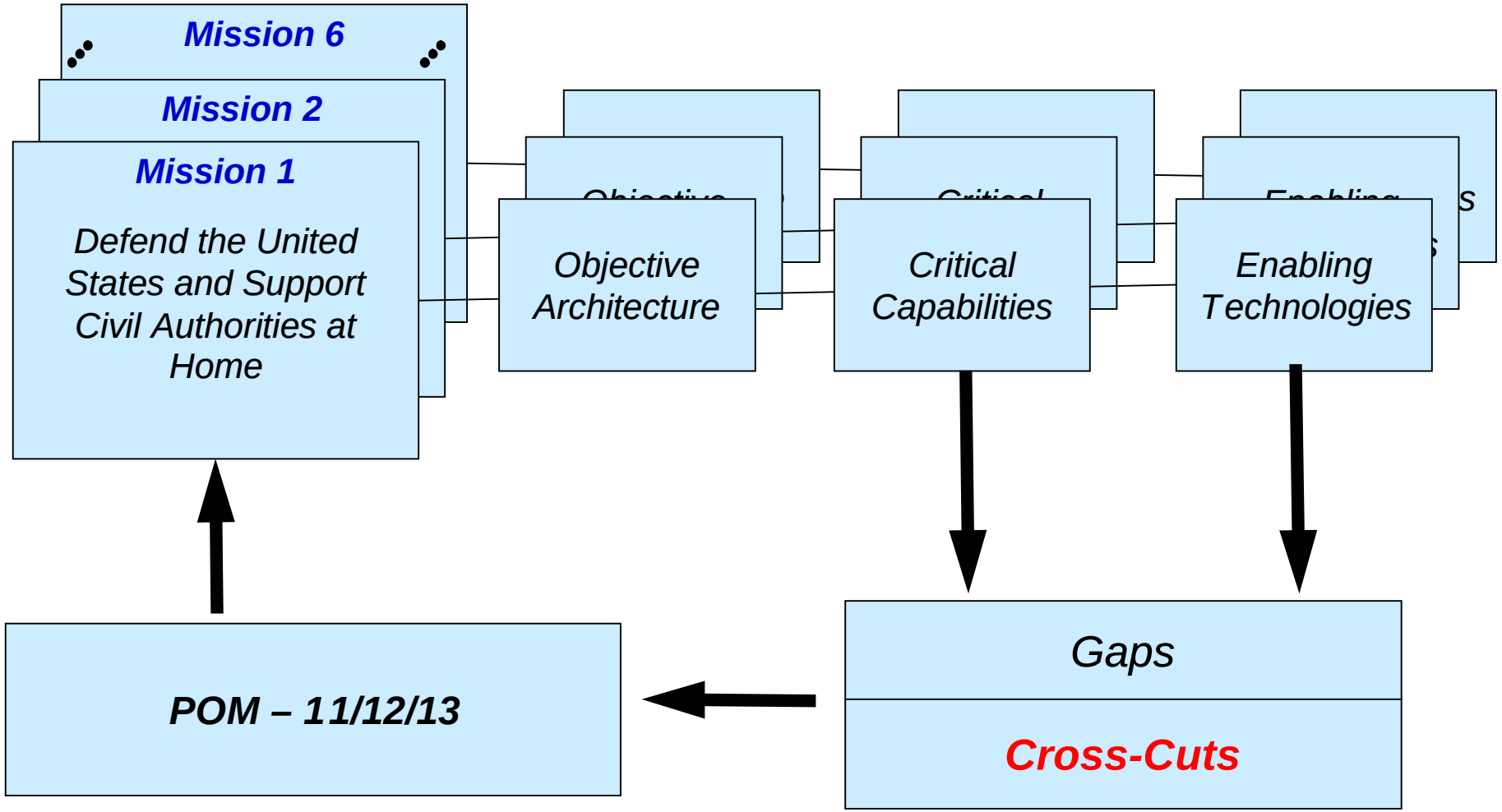
STEM Program

Supports undergraduate and graduate students in disciplines that encompass DoD's critical capabilities such that these students matriculate to the DoD or in the defense industrial base

Summary

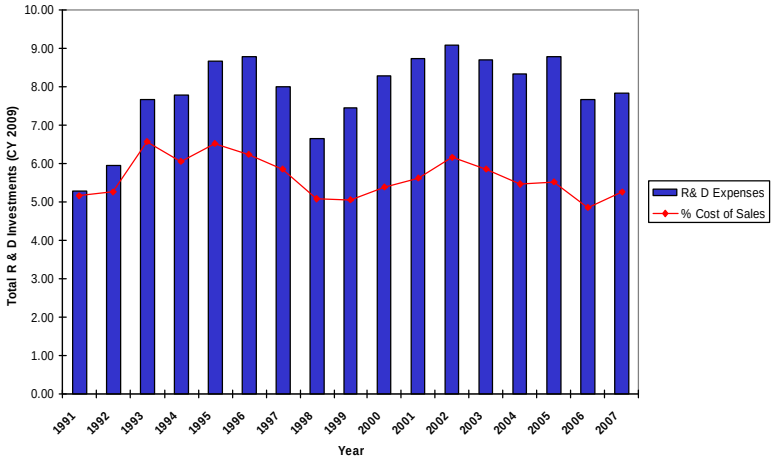
- S&T investment matters to national security
- 2010 Quadrennial Defense Review Continued DoD on Non-Kinetic Path
- Need to Conduct Gap Analysis to Influence Funding Levels, Program Content

QDR Mission Area Studies Approach

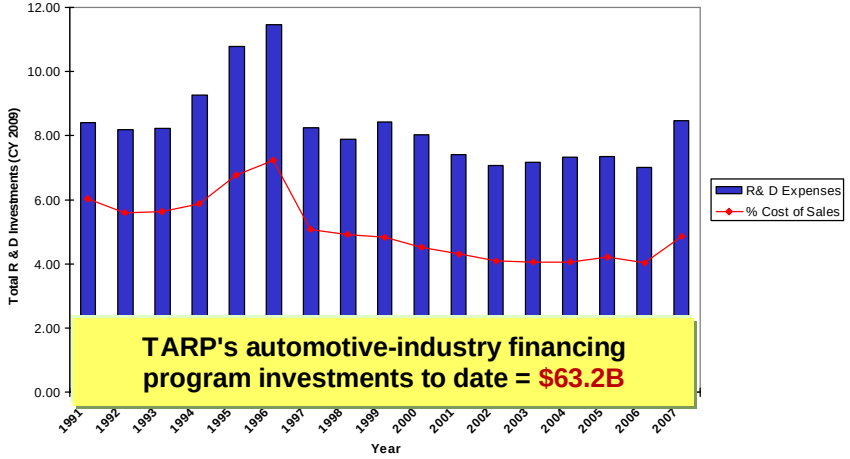


Why S&T Matters – Industrial Experience

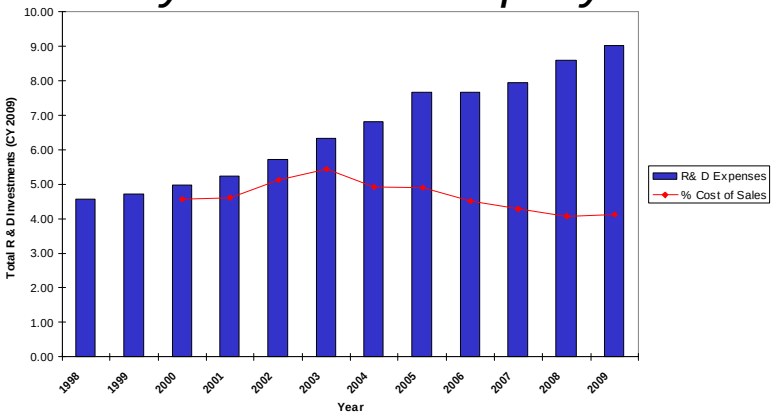
Ford Motor Company



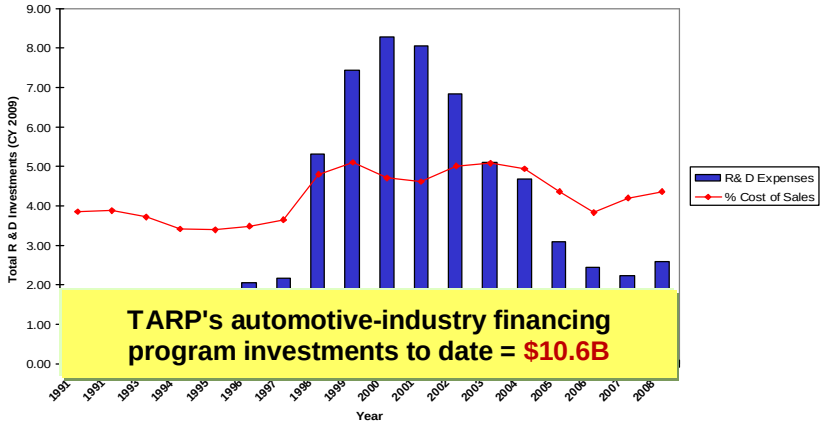
General Motors



Toyota Motor Company



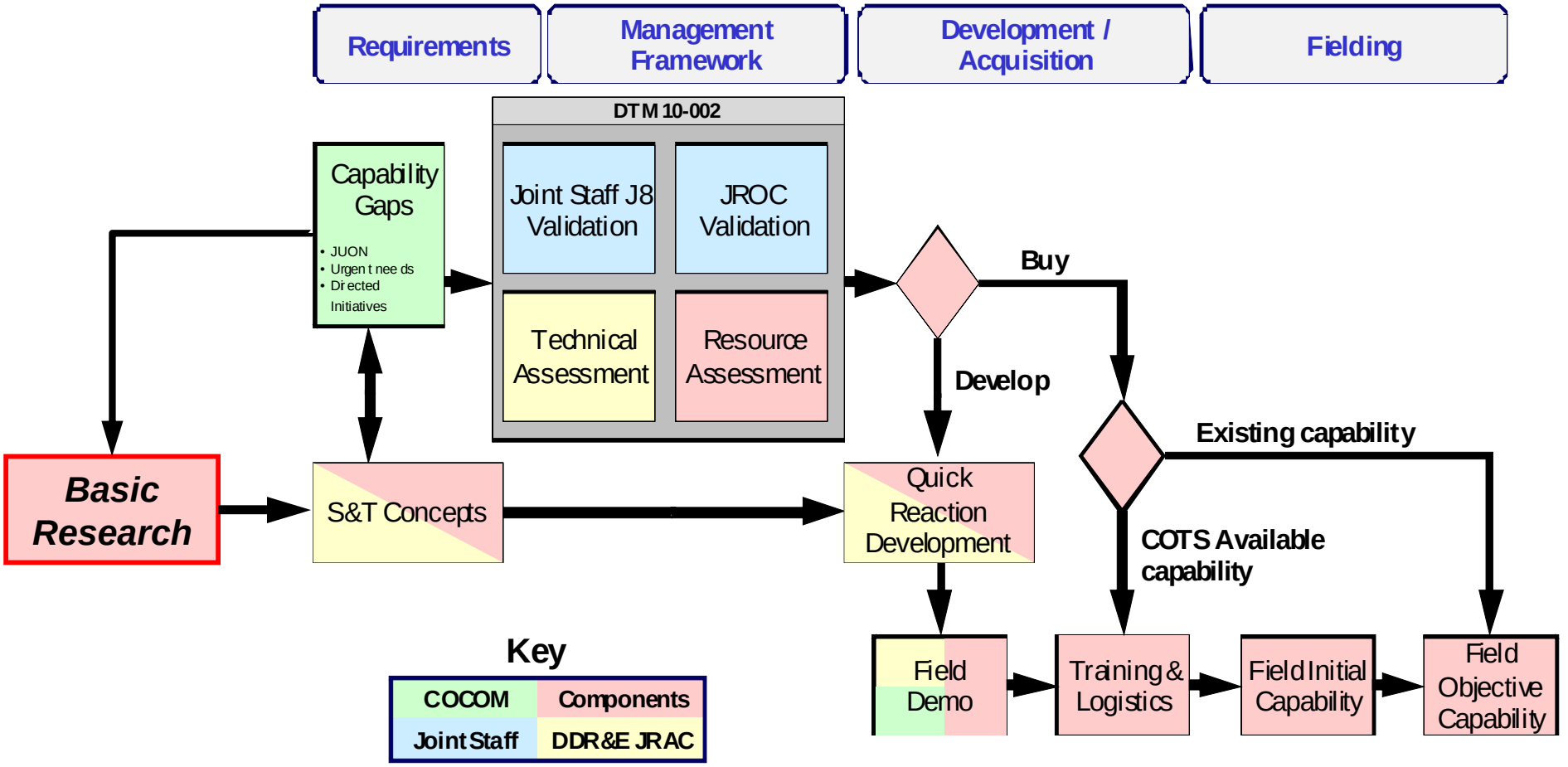
Daimler-Chrysler Motor Company



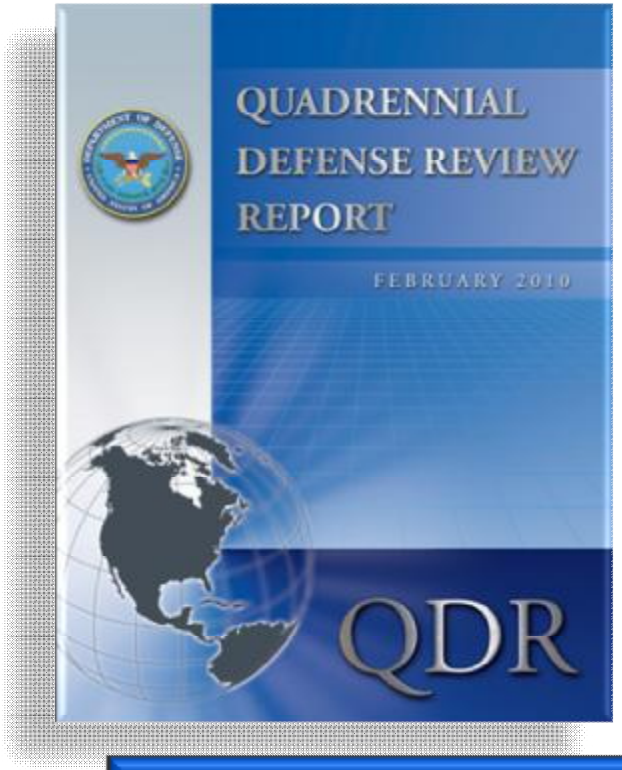
•The Firm(s) That Have Not Maintained R&D Funding – Decline

•The Firm(s) That Have Slowly Increased R&D Funding - Healthy

Basic Research Feedstock for DoD Capabilities



QDR Key Mission Areas and DPPG Tasking



	Key Mission Area (KMA)	Team Lead
1	Defend U.S. and Support Civil Authorities at Home	*Mr. Tom Troyano*
2	Succeed in COIN/Stability/CT Ops	*Mr. Ben Riley*
3	Build Partner Security Capacity	*Mr. Elmer Roman*
4	Deter and Defeat Aggression in Anti-Access Environments	*Mr. Mike Olmstead*
5	Prevent Proliferation and Counter WMD	*Dr. Carol Kuntz*
6	Operate Effectively in Cyberspace	*Dr. Steve King*

***DPPG Task*: "The DDR&E, with the support of the Secretaries of the Military Departments, Directors of the Defense Agencies, and CJCS will lead an effort across the Department to identify the core capabilities and enabling technologies for each of the six QDR key mission areas."**

Each Team's Priority Enabling Technology Areas (ETAs)

ETA \ KMA	1	2	3	4	5	6
Technologies especially important to developing a COP, decision making, and C2: information system technology						
Technologies especially important to detect, track and identify specific potential threats: sensors, electronics and EW						
Realistic, immersive irregular warfare (IW) training tools						
Geospatial understanding						
Immersive and mixed reality simulations (e.g., HSC dynamics)						
Info sharing across multiple domains and security enclaves						
Alternatives to GPS for providing position, nav, timing (PNT)						
Dynamic electromagnetic spectrum management						
Novel approaches for operationally significant CBRN standoff detection						
Threat specific analytical tools for probabilistic consequence prediction						
Distributed trust						
Resilient architectures						

KMAs: 1 (HLD & SCA); 2 (COIN-Stab-CT); 3 (BSC); 4 (AA-AD); 5 (C-WMD); 6 (Cyber)