Fiscal Year 2009
President's Budget Request for
DoD Science & Technology

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Office of the Director,
Defense Research and Engineering

The Bottom Line

PBR09 is a continuation of the transition of S&T investment to enable growth of "non-kinetic", non-platform specific capabilities

Shifting away from an emphasis on ships, tanks, and planes—to focus on protection, information, knowledge, and timely, actionable intelligence

DDR&E Vision

Develop technology to defeat any adversary on any battlefield.

DDR&E Priorities for CY 2008

- **Support Global War on Terrorism**
- **Support Urban Operations Capabilities**
- **Support WMD Detection & Response Capabilities**
- **Develop Transformational Power & Energy Technologies**
- **Develop Manufacturing Technologies**
- **Enhance Technology Transition**
- **Enhance National Security S&E Workforce**
- **Increase funding for Basic Research, plus $270M**

White House Guidance

- **President Bush acknowledged the importance of science and engineering development in his January 2008 State of the Union address**

"To keep America competitive into the future, we must trust in the skill of our scientists and engineers and empower them to pursue the breakthroughs of tomorrow… I ask Congress to double federal support for critical basic research in the physical sciences and ensure America remains the most dynamic nation on Earth.."

President George W. Bush, State of the Union address, January 28, 2008

Overview

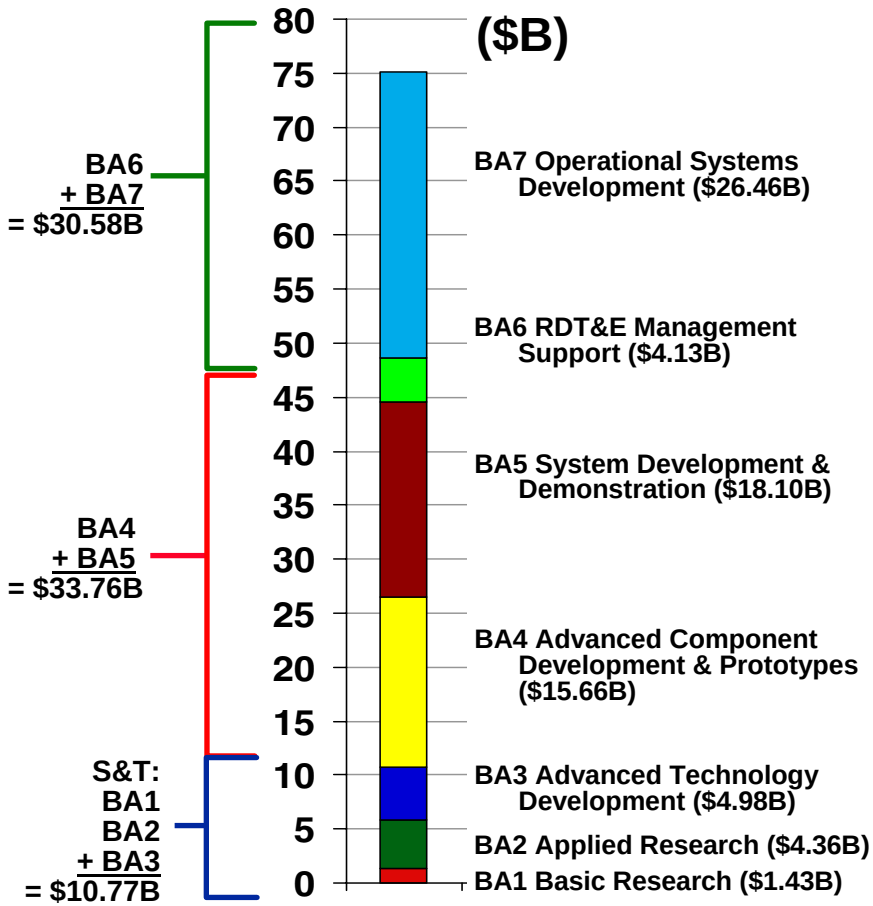
- **PBR 2009 S&T Budget**
- **Budget Changes and Historical Context**
- **Strategic foundation and Investment Focus**
- **Reliance 21 and the R&E Portal**

PBR 2009 S&T Budget

FY08 and FY09 RDT&E Budget Request Comparison

- in Then Year Dollars -

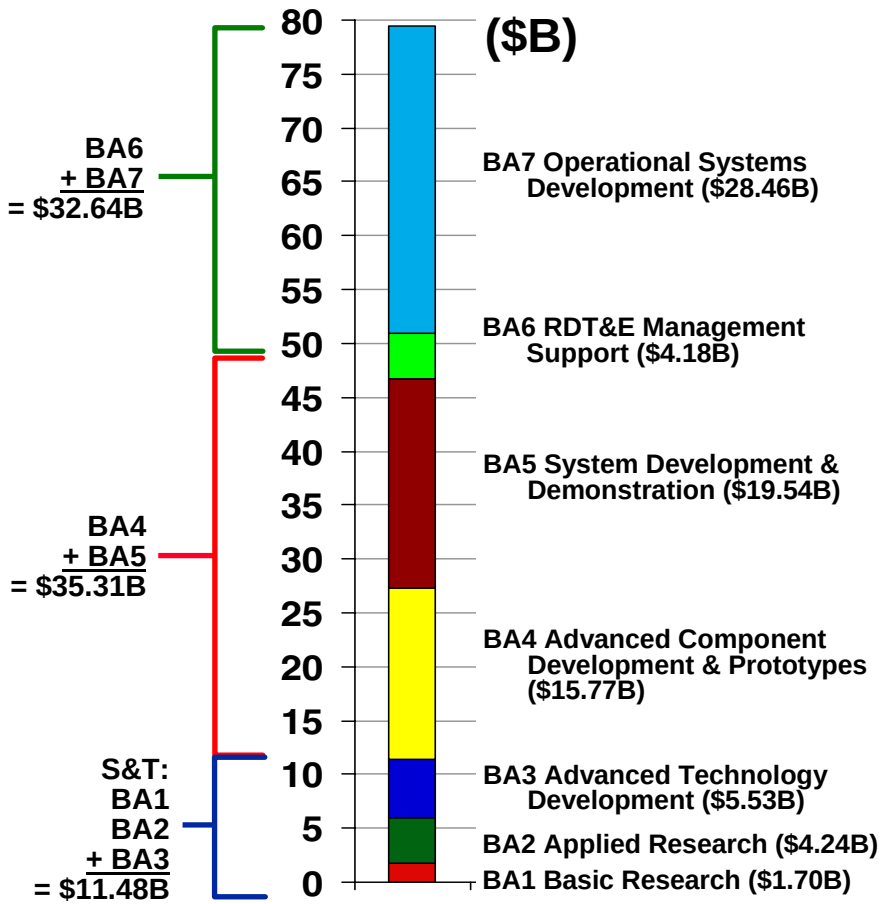
FY08 RDT&E request = $75.12B
(Budget Activities 1-7)



Technology Base (BA1 +BA2) = $5.78B

PBR08 S&T is 14.3% of RDT&E

FY09 RDT&E request = $79.43B
(Budget Activities 1-7)



Technology Base (BA1 + BA2) = $5.94B

PBR09 S&T is 14.5% of RDT&E

FY09 DoD R&E Budget Request Comparison

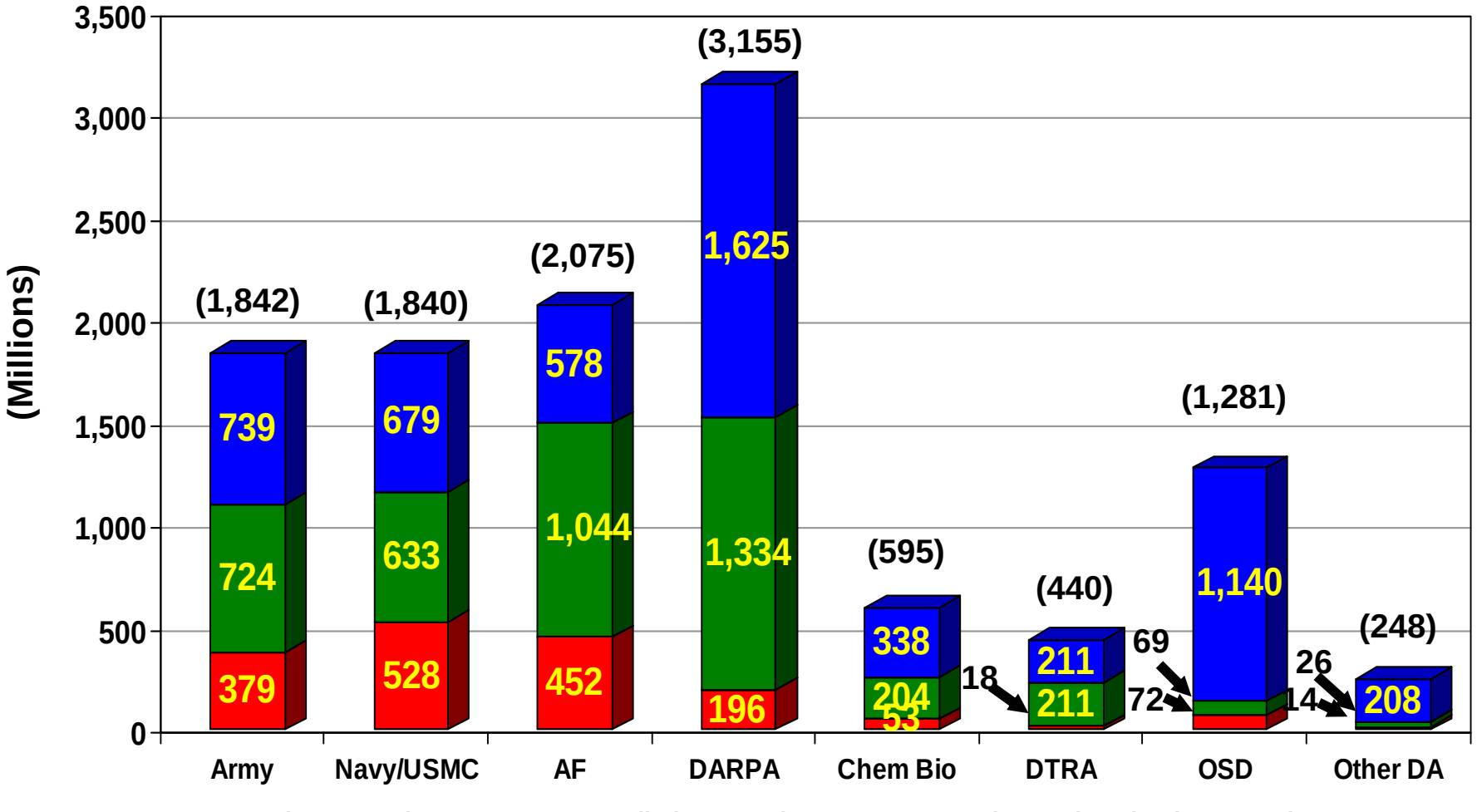
	FY08 PBR	FY08 Approp	FY09 PBR *(Constant Year FY08)*	Real Change from PBR (In CY $)
Basic Research (BA 1)	1,428	1,634**	1,699 *(1,662)*	+16.4%
Applied Research (BA 2)	4,357	5,092	4,245 *(4,153)*	-4.7%
Advanced Technology Development (BA 3)	4,987	6,043	5,532 *(5,412)*	+8.5%
DoD S&T	**10,772**	**12,768**	**11,475 *(11,227)***	**+4.2%**
Advanced Component Development and Prototypes (BA 4)	15,662	15,947	15,774 *(15,431)*	-1.5%
DoD R&E (BAs 1 – 4)	**26,434**	**28,716**	**27,249 *(26,657)***	**+0.9%**
DoD Topline	**481,554**	**569,000**	**515,400 *(502,486)***	**+4.3%**

FY09 DoD S&T Budget Request

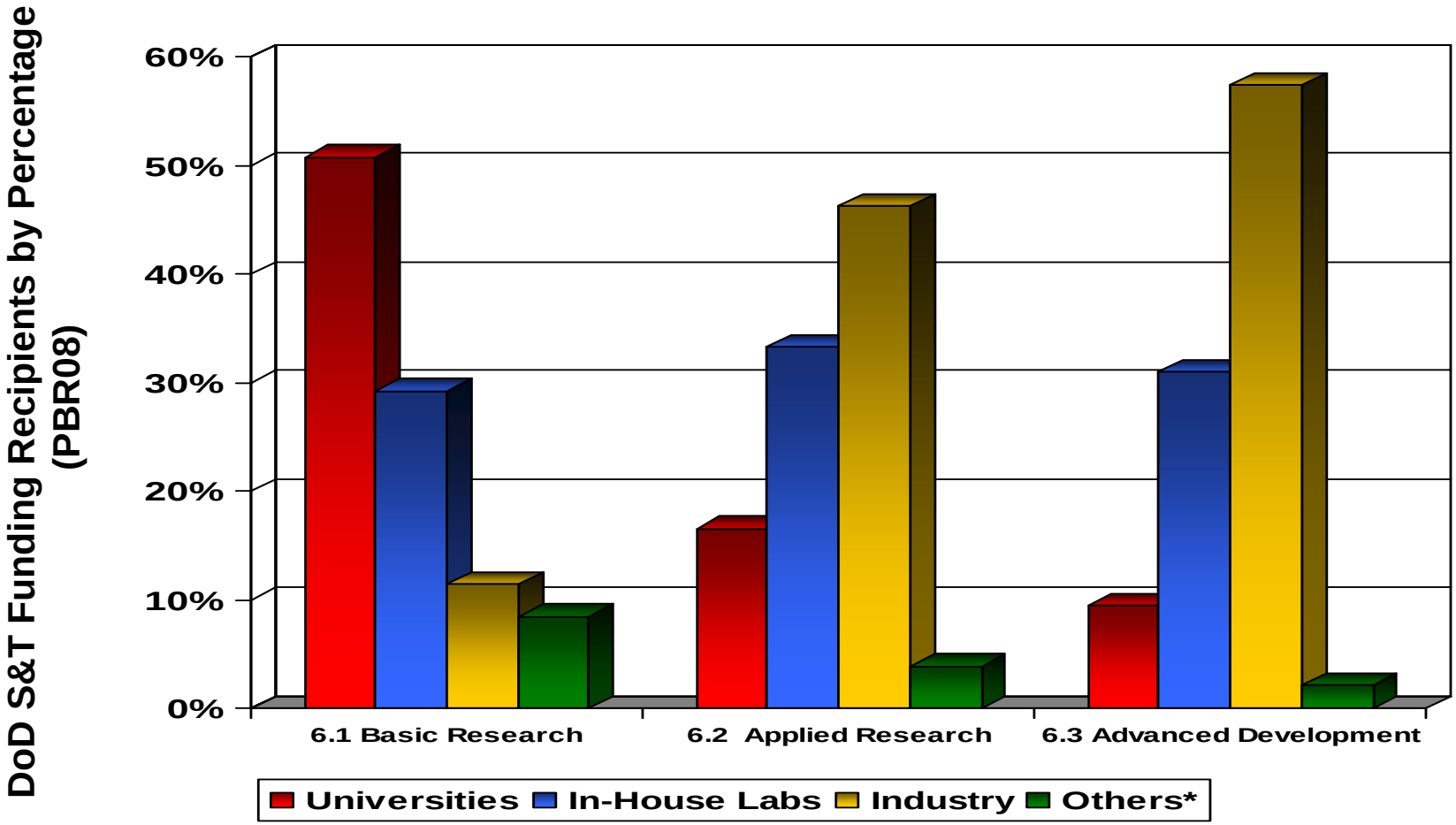
Total FY09 S&T request = $11.48B

Total FY08 S&T Request = 10.77B

Army = 1,728 Navy = 1,667 AF = 1,964 DARPA = 3,033 ChemBio = 610 DTRA = 401 OSD = 1,166 Other DA = 201



Recipients of DoD S&T Funds



***Includes non-profit institutions, State & local govt., & foreign institutions**

Source: National Science Foundation Report (PBR08)

Budget Changes and Historical Context

PBR09 S&T Request Addresses Capability Gaps

- **PBR09 S&T Request continues the realignment initiated in FY08 to address capability gaps identified in the 2006 QDR**
  - **Special ("non-kinetic"/enabling) technologies:**
    - **Clandestine Tagging, Tracking and Locating**
    - **Biometrics**
    - **Human, Cultural, Social Behavior Modeling**

    } ***$183M***
    - **Networks**
    - **Persistent Surveillance**

    } ***$611M***
  - **Technologies to decrease energy consumption and increase alternative sources of energy ($513M)**
  - **Active and conventional armor technology for protection against a range of threats ($68M)**
  - **Accelerating technology transition to fielded systems**

Investment is shifting away from platform-specific technologies

PBR09 S&T Request Addresses Capability Gaps *(Cont'd)*

- **New technology/emphasis areas**
  - **$270M increase to Basic Research**
    - **Enhance the science and engineering personnel base**
    - **Emphasis will be on research to address Grand Capability Challenges, e.g.,**
      - **Cyber protection and information assurance**
      - **Network sciences**
      - **Science of autonomy**
      - **Information fusion and decision sciences**
      - **Biosensors and biometrics**
      - **Human sciences (cultural, cognitive, behavioral, neural)**
      - **Software sciences and materials**
      - **Immersive sciences for training and mission rehearsal**
      - **Power and energy management**
      - **Counter directed energy weapons**
    - **Anticipate about 500 focused research efforts**

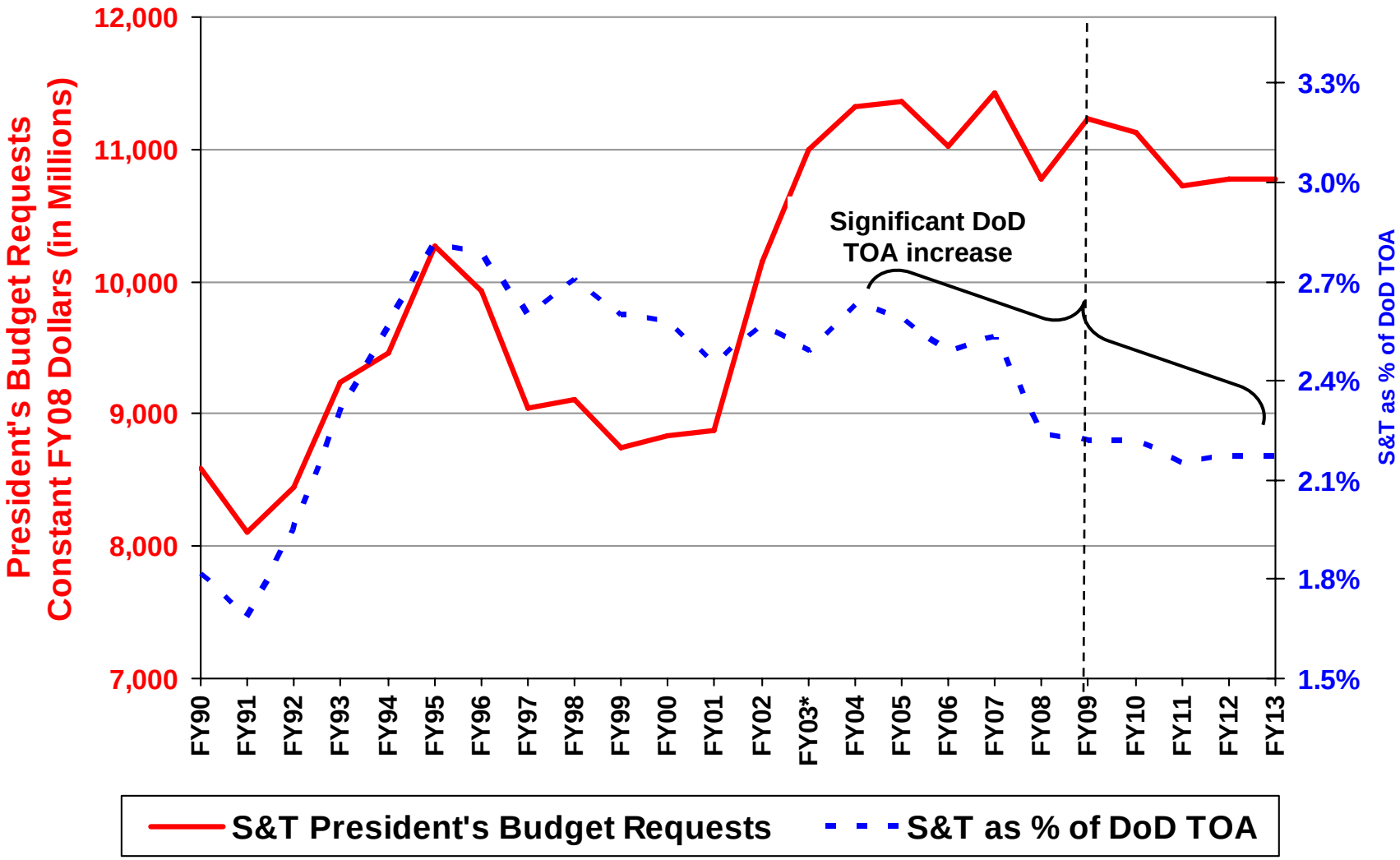
PBR09 S&T Request Addresses Capability Gaps *(Cont'd)*

- **New technology/emphasis areas *(Cont'd)***
  - **Increased protection for dismounted troops and ground forces ($60M)**
  - **Research in plasma and meta-materials to address emerging threats ($35M)**
  - **Cyber protection **($50M)**
  - **Hypersonics/Prompt Global Strike (Blackswift) – New technology prototype **($750M Total)**

** ***Note**: Cyber protection is funded in DARPA BA 6*
Air Force funding for Blackswift is in BA 7

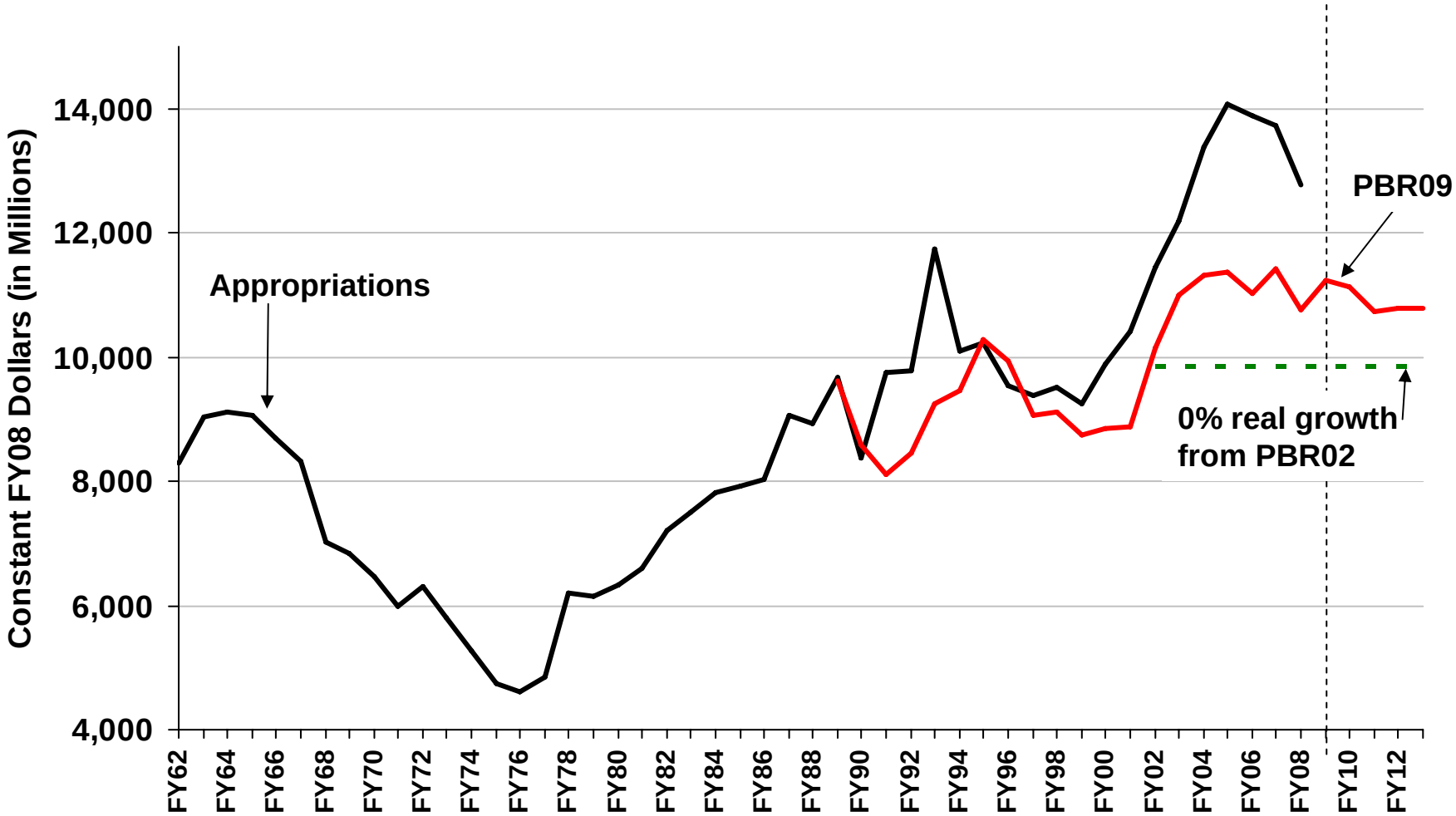
DoD S&T - Macro Scale

- S&T Investment and % of DoD Total Obligation Authority (TOA) -



DoD S&T – Historical Context

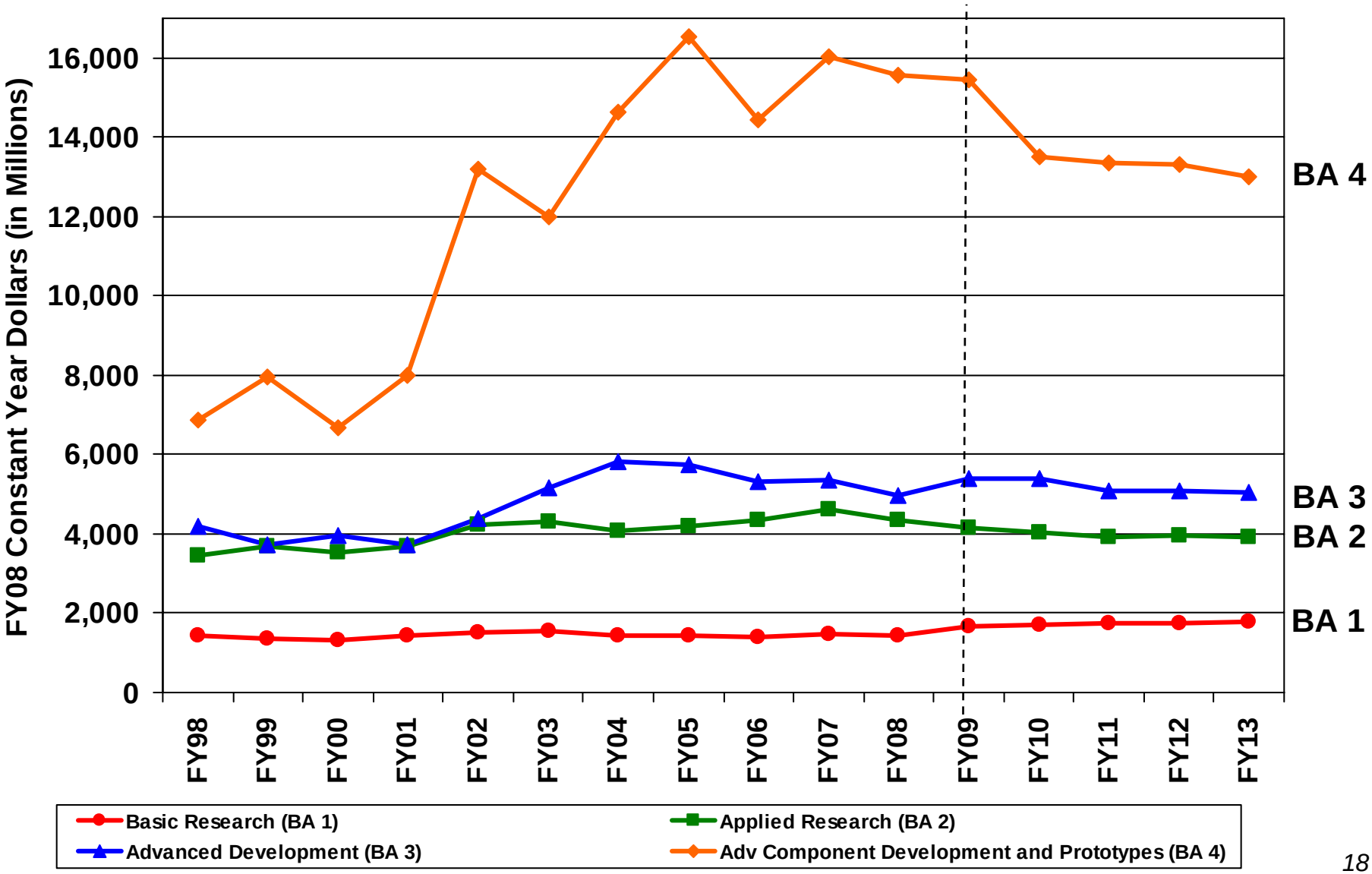
- In FY08 Constant Dollars -



FY09 S&T request is among the highest

DoD R&E Funding By Budget Activity

- President's Budget Requests (in FY08 Constant Dollars) -



Strategic Context and Investment Focus

Desert Storm

- **US dominance over Soviet-era systems "shocked" potential adversaries and combined to give US conventional superiority**
  - **Precision Weapons**
  - **Night Vision**
  - **Low Observability**
  - **Networked Systems**
- **The advent of information-based warfare feed the emergence of irregular warfare**

Strategic Framework

- **US National Security Strategy (March 2006) set national imperative to continue the war on terrorism**
- **2006 Quadrennial Defense Review also restated the need for DoD to balance its capabilities across four categories of challenges:**
  - Traditional
  - Irregular
  - Catastrophic
  - Disruptive

  } ***Transformational***
- **DDR&E S&T initiatives memorandum to SECDEF (24 Aug 07)**

National Defense Strategy—Types of Programs Needing Technology

VULNERABILITY

Higher

Lower

Irregular

- *Language Translation*
- *Cultural Awareness*
- *Combating Terrorism*
- *Small Unmanned Aerial Vehicles*
- *Rapid Terrain Mapping*
- *Constant Surveillance*
- *Active & Conventional Armor*

Catastrophic

- *Ballistic and Cruise Missile Defense*
- *Chemical Weapon Defense*
- *Bio Weapons Defense (includes research into state of genetic engineering*
- *Remote Detection of Weapons of Mass Destruction Materials and Components*

Traditional

- *Conventional Ground, Sea, and Air Vehicles*
- *Standard Weapons*
- *Precision Weapons*
- *Stand Alone (Single Service) Command & Control Systems*

Disruptive

- *Nano, Bio, Information Techs.*
- *Hypersonics*
- *Directed Energy*
- *Networks on the Move*
- *Autonomous Systems*
- *Distributed Sensors*
- *Defeat of Speed of Light Weapons*
- *Metamaterials*
- *Plasma Research*

Higher

Lower

LIKELIHOOD

QDR Priority Formulation

- **Strategic Challenges**
  - **Traditional**
  - **Irregular Warfare**
  - **Catastrophic**
  - **Disruptive**
- **Strategic Outcomes**
  - **Defeat Terrorist Networks**
  - **Defend the Homeland in-Depth**
  - **Shape Choices of Countries at Strategic Crossroads**
  - **Prevent the Use and Proliferation of WMD**

Capabilities to Defeat Terrorist Networks

- Persistent surveillance
- Locate, tag, and track terrorists in denied areas
- Human intelligence
- Capabilities to fuse intelligence
- Language and cultural awareness
- Joint coordination, processes and systems

Non-kinetic effects

- Urban warfare capabilities
- Prompt global strike
- Riverine warfare capabilities

Kinetic effects

Capabilities to Defend the Homeland In Depth

- Interoperable, joint command and control
- Enhanced air and maritime awareness
- Consequence management
- Broad spectrum medical countermeasures

Non-kinetic effects

- Tailored deterrence, including prompt global strike
- Air and missile defense

Kinetic effects

Capabilities to Shape the Choices of Countries at Strategic Crossroads

- Improved language and cultural awareness
- Persistent surveillance (penetrate and loiter)
- Cyberspace shaping / defense
- Secure broadband communications

Non-kinectic effects

- Prompt, high-value global strike
- Integrated defense against all missiles
- Air dominance
- Undersea stealth

Kinetic effects

Capabilities to Prevent the use of Weapons of Mass Destruction

- **Locate, tag, track, and characterize**
- **Stand off fissile material detection**
- **Wide area persistent surveillance**
- **Fusion of HUMINT, ISR, and open source information**

Non-kinetic effects

- **Capabilities to "render safe" WMD**
- **Non-lethal weapons**

Kinetic effects

National Defense Strategy Drives S&T Investment

S&T Enabling Technology Priorities
--Supporting the QDR Strategic Outcomes--

- **Technology focus areas:**
  - **Biometrics and Biological exploitation**
  - **Information Technology and applications**
  - **Persistent Surveillance Technologies**
  - **Networks and Communication**
  - **Human, Social, Cultural, and Behavioral Modeling**
  - **Language Translation Technologies**
  - **Manufacturing Technologies**
  - **Cognitive Enhancement**
  - **Directed Energy Technologies**
  - **Autonomous Systems Technologies**
  - **Hyperspectral Sensors**
  - **Nanotechnology**
  - **Advanced Materials**
  - **Energy and Power Technologies**
  - **Organization, Fusion, & Mining Data**
  - **Combating Weapons of Mass Destruction Technologies**
  - **Energetic Materials**

In Blue—Areas with Substantial Increases in FY08/09 President's Budget Request

S&T Enabling Technology Priorities
--Supporting DDR&E Investment Initiatives--

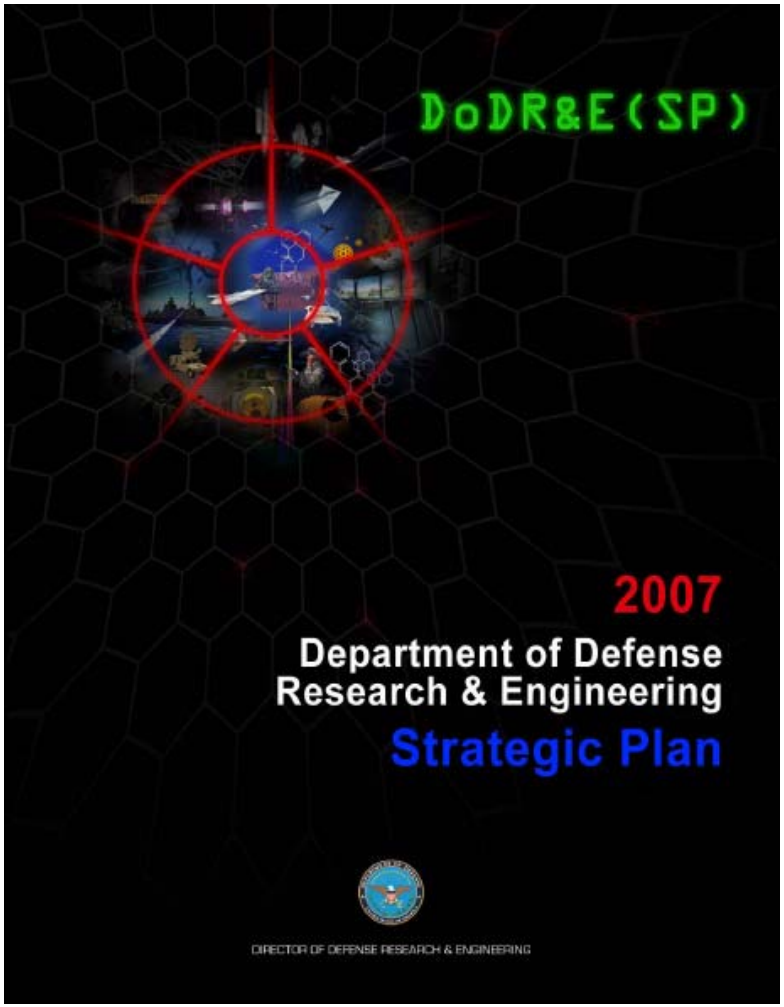
- **S&T Area Investment Initiatives from 24 Aug 07 memorandum to SECDEF:**
  - **Foundational Sciences**
  - **Active & Conventional Armor**
  - **Defeat of Speed of Light Weapons**
  - **Adaptive, Interactive, Full Immersion Training for Soldiers/Marines**
  - **Metamaterials**
  - **Information Warfare**
  - **Information Assurance**
  - **Networking Technologies**
  - **Manufacturing Science Technologies**
  - **Neuro-Ergonomics**
  - **Directed Energy Technologies**
  - **Autonomous Operation of Networks of Unmanned Vehicles in Complex Envir,**
  - **Advanced Medical Research**
  - **Software Development Technology**
  - **Energy and Power Technologies**
  - **Organization, Fusion, & Mining of Large Data Sets for Enhanced Decision Making**
  - **Combating Weapons of Mass Destruction Technologies**
  - **Energetic Materials**

Reliance 21 and the R&E Portal

Defense S&T Reliance

Defense S&T Reliance provides the framework to enable the DoD S&T community to work together to enhance the Defense S&T program and eliminate unwarranted duplication. It strengthens cooperation among the Services and Agencies thereby improving responsiveness to their warfighting and acquisition customers.

S&T Plans and Reliance 21



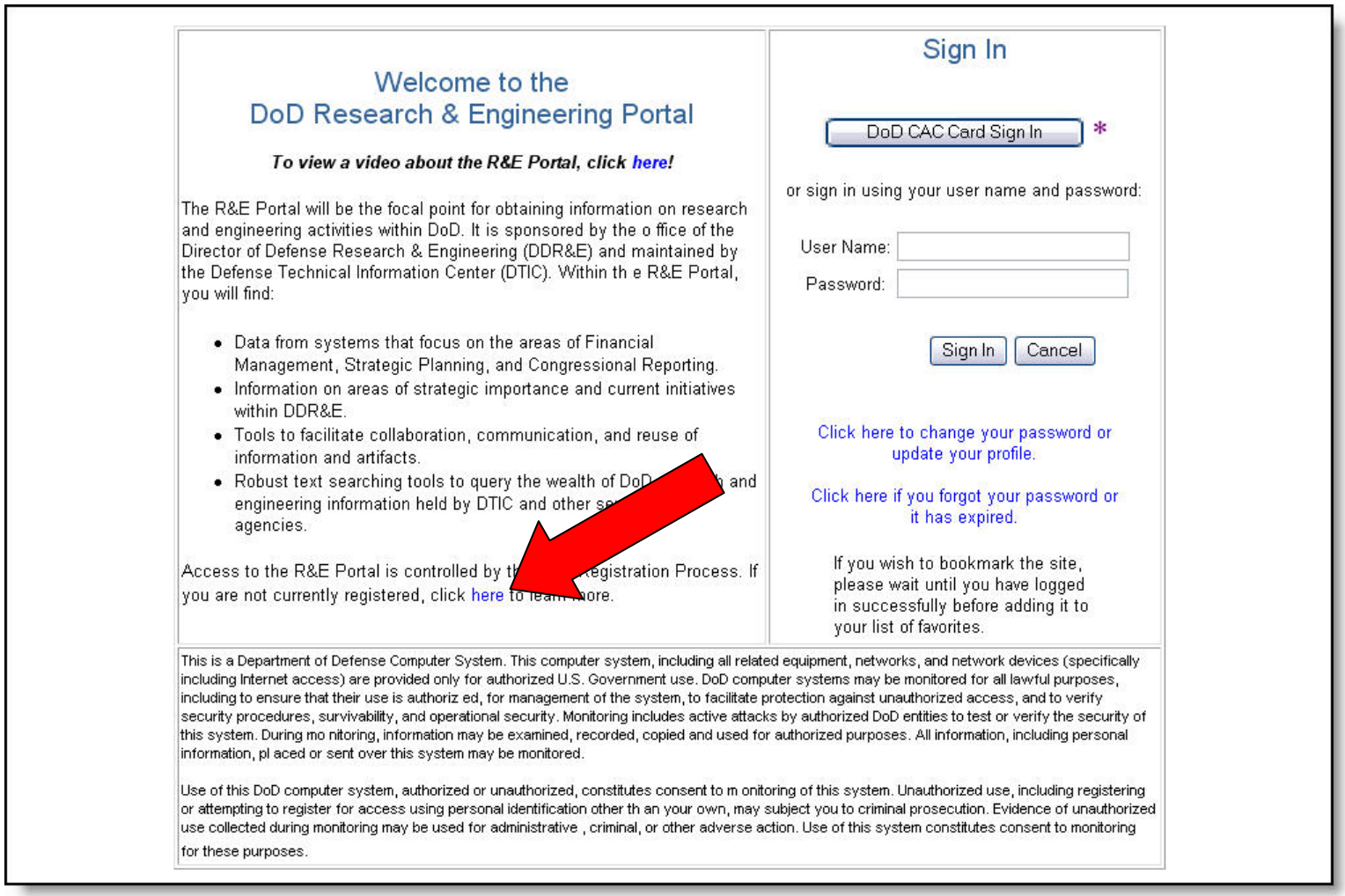
Defense Science and Technology Strategy and Plans

- ***Defense S&T Strategy (Replaced with DDR&E Strategic Plan)***
- ***Basic Research Plan (6.1) - BRP -(As necessary, new plan at printer)***
- ***Defense Technology Area Plan (6.2, 6.3) - DTAP - (Replaced with Technology Focus Teams)***
- ***Joint Warfighting Science and Technology Plan - JWSTP (Biennial, even years)***
- ***Defense Technology Objectives (DTO) Volume that supports JWSTP and DTAP (Replaced by Marquee Programs in JWSTP)***

Research & Engineering (R&E) Portal (https://rdte.osd.mil)

- **Provide DoD R&E community (civil service, military, approved contractors) with *single-point access* to all current R&E information:**
  - **Reliance 21 S&T planning documents**
  - **New E-Gov database**
  - **R&E Points of Contact**
  - **Congressional budget query**
  - **RDT&E budget data**
  - **DDR&E website**
  - **Dialog NewsEdge (24/7 breaking news on technology)**
  - **DoD In-House S&T Activities Report**
- **Be able to *intelligently search* all data**

R&E Portal Access (https://rdte.osd.mil)



Welcome to the
DoD Research & Engineering Portal

To view a video about the R&E Portal, click here!

The R&E Portal will be the focal point for obtaining information on research and engineering activities within DoD. It is sponsored by the o ffice of the Director of Defense Research & Engineering (DDR&E) and maintained by the Defense Technical Information Center (DTIC). Within th e R&E Portal, you will find:

- Data from systems that focus on the areas of Financial Management, Strategic Planning, and Congressional Reporting.
- Information on areas of strategic importance and current initiatives within DDR&E.
- Tools to facilitate collaboration, communication, and reuse of information and artifacts.
- Robust text searching tools to query the wealth of DoD and engineering information held by DTIC and other se agencies.

Access to the R&E Portal is controlled by th egistration Process. If you are not currently registered, click here to learn more.

Sign In

DoD CAC Card Sign In *

or sign in using your user name and password:

User Name:

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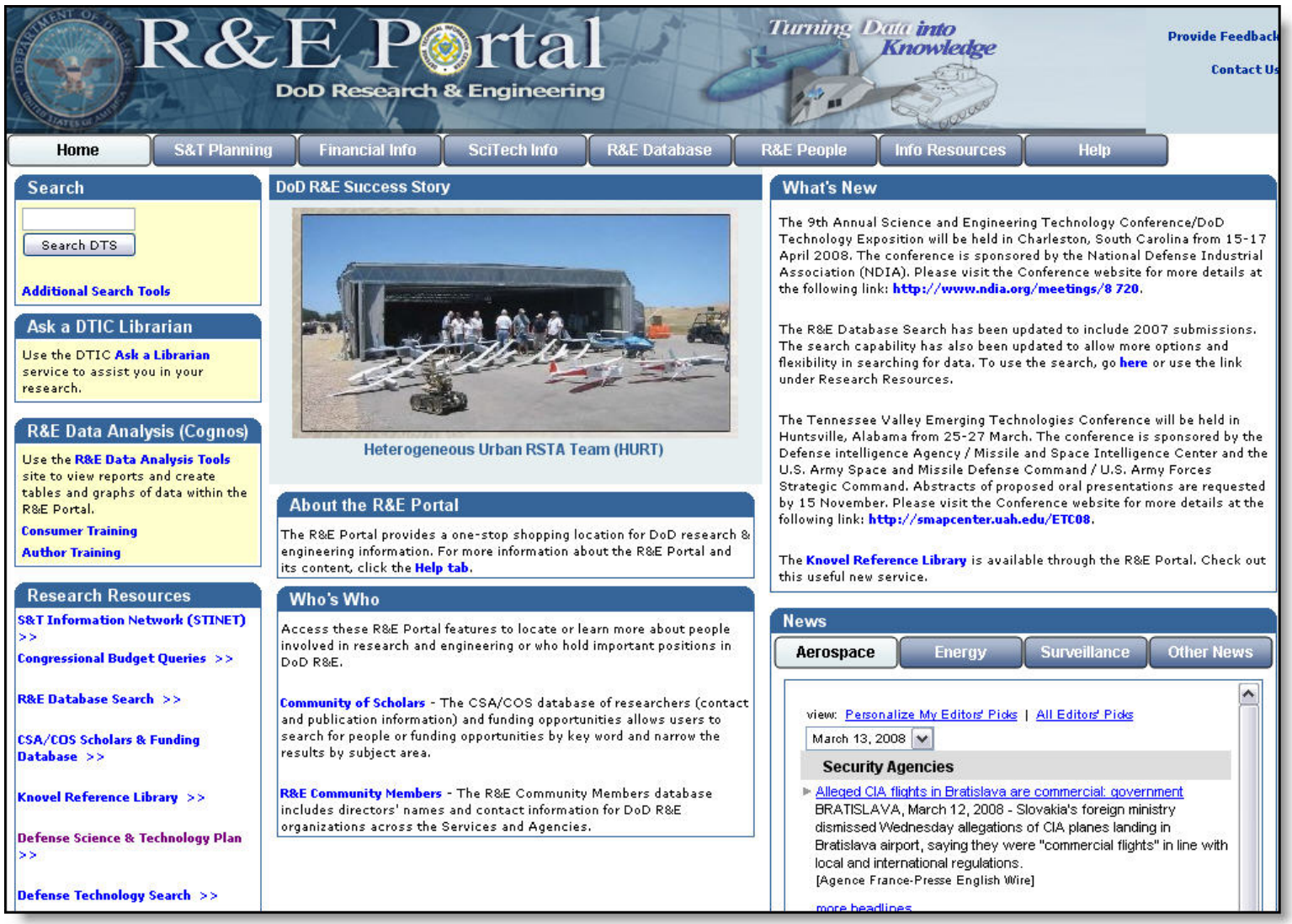
https://rdte.osd.mil

Research & Engineering (R&E) Portal

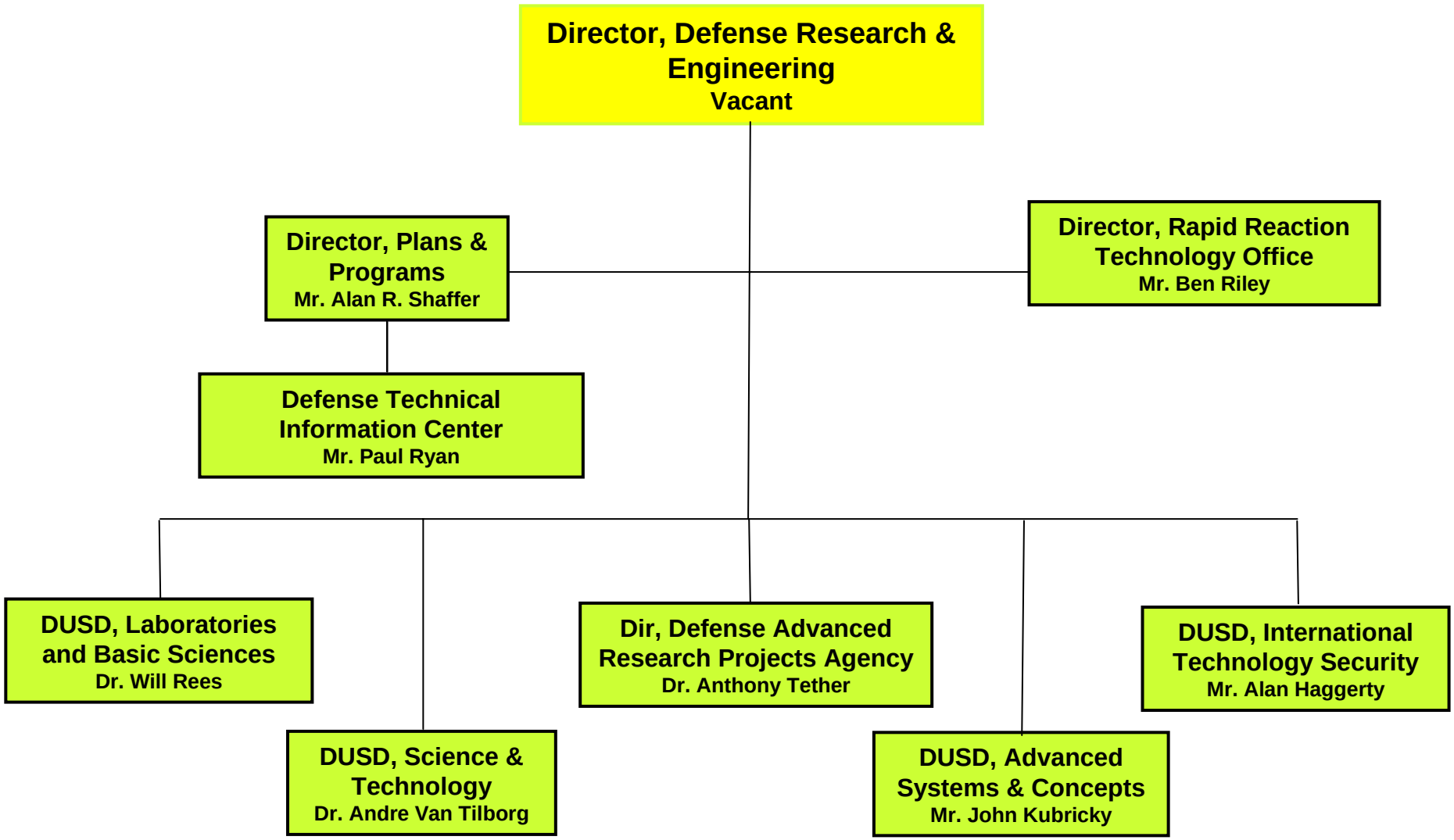


Summary

- **PBR09 S&T investment is driven by:**
  - ***DoD R&E Strategic Plan (guided by National Security Strategy and the QDR)***
  - **S&T Initiatives in 24 Aug 07 memorandum from DDR&E to SECDEF**
- **PBR09 shows SecDef's commitment to a strong S&T program – especially basic research**
  - **PBR09 is 4% higher than PBR08, in real terms**
  - **PBR09 is within $200M of highest request (PBR07), in real terms**
  - **SecDef directed increase in Basic Research is 16% higher than PBR08, in real terms**

Backup

DDR&E Organization

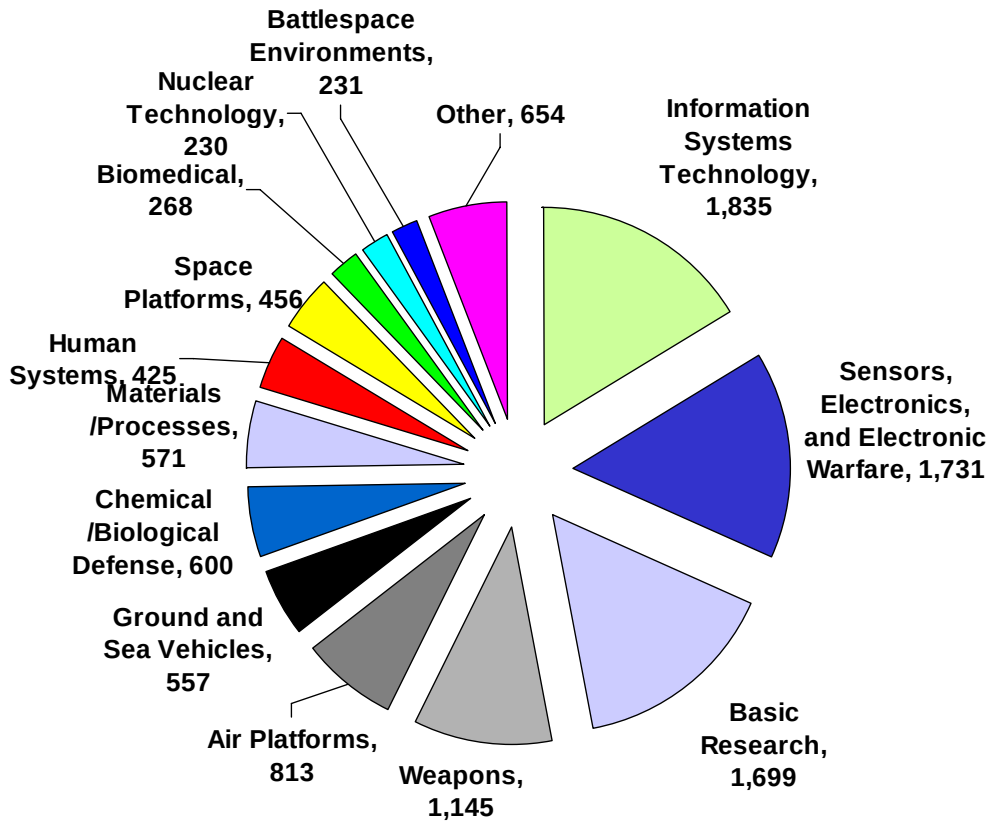


FY09 President's Budget Request

TY$M		FY08 Enacted	FY09	FY10	FY11	FY12	FY13
ARMY	Basic Research	379	379	367	383	395	424
	Applied Research	1,175	724	727	741	736	736
	Advanced Development	1,337	738	730	724	754	782
	Total S&T	**2, 891**	**1,842**	**1,824**	**1,848**	**1,885**	**1,943**
NAVY/	Basic Research	498	528	539	548	576	608
MARINE	Applied Research	801	633	612	660	732	787
CORPS	Advanced Development	722	679	649	663	6264	596
	Total S&T	**2,021**	**1,840**	**1,800**	**1,871**	**1,935**	**1, 991**
AIR	Basic Research	421	452	470	493	502	513
FORCE	Applied Research	1,170	1,044	1,103	1,059	1,096	1,112
	Advanced Development	664	578	669	632	642	659
	Total S&T	**2,255**	**2,075**	**2,242**	**2,184**	**2,240**	**2,284**
DEFENSE	Basic Research	336	339	392	417	440	445
-WIDE	Applied Research	1,912	1,844	1,770	1,700	1,720	1,721
	Advanced Development	3,264	3,536	3,594	3,408	3,498	3,563
	Total S&T	**5,512**	**5,718**	**5,756**	**5,525**	**5,659**	**5,730**
DoD	Basic Research	1,634	1,698	1,768	1,840	1,914	1,990
	Applied Research	5,058	4,245	4,213	4,160	4,284	4,357
	Advanced Development	5,987	5,532	5,642	5,427	5,520	5,600
	Total S&T	**12,679**	**11,475**	**11,623**	**11,428**	**11,718**	**11,947**

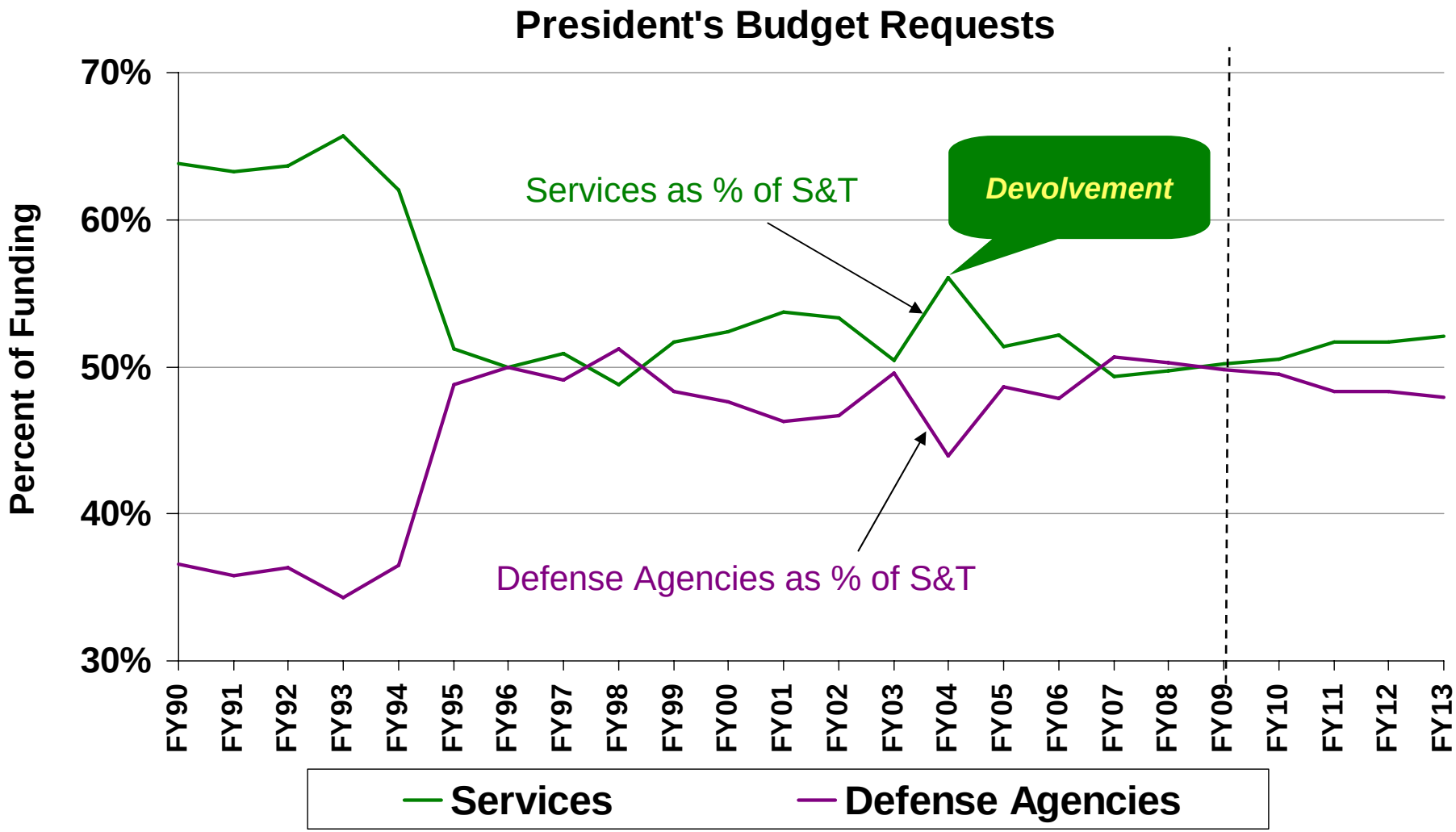
Characterization of the FY09 DoD S&T Program

- **Funding**
  - **Current year S&T dollars: $10.77B FY08 to $11.48B FY09**
  - **Percent of DoD funding: 2.24% FY08 to 2.22% FY09**
  - **Over 50% of total investment in 4 functional areas:**
    - Information Systems (1.8B)
    - Sensors, Electronics / EW (1.7B)
    - Basic Research (1.7B)
    - Weapons (1.1B)



DoD S&T program is focused on "sensing and shooting"

S&T Breakout
- Services and Defense Agencies as % of Total S&T -



Marquee Program Count

- **Army – 25**
- **Navy – 65**
- **Air Force – 26**
- **DARPA – 44**
- **DTRA – 4**
- **MDA – 1**
- **AS&C – 28**

Total = 193