



Th and Investment Focus

Mr. Robert W. Baker

March 4, 2003

Deputy Director, Plans & Programs, ODDR&E

DDR&E Priorities for FY 2004

Technical

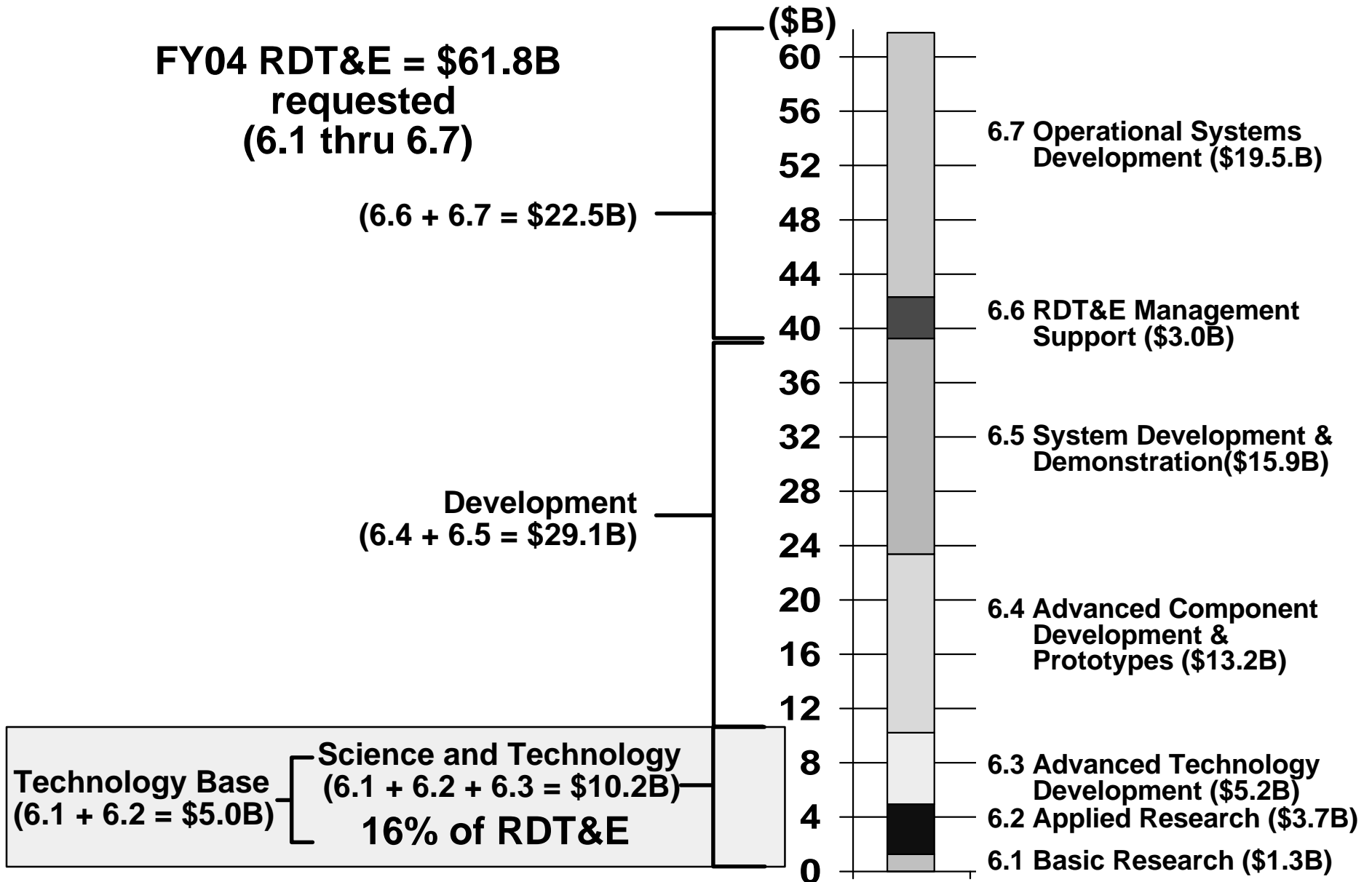
- **Basic Research**
- **Strategic Initiatives**
 - **National Aerospace Initiative**
 - **Energy and Power Technologies**
 - **Surveillance and Knowledge Systems**
- **QDR Capabilities**

Non-Technical

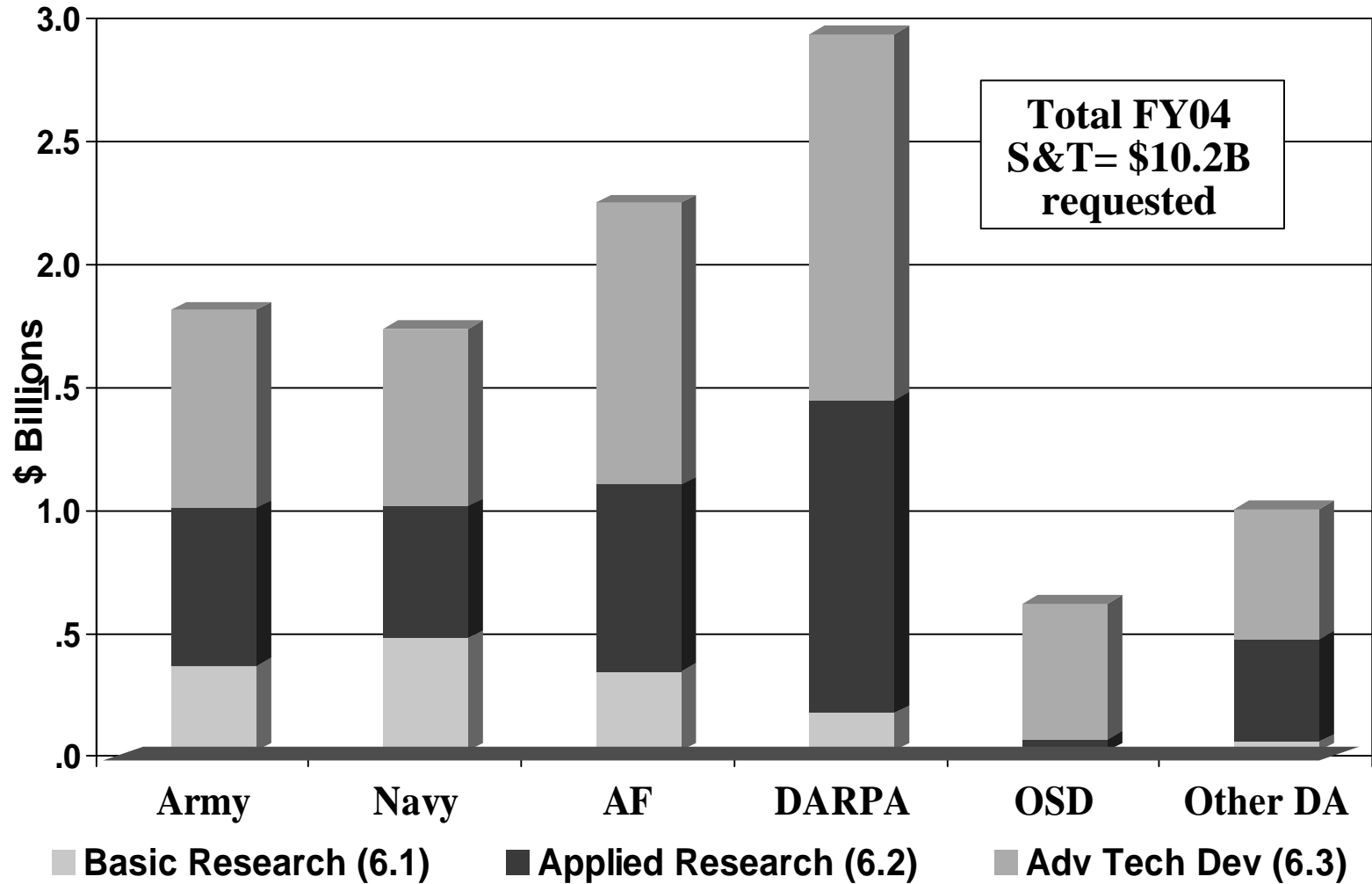
- **Funding Stability**
- **Technology Transition**
- **S&T Workforce**



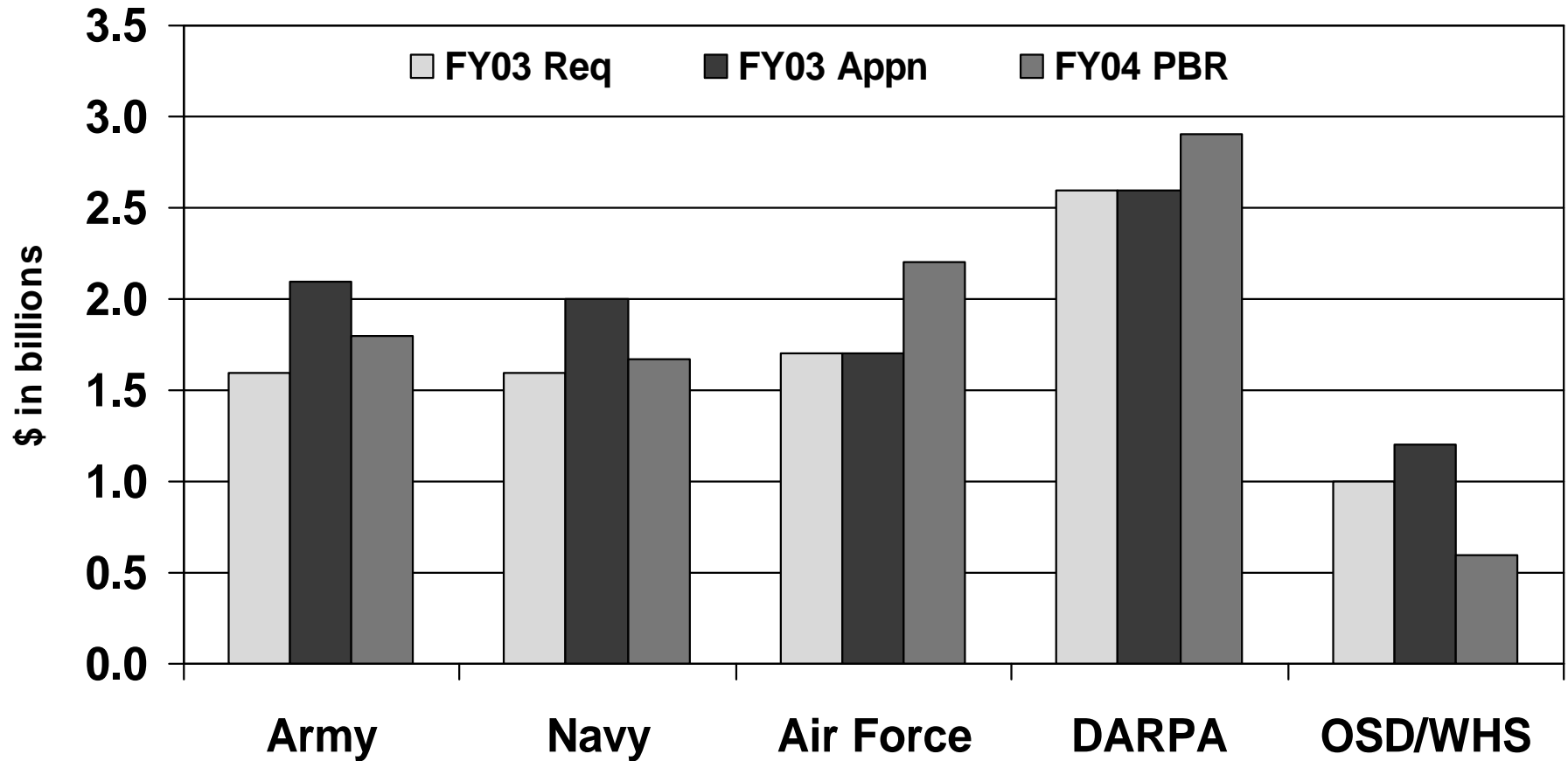
FY04 RDT&E Budget Request



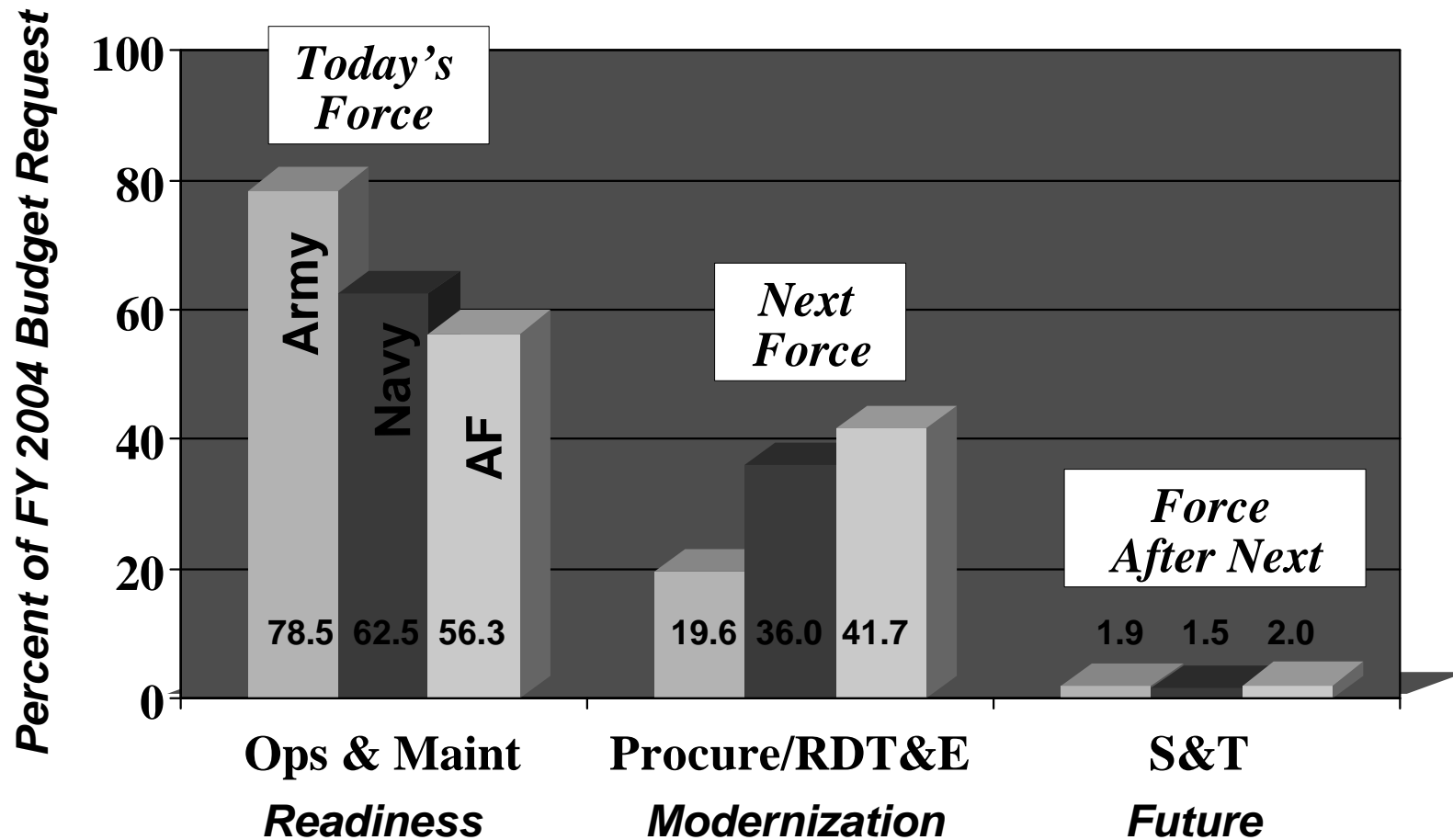
FY04 DoD S&T Budget Request



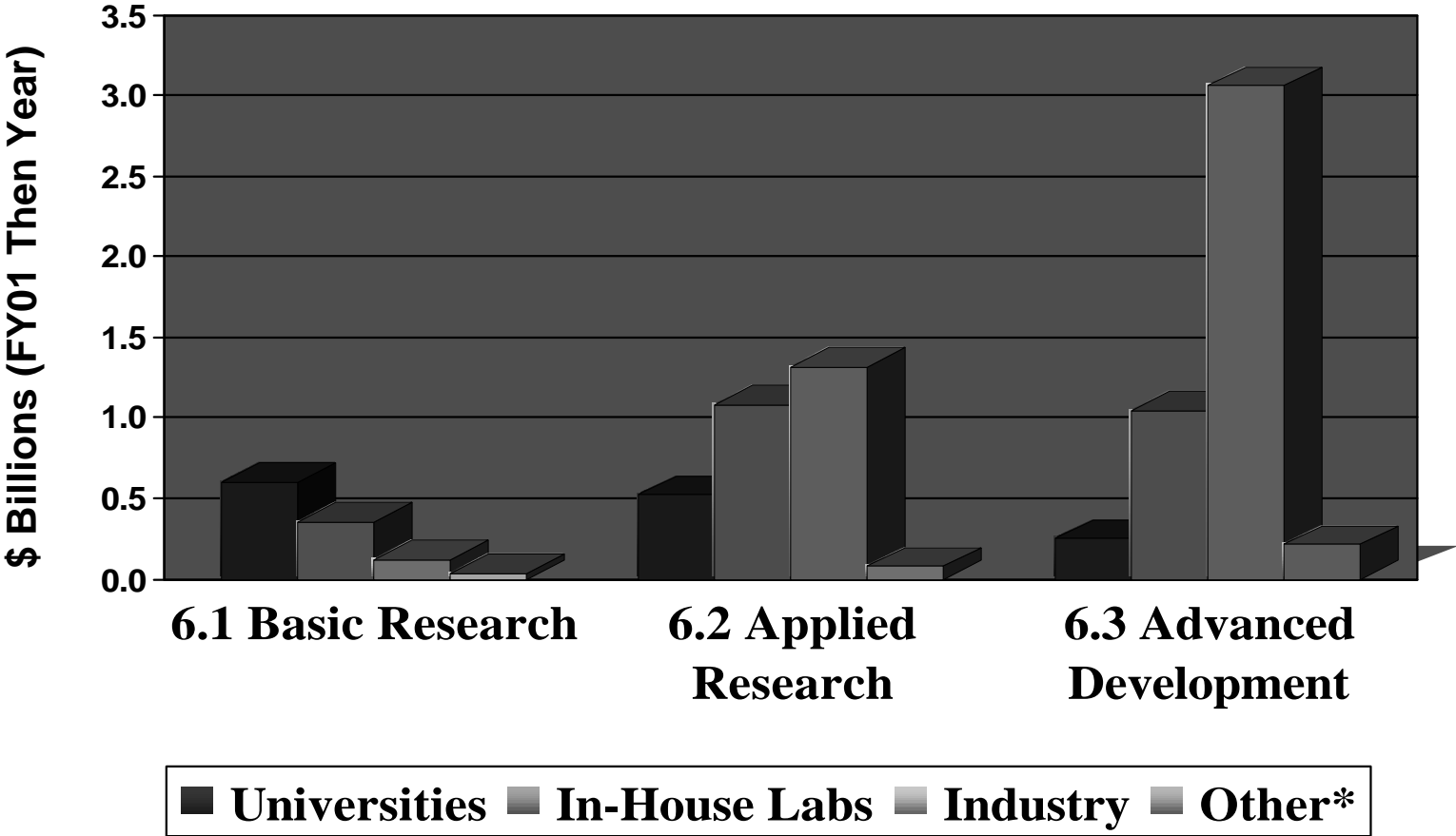
Science & Technology Trends



Technology Investment Percent of Overall Budget Request



Recipients of DoD S&T Funds



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

Source: National Science Foundation Report, Volume 49 (FY 2001)

Devolvement

- **Total Devolved to the Services: \$542.8M****
 - **Devolvment is 5.3% of the total DoD S&T Program**
- **To Army**
 - **Force Health Protection: \$9.8M**
 - **DEPSCOR: \$9.7M**
 - **Historically Black Colleges and Universities: \$14.1M**
 - **University Research Initiative: \$71.6M**
 - **Explosive Demilitarization Technology: \$9.4M**
 - **Total Devolved to Army: \$114.6M**

**** Does not Include High Performance Computer Procurement--\$49M or \$14M devolved to Defense Human Resources Agency**

Devolvement (Con't)

- **To Navy**
 - **University Research Initiative: \$70.6M**
 - **In House Laboratory Independent Research: \$2.2M**
 - **Total Devolved to Navy: \$72.8M**
- **To Air Force**
 - **High Energy Laser**
 - **Research Initiatives: \$12.1M**
 - **Applied Research: \$41.8M**
 - **Advanced Technology Demonstration: \$10.9M**
 - **High Performance Computer Modernization: \$185.3M**
 - **University Research Initiative: \$105.2M**
 - **Total Devolved to the Air Force: \$355.3M**

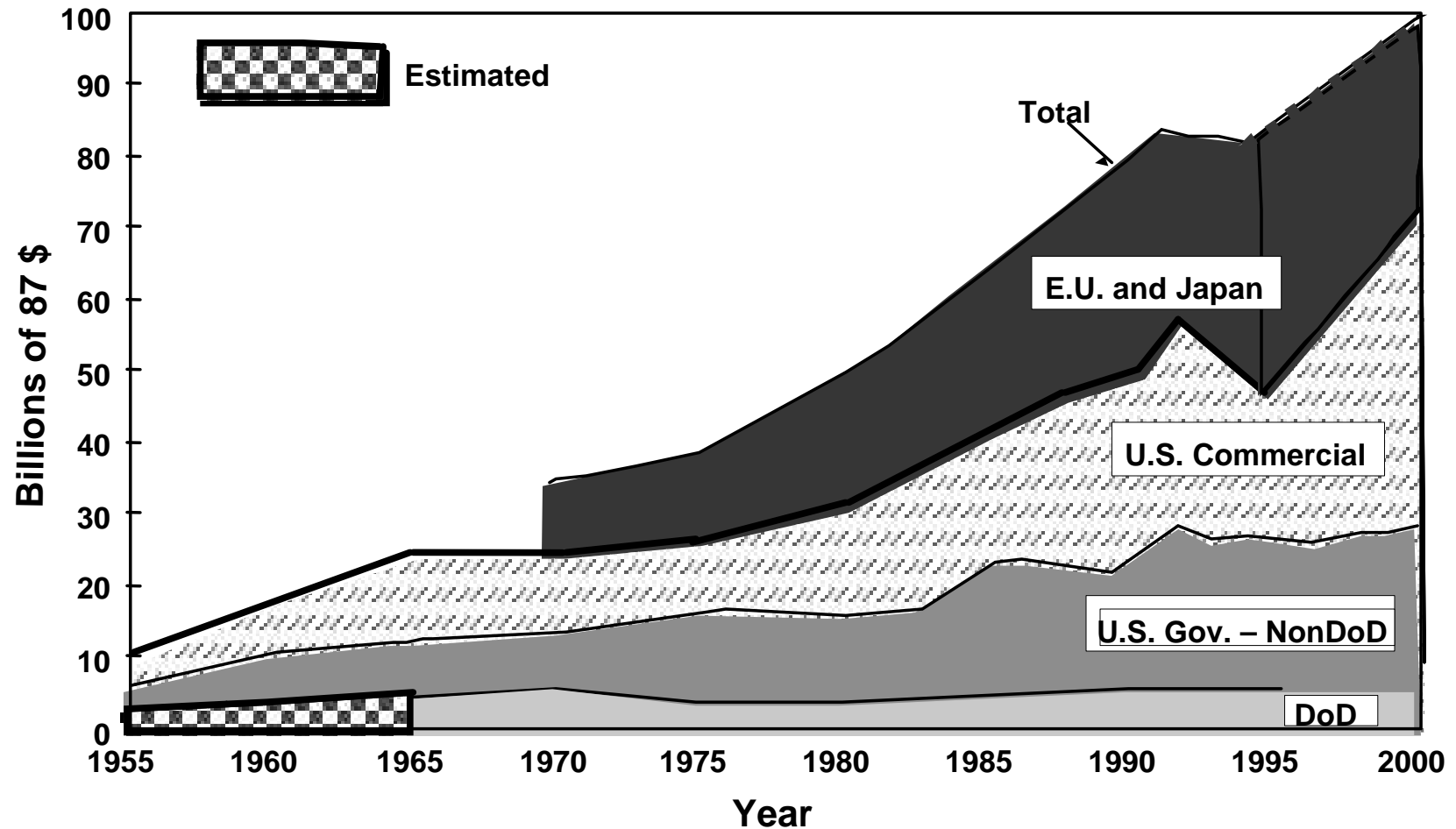
FY04 S&T Budget Facts

- **Total FY04 PBR is \$10.231B—about \$30M greater than zero real growth from FY03 Budget Request**
 - **Compared to FY03 PBR + Disaster Emergency Response Fund + Nuclear Posture Review Funded Activity (\$10.00B)**
 - **Less than FY03 Appropriated Budget of \$10.78B**
- **Notes on FY 04 Budget:**
 - **Continued Growth of Joint Experimentation (Navy Pass Through)**
 - **Even without Devolvement, the movement of S&T Dollars from Services to Agencies has slowed**
 - **Had “D” lines not devolved, Services would have made up 51% of DoD Investment (up from 50% in FY03 PBR)**
 - **With the addition of Devolvement funding, Services makeup 56% of total DoD S&T PBR**

FY04 S&T Budget Facts (Con't)

- **President's Budget Request Shows:**
 - **"Real Growth" in:**
 - DARPA (+264M)
 - Missile Defense Agency (+119M)
 - SOCCOM (New 78M Program)
 - Army (+179M; Devolvement added only 115M)
 - Air Force (+567M; Devolvement added 355M)
 - **"Paper Growth" in:**
 - Navy (+107M; Devolvement added +73M; +67M Joint Experimentation)
 - **"Real Decline" in:**
 - Defense Threat Reduction Agency (-12M)
 - Chemical Biological Defense Program (-330M; 324M to DHS)

U.S. and Worldwide Research Base

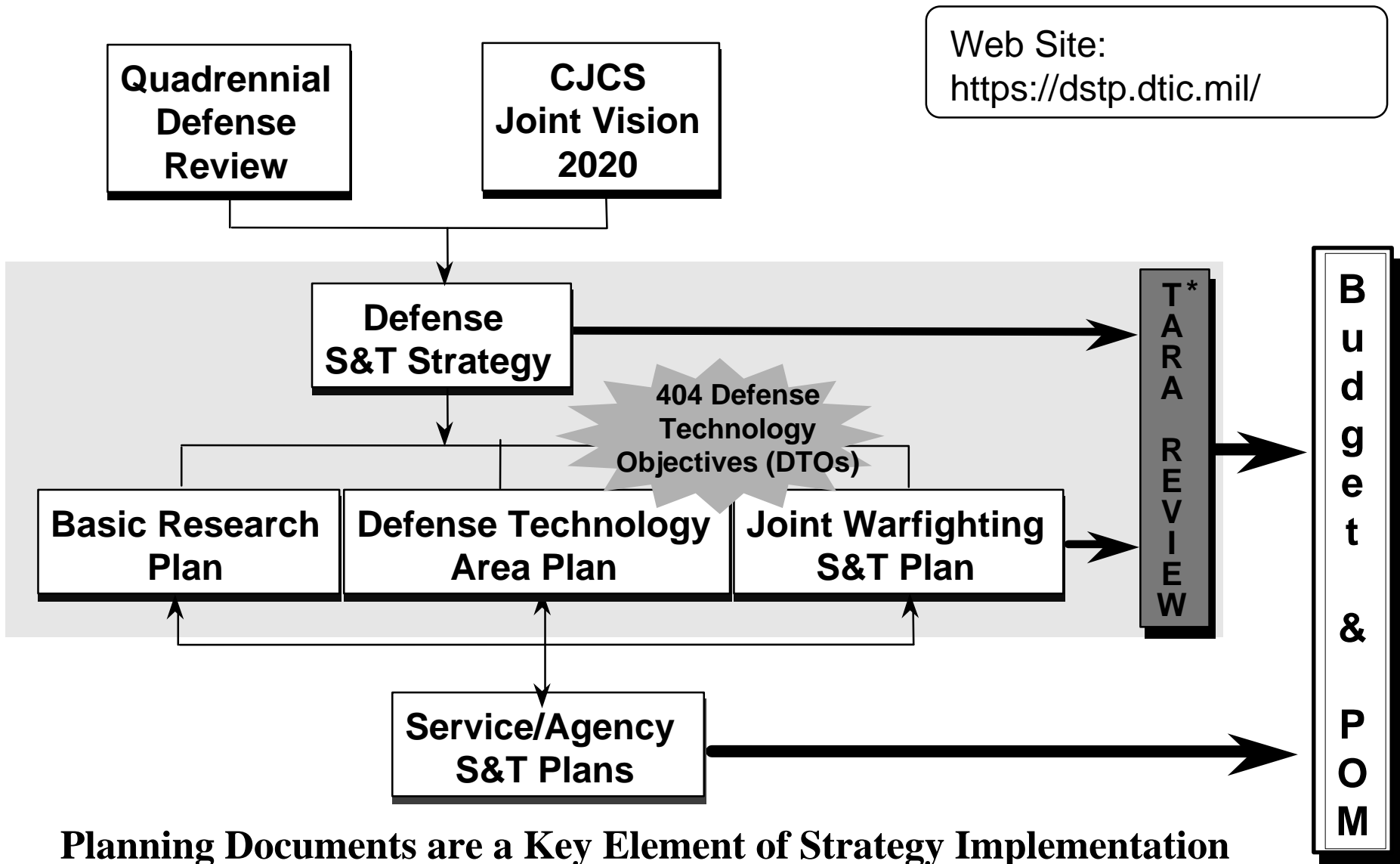


Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation

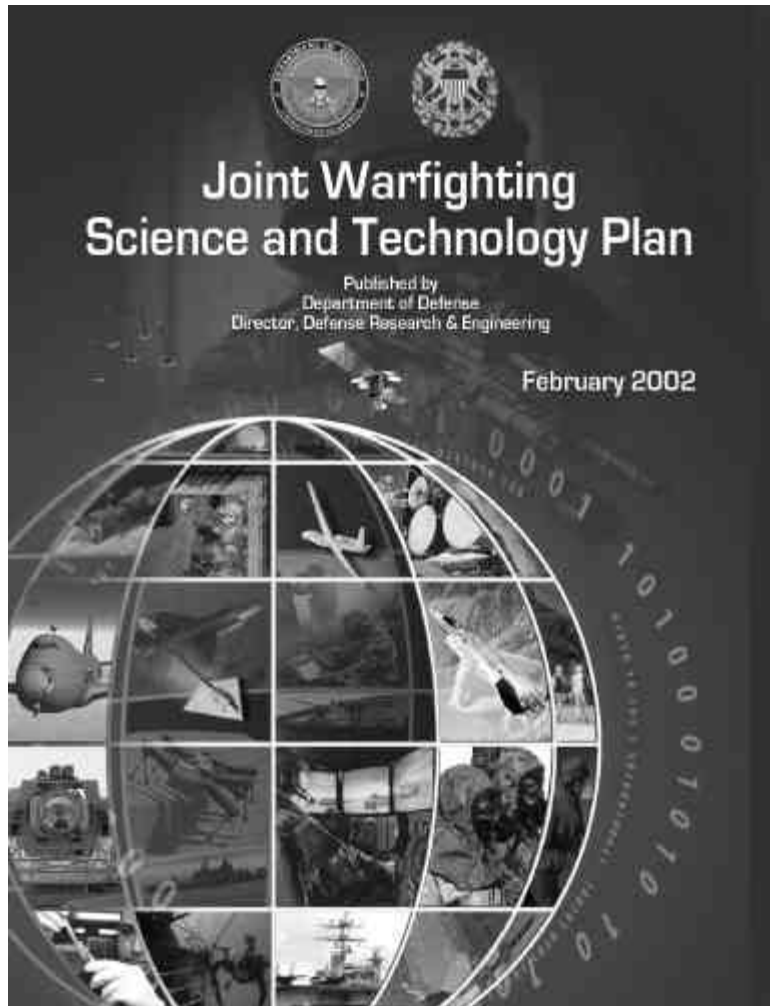
The Uncertain Future -- Hard Problems

- **How do we protect our forces in the face of weapons proliferation - WMD, missiles?**
- **How do we fight in cities?**
- **How do we transport our forces more rapidly?**
- **What is a proper mix of heavy vs. light forces?**
- **What type of weapons do we develop?**
- **As we continue to exploit Information Superiority we are becoming more vulnerable to Information Warfare. How do we protect our information management systems and infrastructure?**

Integrated Annual Defense S&T Planning Process



S&T Strategy and Plans



Defense Science and Technology Strategy and Plans

- ***Defense S&T Strategy (Being Updated)***
- ***Basic Research Plan (6.1) - BRP - (Biennial)***
- ***Defense Technology Area Plan (6.2, 6.3) - DTAP - (Biennial)***
- ***Joint Warfighting Science and Technology Plan - JWSTP (*Annual)***
- ***Defense Technology Objectives (DTO) Volume that supports JWSTP and DTAP (Annual)***

Basic Research Plan (BRP)

BRP-- A strategic plan to link longer term research to broad, revolutionary warfighter capabilities

- **Basic Research Areas**

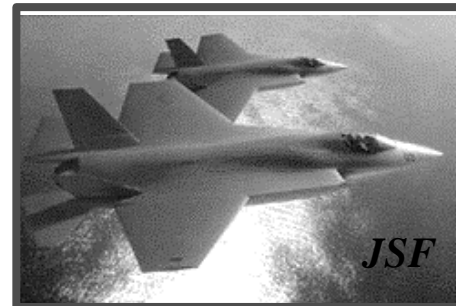
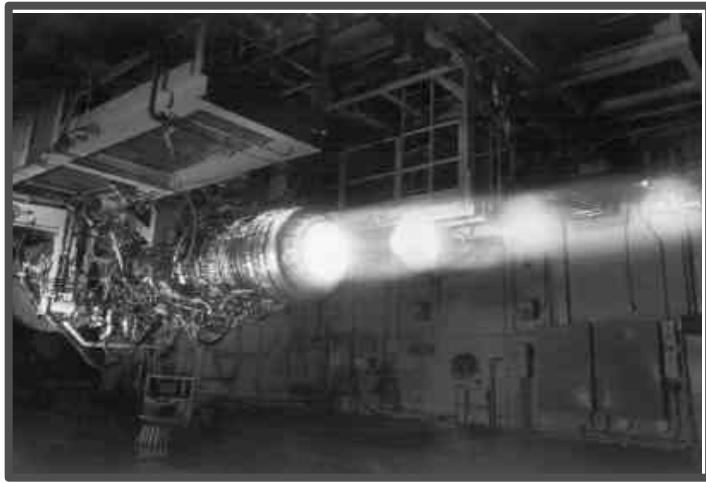
- Physics
- Chemistry
- Mathematics and Computer Science
- Electronics
- Materials Science
- Mechanics
- Terrestrial and Ocean Sciences
- Atmospheric and Space Sciences
- Biological Sciences
- Cognitive and Neural Science



*A Strategic plan
guiding new
technology
development
built around
Basic Research
Areas*

Defense Technology Area Plan (DTAP)

- **DTAP -- A detailed plan focusing DoD science on militarily significant technologies in specific functional areas**



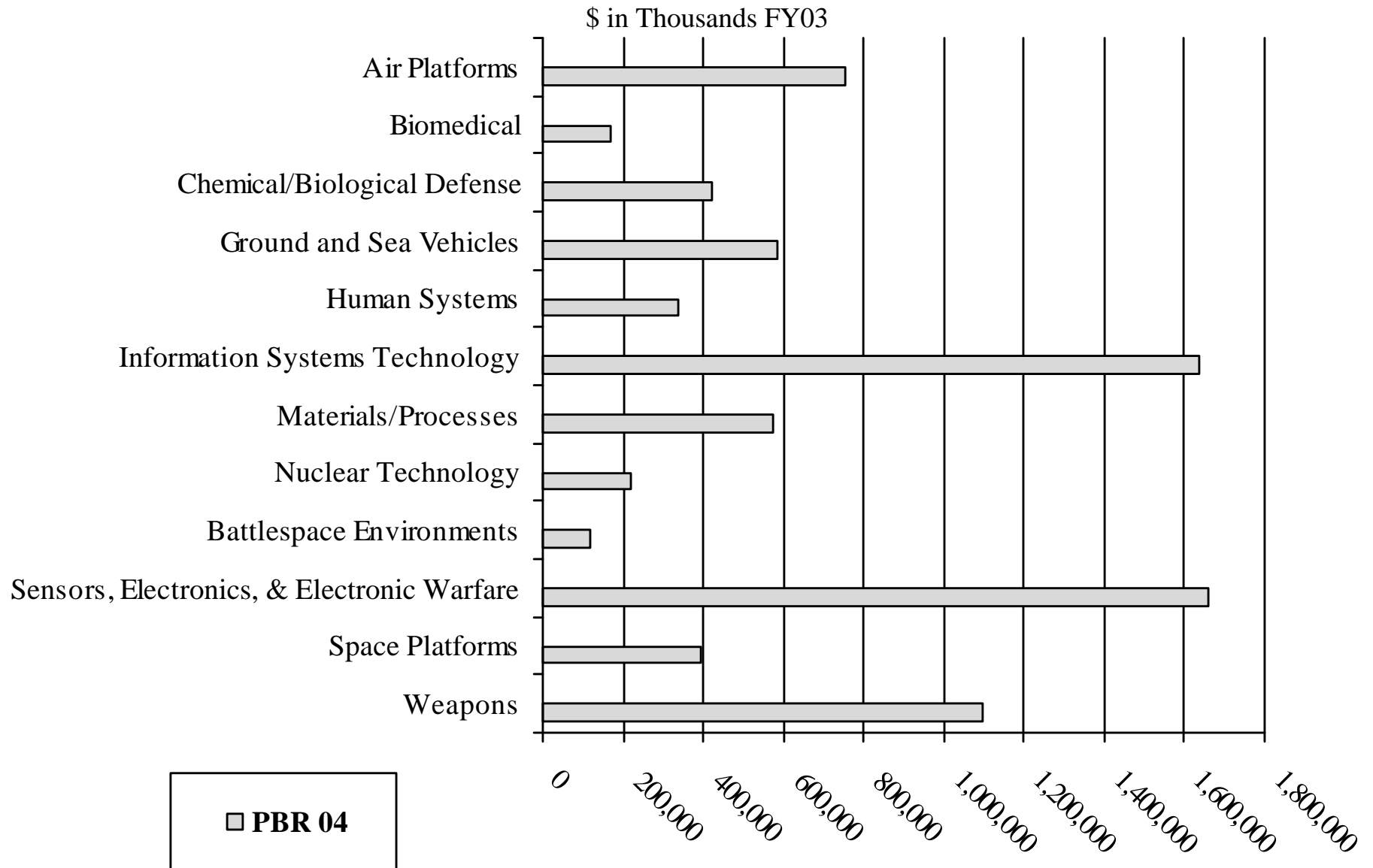
Example: DTO AP.08 Fighter/Attack Propulsion

*An agreement between the S&T Community
and Acquisition Customers*

Defense Technology Area Plan

- **Twelve technology focus areas in February 2001 edition:**
 - » **Air Platforms**
 - » **Chemical-Biological Defense**
 - » **Nuclear Technology**
 - » **Information Systems**
 - » **Materials & Processes**
 - » **Weapons**
 - » **BioMedical**
 - » **Battlespace Environments**
 - » **Sensors, Electronics and Electronic Warfare**
 - » **Space Platforms**
 - » **Human Systems**
 - » **Ground & Sea Vehicles**
- **Provides a horizontal perspective across Service and Defense Agency efforts, thereby charting total DoD investment for a given technology area**

FY04 Defense Technology Areas



Joint Warfighting S&T Plan (JWSTP)

- **Required annually by Congress on 1 Mar**
 - **“a plan for ensuring that the science and technology program of the Department of Defense supports the development of future joint warfighting capabilities identified as priority requirements”**
- **FY03 JWSTP contains 13 JROC validated Joint Warfighting Capability Objectives (JWCOs)**
- **JWCO chapters developed by team of technology and warfighting representatives from Services, Agencies, Combatant Commanders, Joint Staff, and OSD**

Joint Warfighting Capability Objectives (JWCOs)

- **JWCOs are priority future joint warfighting capabilities**
 - JWCOs are generated by “requirements pull”
 - A “bottom-up” driven process
- **Descriptions are developed by Combatant Commanders, Services, and Joint Staff**
- **Improve S&T planning focus on joint warfighting**

February 2003 JWSTP JWCOs

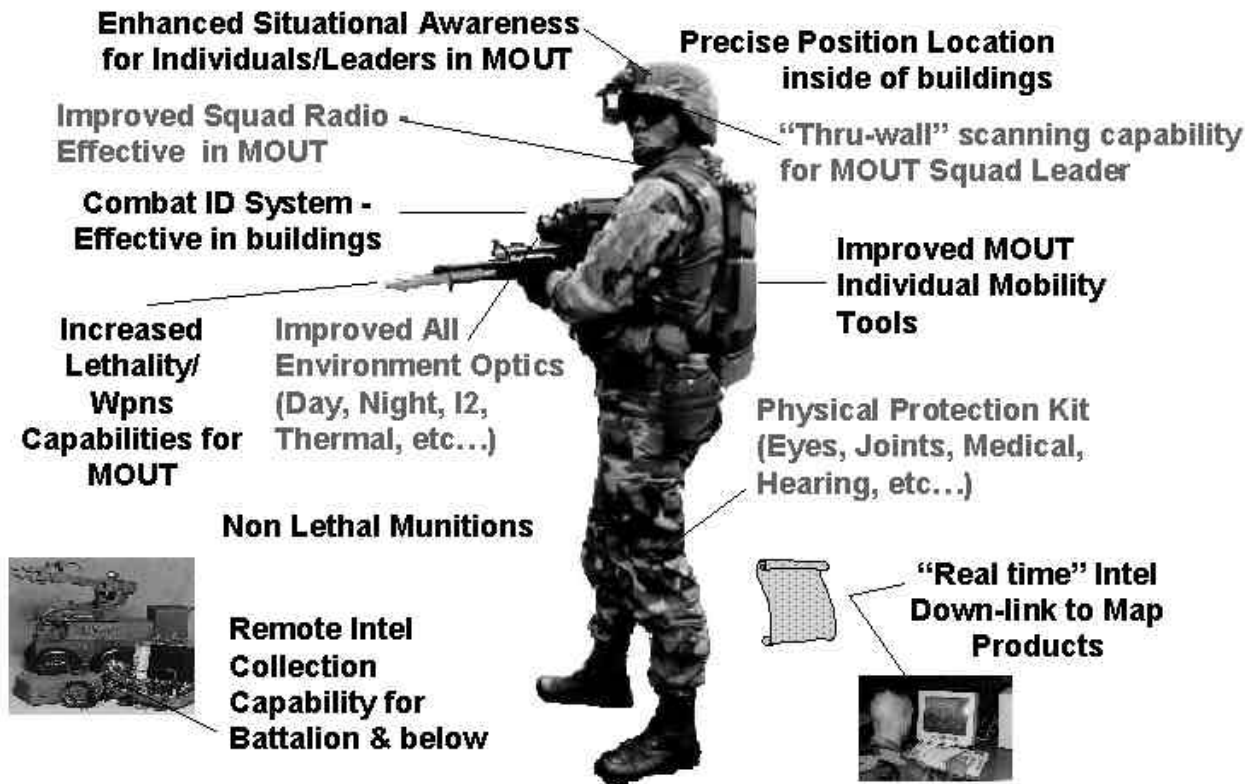
- **Information Superiority**
- **Precision Engagement**
- **Combat Identification**
- **Air and Missile Defense**
- **Military Operations on Urbanized Terrain**
- **Focused Logistics and Sustainment of Strategic Systems**
- **Dominant Maneuver**
- **Electronic Warfare**
- **Counterproliferation of Weapons of Mass Destruction**
- **Combating Terrorism**
- **Protection of Space Assets**
- **Hard and Deeply Buried Target Defeat**
- **Warrior Readiness**

Military Operations on Urbanized Terrain (Example)

Military Operations on Urbanized Terrain (MOUT) is the capability to operate and conduct military operations in the urban battlespace and to achieve desired effects with minimal casualties and collateral damage. It includes integration of lethal and non-lethal weapons, precision weapons and targeting analysis, intelligence, surveillance, reconnaissance, navigation, and communications effective in and around urban areas.

Joint Warfighting S&T Plan (JWSTP)

JWSTP-- Focus to blend emerging technology into warfighter needs

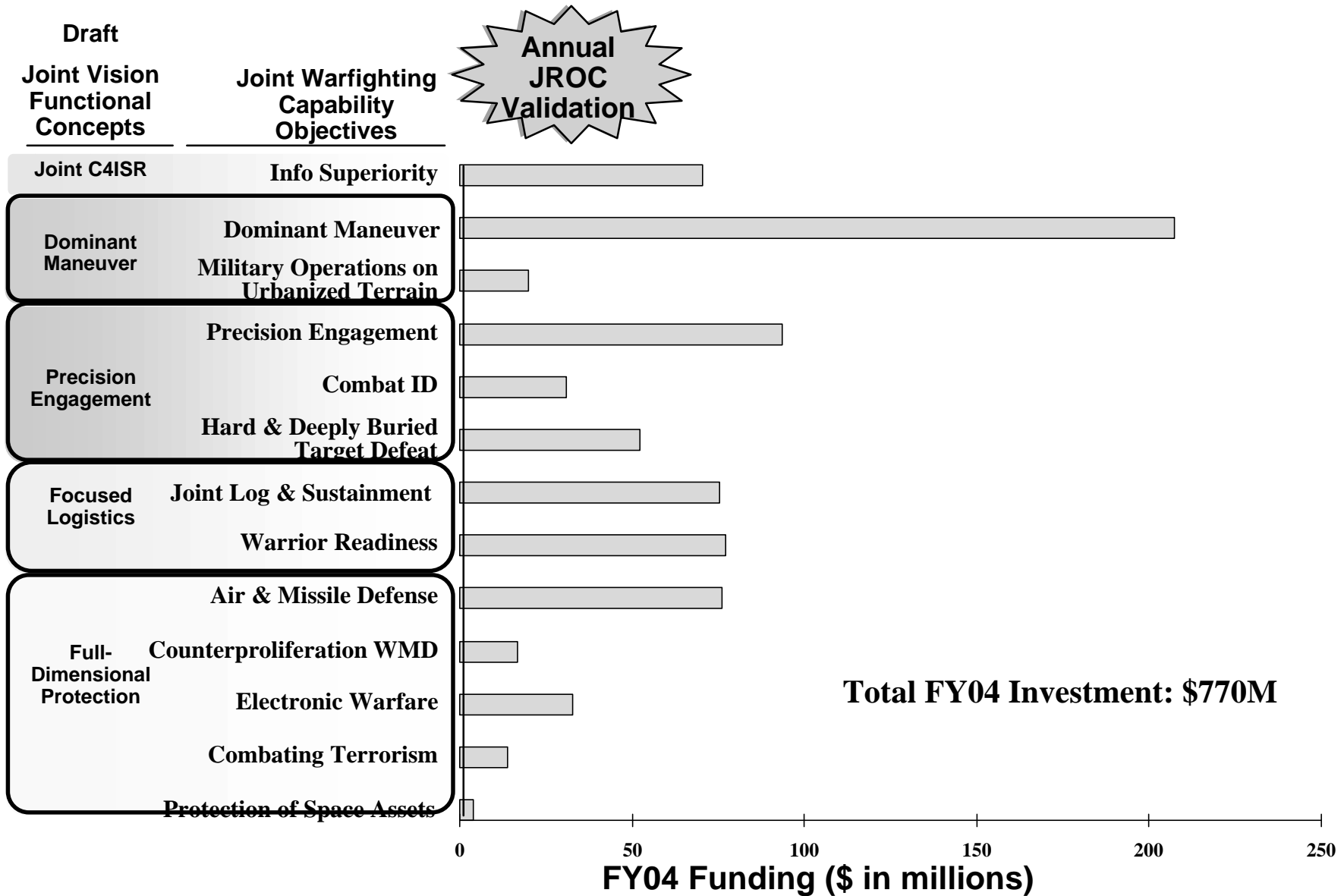


An agreement between Joint Warfighters and S&T Community

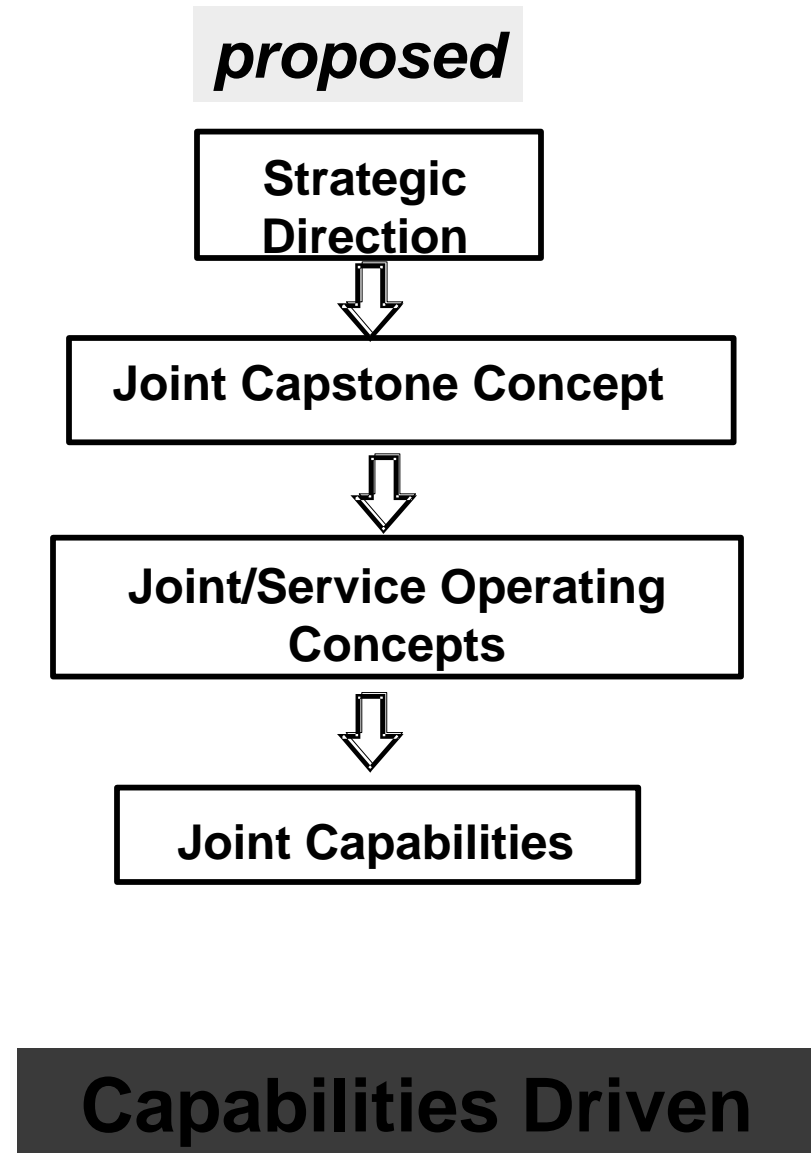
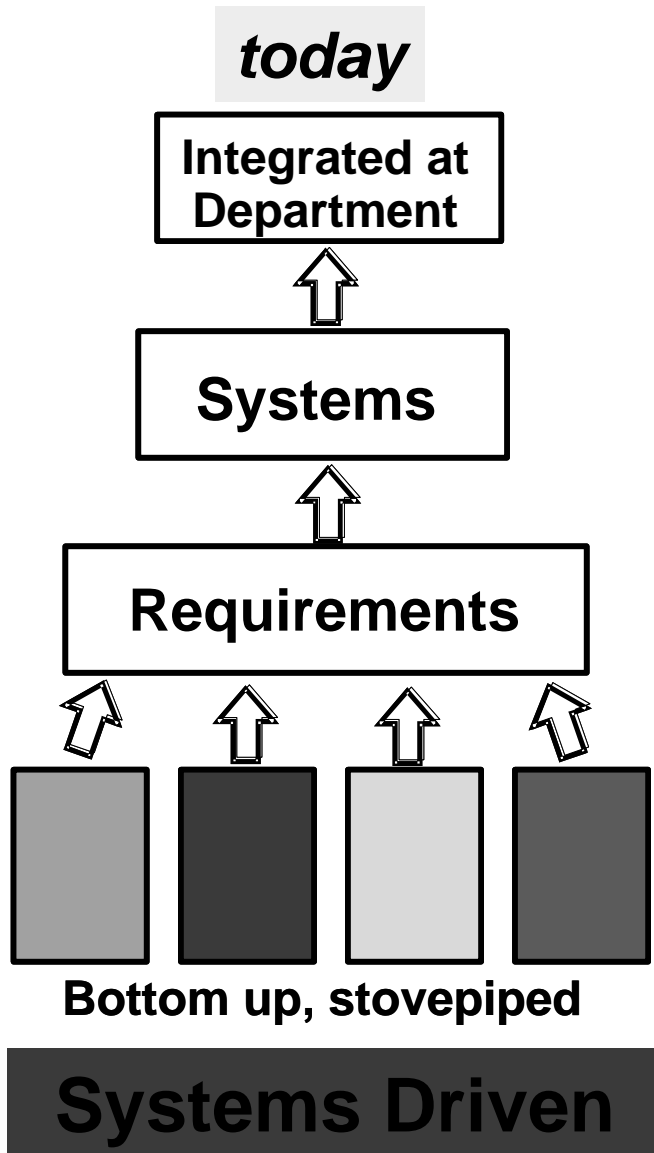
Example: DTO E.02 *Military Operations in Urban Terrain*

Objective: Demonstrate a situation awareness/communications/geolocation capability in restrictive environments.

FY04 JWSTP DTO Funding



Proposed New Process

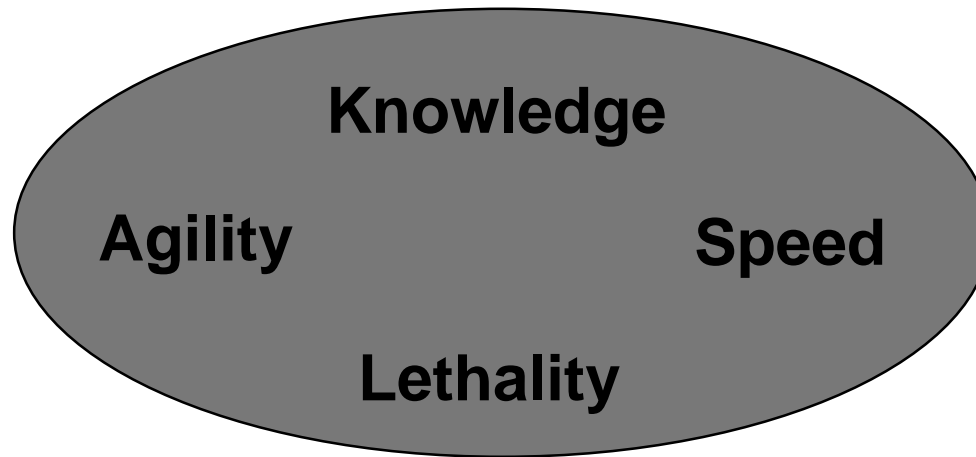


New Process Issues and Concerns

- **Alignment of JWCOs, *Joint Vision* Operational Concepts, and QDR Operational Goals/Capabilities against one common list of future capabilities**
- **Maintaining warfighter (CC and Service) involvement in the “new process”**
- **Maintaining a proper mix of requirements driven (near-term/bottom-up) and capabilities driven (far-term/top-down) efforts**
 - **“Spin-off” technology to support near-term requirements as we develop technology to achieve far-term capability**

Technology and Transformation

Transformational Attributes



- Transformation Occurs With Leaps In Capabilities:
 - Manhattan Project—Lethality
 - Reconnaissance Satellites—Knowledge
 - Stealth—Agility
 - Ballistic Missiles—Speed

**What Technologies Bring About Tomorrow's
Operational Advantage?**

National Aerospace Initiative



Hypersonics

- Suborbital Vehicles
- Strategic Strike
- Fast Transport
- Time Critical Targets



Access To Space

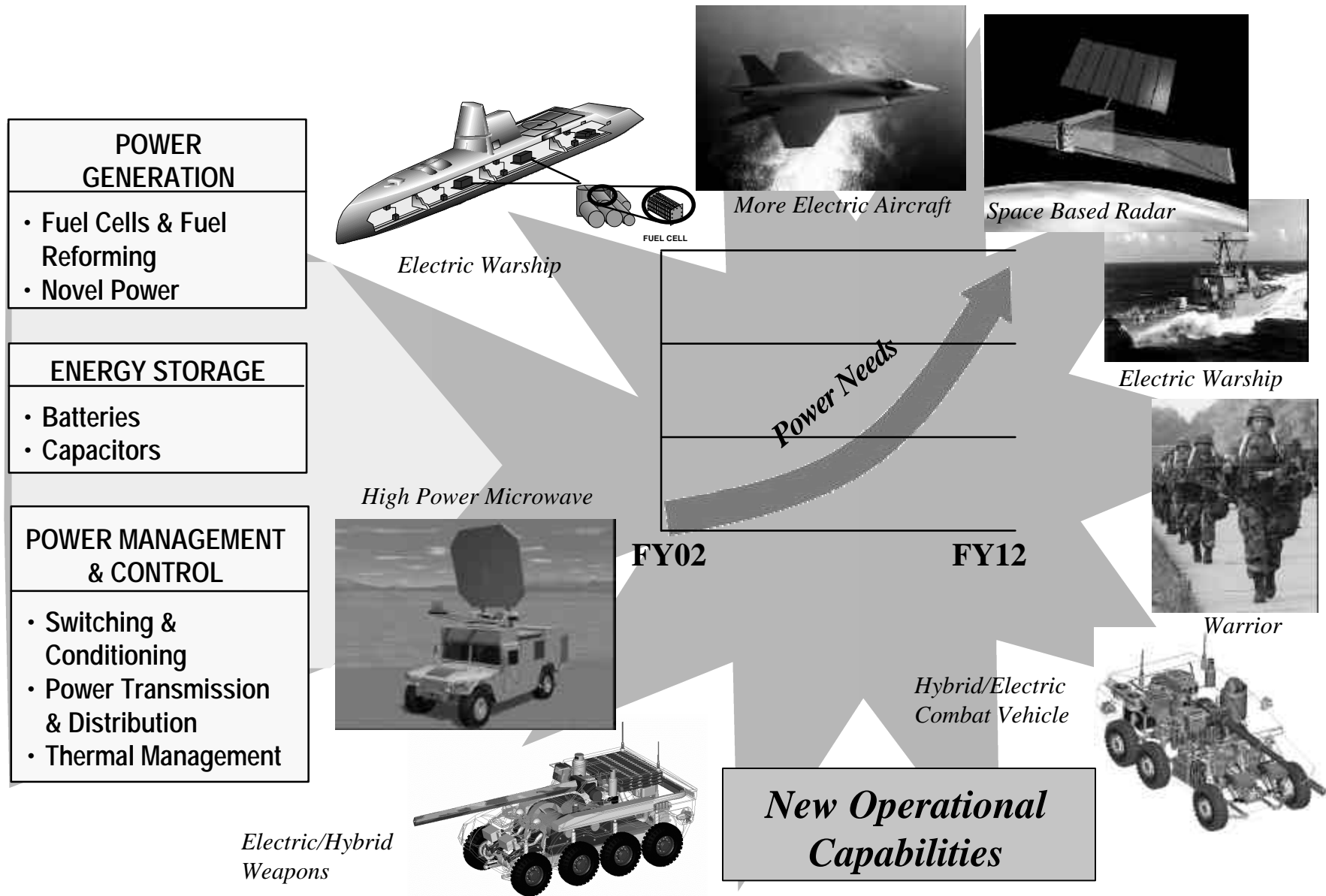
- 2 Stage-to-Orbit
 - 1st Stage Air Breathing
 - 2nd Stage Rocket
- Single Stage-to-Orbit



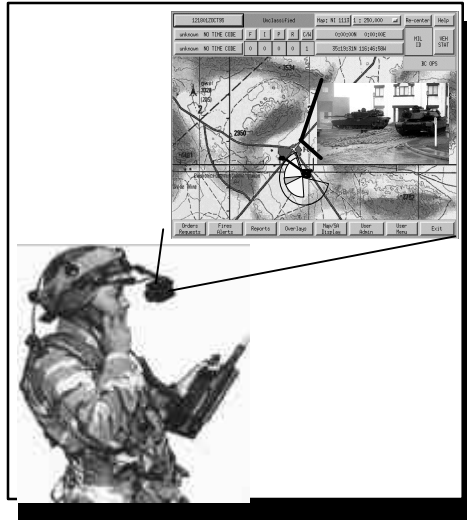
Space Technology

- Microsats
- Multifunctional Sats.

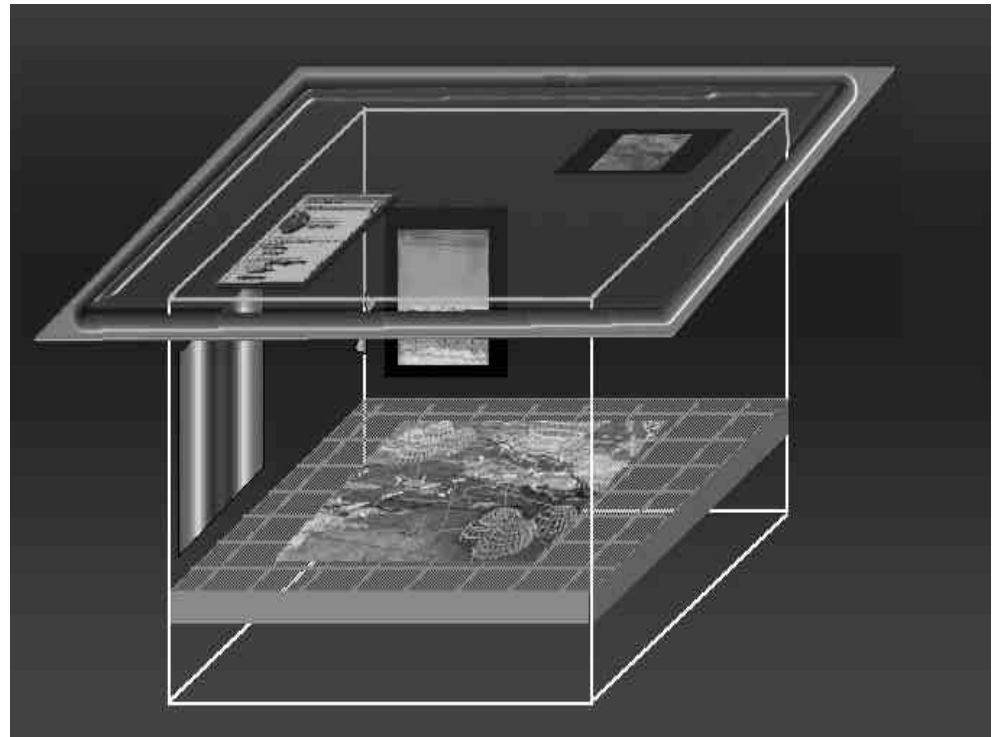
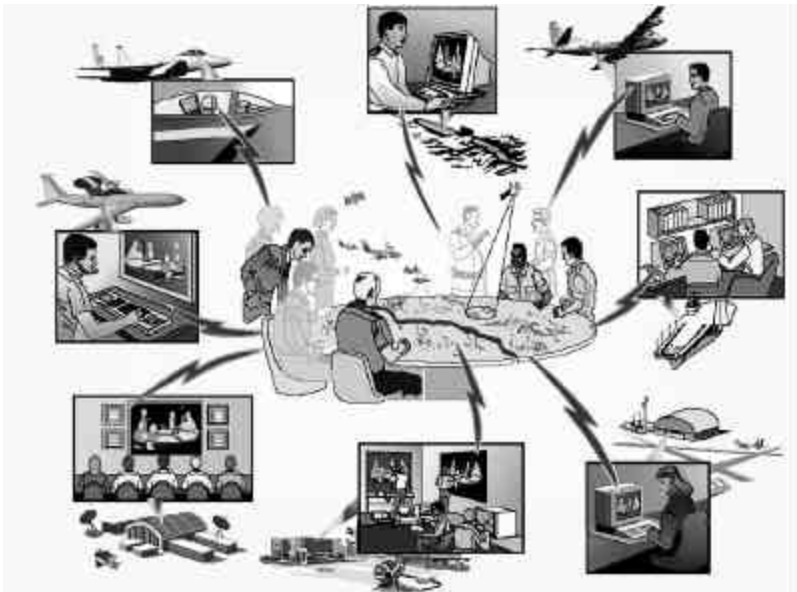
Power and Energy Technologies



Surveillance & Knowledge Systems



- **High Bandwidth Communications / Information Assurance**
- **Sensors and Unmanned vehicles (Robotics, UAVs, etc.)**
- **Information / Knowledge Management Systems**
- **Cyber Warfare**

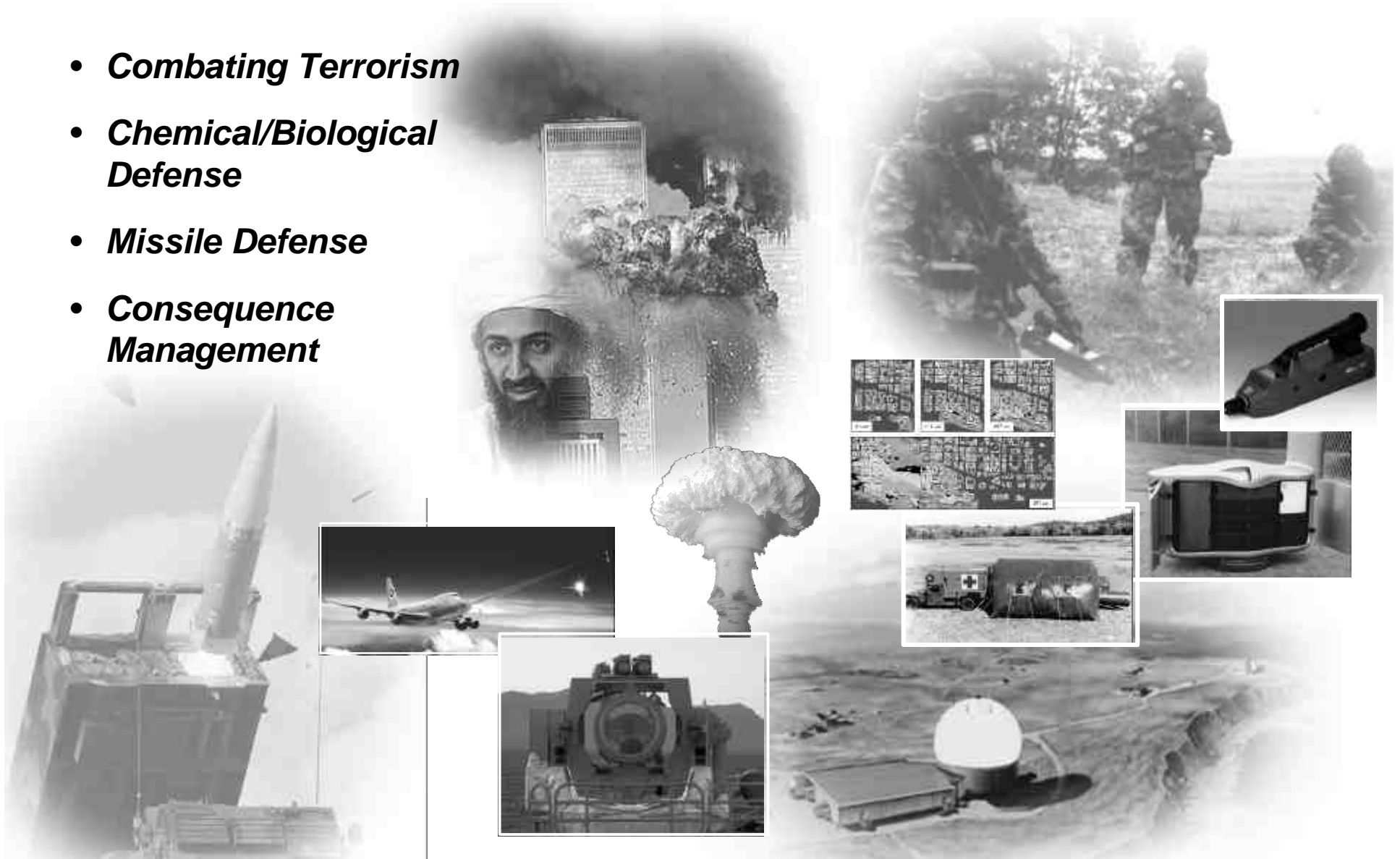


QDR Operational Goals

- **Critical Transformational Capabilities**
 - **Protect Bases of Operations**
 - **Conduct Information Operations**
 - **Project and Sustain US Forces**
 - **Deny Enemy Sanctuary**
 - **Conduct Space Operations**
 - **Leverage Information Technologies**

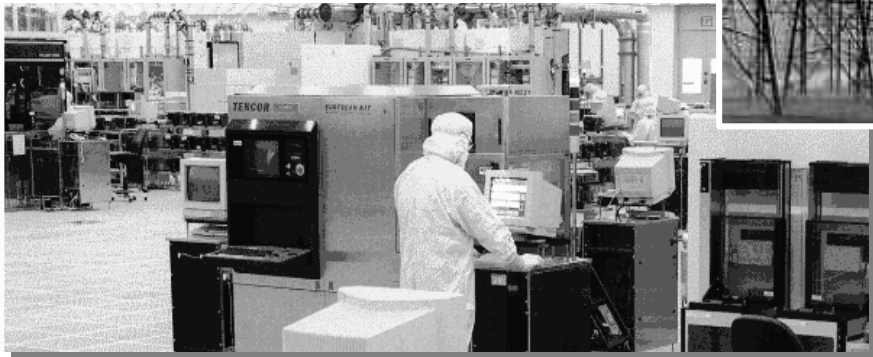
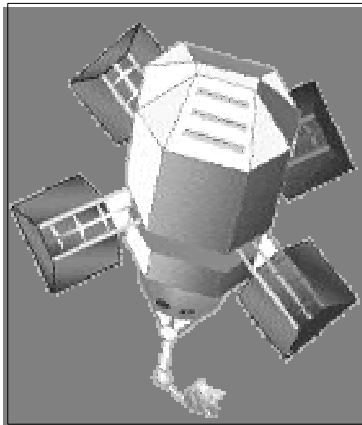
Protect Bases of Operations (FY04 BES \$1.0B)

- *Combating Terrorism*
- *Chemical/Biological Defense*
- *Missile Defense*
- *Consequence Management*



Conduct Information Operations (FY04 BES \$0.3B)

- *Defensive IO and Information Assurance*
- *Offensive IO*



Project and Sustain US Forces (FY04 BES \$3.1B)

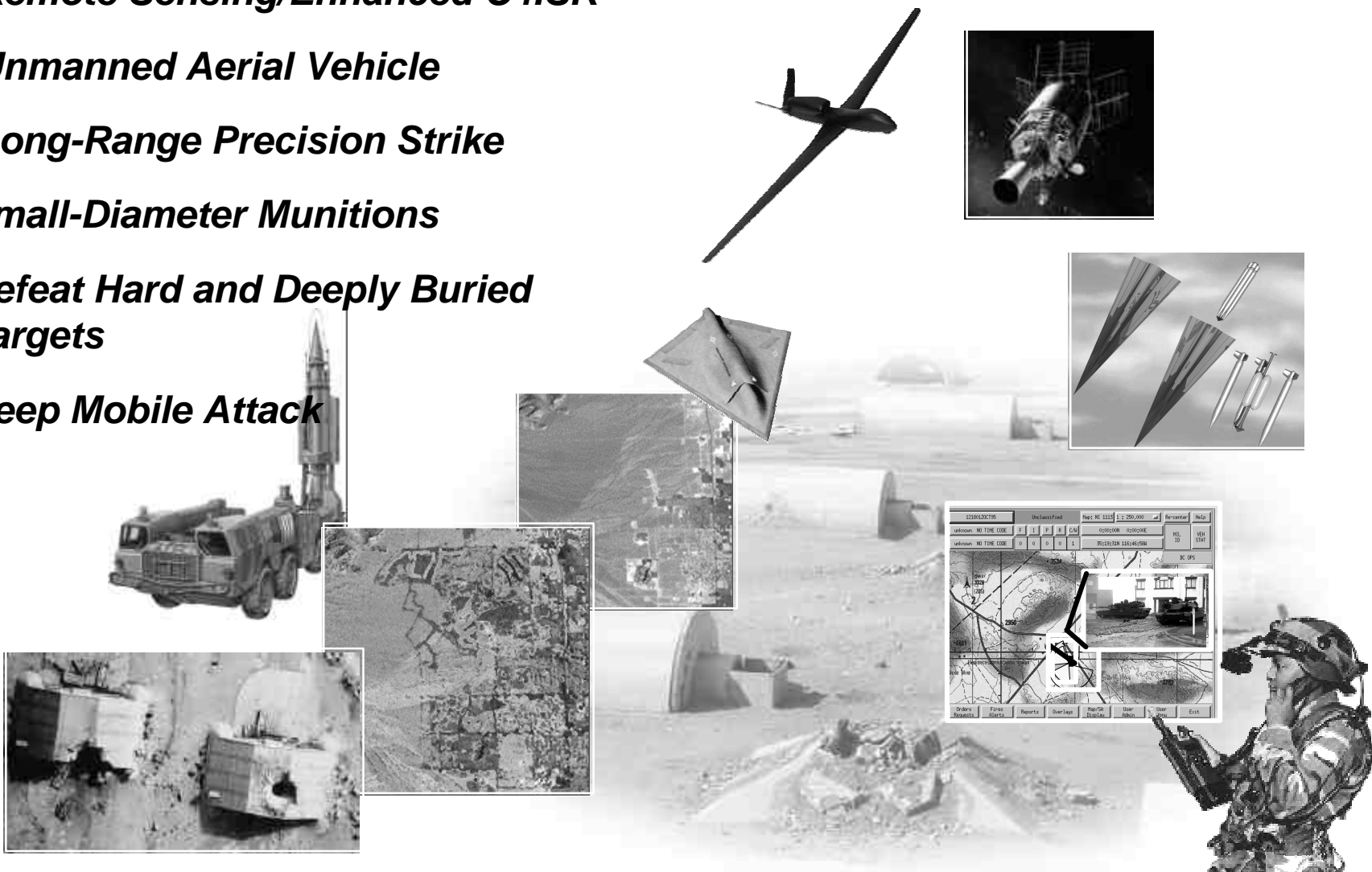
- *Anti-Access Capabilities*
- *Minimize Logistics Footprint*
- *Rapid Force Deployment*
- *Warfighter Readiness*



Deny Enemy Sanctuary (FY04 BES \$2.0B)

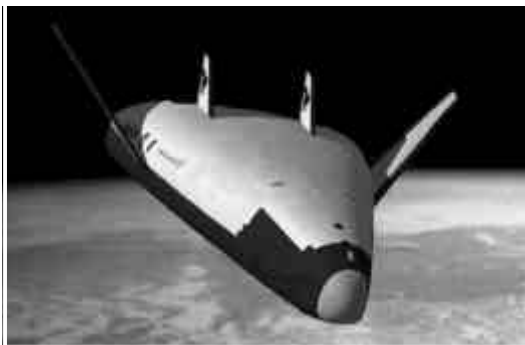
Persistent Surveillance, Tracking and Rapid Engagement with Precision Strike

- Remote Sensing/Enhanced C4ISR***
- Unmanned Aerial Vehicle***
- Long-Range Precision Strike***
- Small-Diameter Munitions***
- Defeat Hard and Deeply Buried Targets***
- Deep Mobile Attack***



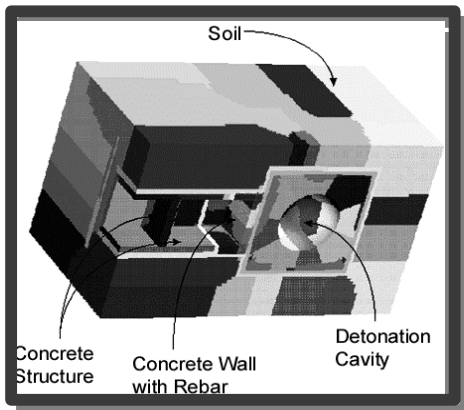
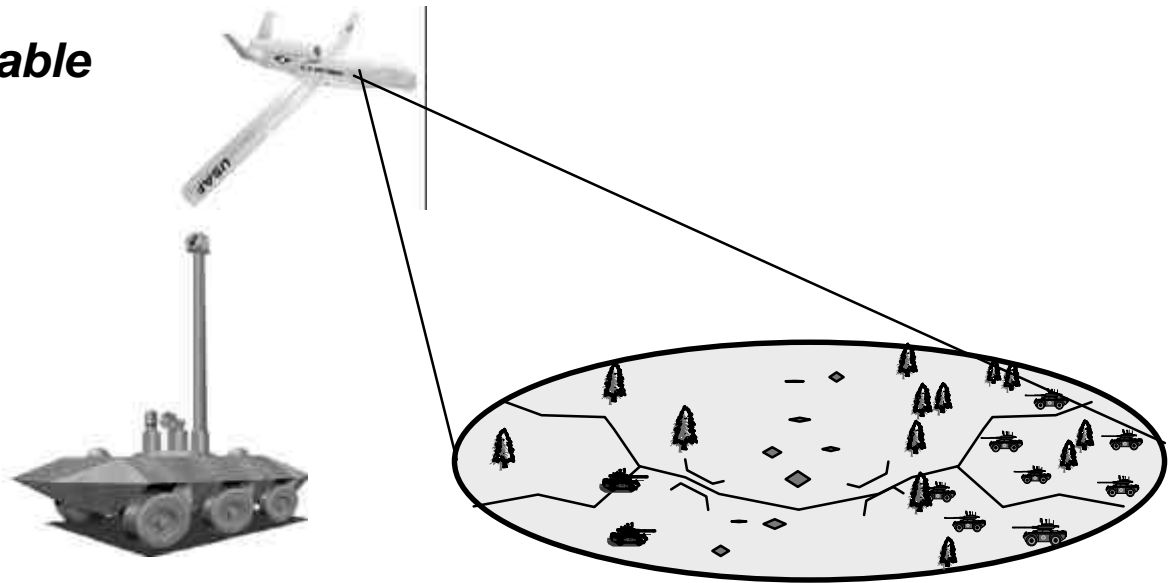
Conduct Space Operations (FY04 BES \$0.8B)

- *Ensure Access to Space*
- *Protect Space Assets*
- *Assure Space Surveillance*
- *Control Space*
- *Sub-Orbital Space Vehicle*



Leverage Information Technologies (FY04 BES \$0.6B)

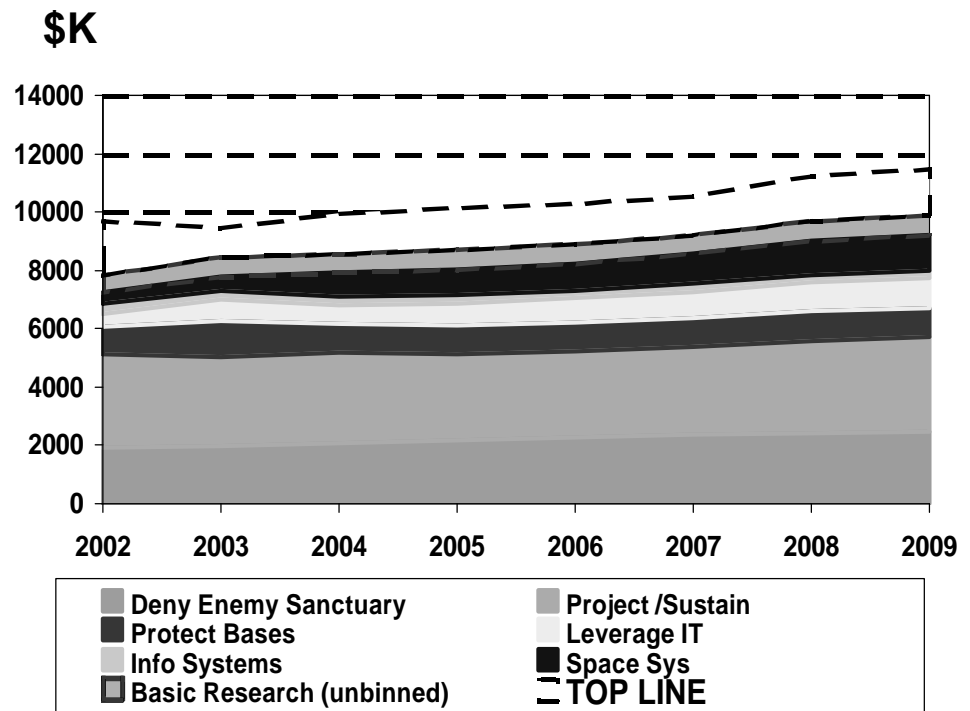
- *High-capacity Interoperable Communications*
- *Survivable, Improved, Tactical and Strategic Communications*
- *End-to-end C4ISR*



Linking S&T to Transformation Study: Findings Based on FY04 BES

- Approximately 80% of the DoD S&T program is invested in QDR Transformational Operational goals
- Remaining 20% includes Basic Research & other enabling technologies
 - Advanced Electronics
 - Materials
 - Medical Programs
 - Environmental Restorations
 - Dual Use S&T
 - Life Cycle Extension

Investment in QDR Transformational Operational Goals



The “3%” Question

- **Why should S&T be at 3% of Total DoD Budget?**
- **No analytic formula**
- **Statement of what the organization believes is critical**
- **In Industry, competition drives R&D; R&D is higher in companies where competition is high**
 - **Companies with R&D > 15%: Pfizer, Lilly, Merck, Microsoft, AMGEN, Genetech, AMD, All Information Age**
 - **Lowest Industrial Investment is in sectors: Wood & Paper, Soap, Coal, Primary Metal, ... All Industrial Era**
- **Secretary of Defense has set DoD S&T investment goal:**

“We did not achieve the level of growth in the Science and Technology accounts we had hoped for. Our request is \$10.2 billion, or 2.69% of the 2004 budget. That is below the goal of 3%.”

--- Donald H. Rumsfeld, Secretary of Defense, February 5, 2003,
Testimony before the House Armed Services Committee

Summary

- **Strong S&T investment will enable Transformation**
- **DoD S&T Program is largely aligned to support Transformation Operational Goals**
- **DoD has a several Transformational S&T activities with clear deliverables**
- **Some Transformational technologies are underfunded**