Mission...to ensure that the warfighters today and tomorrow have superior and affordable technology to support their missions, and to give them revolutionary war-winning capabilities.
Mission

to ensure that the warfighters today and tomorrow have superior and affordable technology to support their missions, and to give them revolutionary war-winning capabilities.

Office of the Deputy Under Secretary of Defense for Science and Technology

Defense Science and Technology
A Focus on Revolutionary Advances

Stealth

Adaptive Optics and Lasers

GPS

Night Vision

Phased Array Radar
Strategic Environment

Global US Interests
Political - Economic - Humanitarian

Globalization of Technology

Asymmetric Threats
In any domain - Air, Land, Sea, Space or Information
FY01 RDT&E

FY01 RDT&E = $41.3B
(6.1 thru 6.7)

6.1 Basic Research ($1.3B)
6.2 Applied Research ($3.7B)
6.3 Advanced Technology Development ($4.0B)
6.4 Demonstration and Validation ($7.9B)
6.5 Engineering and Manufacturing Development ($8.8B)
6.6 RDT&E Management Support ($2.6B)
6.7 Operational Systems Development ($13.0B)

Science and Technology
(6.1 + 6.2 + 6.3 = $9.0B)

Technology Base
(6.1 + 6.2 = $5.0B)

Development
(6.4 + 6.5 = $16.7B)

(6.6 + 6.7 = $15.6B)

21% of RDT&E
DoD S&T Investment

Total FY01 S&T = $9.0B

$ Billions

Army  Navy  Air Force  DARPA  OSD  Other Def Agencies

Basic Research (6.1)  Applied Research (6.2)  Adv Tech Dev (6.3)
Recipients of DoD S&T Funds

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

Source: National Science Foundation Report, Volume 48 (FY 2000)
Technology Perspectives FY01

Today’s Force
- Army: 76.1%
- Navy: 61.1%
- AF: 60.8%

Next Force
- Ops & Maint Readiness: 21.4%
- Procure/RDT&E Modernization: 36.9%
- S&T Future: 37.4%

Force After Next
- 2.6%
- 2.0%
- 1.7%
Department of Defense
Science & Technology (S&T)

Appropriated

President’s Budget Request

$ in billions / FY00 Constant

FY91 FY92 FY93 FY94 FY95 FY96 FY97 FY98 FY99 FY00 FY01
Service Investment in Science & Technology

Services Science & Technology (S&T) (6.1, 6.2, 6.3)

$ in billions/FY01 Constant

FY89 FY90 FY91 FY92 FY93 FY94 FY95 FY96 FY97 FY98 FY99 FY00 FY01

- Army S&T
- Navy S&T
- Air Force S&T
DUSD (S&T) Priorities 2001

**Technical**

- Basic Research
- Strategic Initiatives
  - Hard Problems
    - Time Critical, Standoff and Concealed Target Defeat
    - Cruise and Ballistic Missile Defense
    - Chem-Bio Defense Modeling and Stand-off Detection
    - Military Operations in Urban Terrain
    - Counters to Asymmetrical Threats
  - Revolutionary Warfighting Concepts
    - Fuller Dominance of Space
    - Network Centric Warfare
    - Unmanned Systems for Land, Air, Sea, and Underwater
  - Military Significant Research Areas
    - Nanoscience and Advanced Materials
    - Advanced Power
    - Human Dimensions and Psychological Factors
    - Directed Energy

**Non-Technical**

- Funding Stability
- Technology Transition
- S&T Workforce
Basic Research

- Microsatellites
- Joint Strike Fighter
- Flexible Sensor Skins
- Bio Sensors
- Micro Air Vehicles
- Augmented Reality
- Micro Robots
- Biofluidic Chips
- DD-21
- Handheld
- Nanotechnology
- Embedded Biofluidic Chips
Hard Problems

Time Critical, Standoff, and Concealed Target Defeat

- Locate
- Characterize
- Defeat
- Assess

Provides capability to safely identify and strike intended targets.
Hard Problems
Cruise and Ballistic Missile Defense

- Detect
- Track
- Negate
- Protect

Provides capability to remotely detect, track, and negate cruise and ballistic missile threats.
Hard Problems
Chem-Bio Defense Modeling and Stand-off Detection

- Detect
- Predict
- Characterize agent toxicity
- Determine genetic/chemical composition
- Model & simulate

Provides real-time capability to remotely detect chemical and biological agents and forecast their dispersion.
Hard Problems
Military Operations in Urban Terrain

- Enhance understanding
- Improve training
- Expand mission rehearsal capabilities
- Provide fast, safe breaching capabilities
- Neutralize threat

Provides capability to engage threat forces in an urban environment.
Hard Problems

Counters to Asymmetrical Threats

- Understand unconventional threats
- Predict human behavior
- Develop decision support aids
- Dissuade

“Win without fighting”

Provides improved information operations, computational models, and social science theory to allow commander to shape engagement without force.
Revolutionary Warfighting Concepts
Fuller Dominance of Space

- Develop affordable space transportation
- Assure space surveillance
- Control space
- Protect on-orbit assets
- Apply force from space

Provides capability to fully exploit space, conducting operations at will.
Revolutionary Warfighting Concepts
Network Centric Warfare

- Develop robust connectivity and interoperability
- Provide information assurance
- Improve decision support
- Exploit high performance computing

Provides increased combat power by networking sensors, decision makers, and mission executors, to achieve shared awareness, self-synchronization, and improved operations.

Smart Sensor Web
Software Intensive Systems
Revolutionary Warfighting Concepts
Unmanned Systems for Land, Air, Sea, and Underwater

- Control assets remotely
- Miniaturize components
- Integrate information
- Develop collective behavior
- Develop distributed operations

Provides capability to safely execute an expanded range of missions.
Militarily Significant Research Areas
Nanoscience and Advanced Materials

• Exploit:
  – Carbon computers
  – Molecular engineering
  – Nanoscale robots, sensors, machines
  – Battery electrode and energy storage
  – Vacuum microelectronics devices
  – Molecular composites

Provides opportunity to develop totally new operational concepts and capabilities.
Militarily Significant Research Areas

Advanced Power

- Improve energy storage and release
- Enhance power generation/distribution
- Develop new power applications
- Exploit electric drive
- Enhance propulsion technologies

Provides opportunity to more efficiently project a capability throughout the battlespace.
Militarily Significant Research Areas
Human Dimension and Psychological Factors

- Improve training aids
- Develop decision making skills
- Improve cognitive readiness
- Enhance performance

Provides opportunity to improve human information recognition and retention.
Militarily Significant Research Areas
Directed Energy

• Exploit:
  – High energy lasers
  – High powered microwaves

Provides opportunity to revolutionize operations in traditional battlespace environments.
Defense Modeling & Simulation Office Vision

“Lead and Integrate the DoD M&S community, and Leverage M&S science and technology advances to ensure that the warfighters of today and tomorrow have superior and affordable M&S tools, products and capabilities to support their missions and to give them revolutionary war-winning capabilities.”

Lead, Integrate and Leverage M&S for the Warfighter
Defense Modeling & Simulation Office Priorities

• Joint Warfighter Requirements
  – Support to CINCs & Services
  – Joint Program Support (JSIMS, JMASS, JWARS) & Integration

• Enterprise Activities
  – High Level Architecture Transition
  – Simulation Interoperability Standards
  – Synthetic Environment

• Science & Technology Initiatives / Concepts Applications
  – Human and Group Behavior
  – Simulation Based Acquisition
  – Technology Demonstration

• Community Services & Coordination
  – M&S Integration Task Force & DoD M&S Master Plan
  – M&S Information Analysis Center
  – M&S Resource Repository
  – Outreach
**DMSO Accomplishment:**
High Level Architecture (HLA)

**HLA: technical architecture for interoperability and reuse - Nov 2000**

- IEEE standardization
- Focused community on real interoperability issues
- Enabled cross domain federation
- Created reuse products and opportunities
- Brought rigorous systems engineering to federation development
- 60% to 80% community technology adoption (SEI study)
Joint Simulation System (JSIMS)
**JOINT SIMULATION SYSTEM (JSIMS)**

**MISSION**
To provide...
- A computer-simulated environment...
- For use by CINC's, joint organizations, and the Services...
- To educate, train, and develop doctrine and tactics...
- For Joint warfighting and other operational needs.
DMSO Accomplishment:
Integrated Natural Environment Program

Provides the warfighter integrated authoritative representations of the natural environment

Effect of high winds on concealment smoke changed outcome of the battle.

Environmental data from the various domains

- Released SEDRIS Interoperability Standards and software tools
- SEDRIS specified in acquisition of Army, Joint, and NATO systems
- Demonstrated use of dynamic run-time natural environment
- Increased environmental data records available in library by 30,000
Vision: To enhance warfighter decisions by enabling valid models using credible data that reflect realistic human behavior.

Current DMSO Focus: Human Behavior Representation

Individuals  Teams  Organizations

Training  Systems Analysis  Command Decision Aiding  System Acquisition

Sensing & Perception  Physical Movement  Information Processing  Decision Making  Communication & Coordination

see  smell  hear  taste
DMSO Accomplishment: Service Academy Outreach

- M&S laboratories enhanced at all three Academies
- Summer interns (6 to 10 per Academy)
- Visiting M&S professors
- Doubled simulation-based training at Academies
S&T Requires Strong Partnerships

- Link to the Warfighter
- Expanded Resource Base
- New Ideas, Knowledge

- Service Labs
- Darpa
- High Risk, High Payoff
- Coalition Capability
- International
- Interagency
- Universities
- Industries

- Maximum National Security Payoff
- Innovation, Transition
A Focus on Tomorrow's Possibilities

"Technical Superiority is Critical for National Security. In peace, it provides deterrence; In crisis, it provides options; In war, it provides an edge."

Defense Science and Technology Strategy
May 2000