



# ***Defense Science and Technology***

***4 April 2000***

***Fifth Annual S&T Congressional Visits Day***

**Dr. Delores M. Etter**

**Deputy Under Secretary of Defense (Science & Technology)**

# DoD Science & Technology 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.*



# Revolutionary Capabilities

***Stealth***



***Adaptive  
Optics and  
Lasers***



***Night Vision***



**DoD S&T**

***GPS***



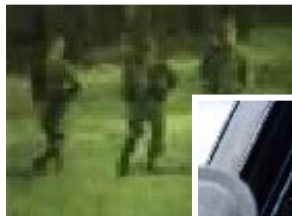
***Phased Array Radar***



# The Difference in Kosovo



***MH-60 Pave Hawk***



***Night Vision***



***UAVs  
Hunter  
Predator***



***B-2***

***EA-6B  
Prowler***



***JDAMS***



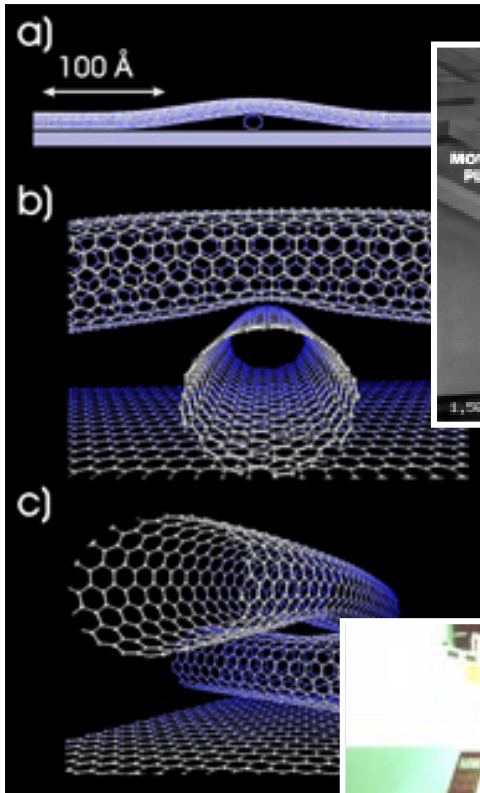
***C-17 Globemaster***



***F-117***

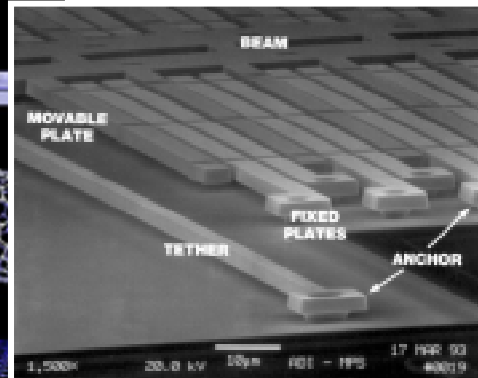


# Current S&T



*Nanoscience*

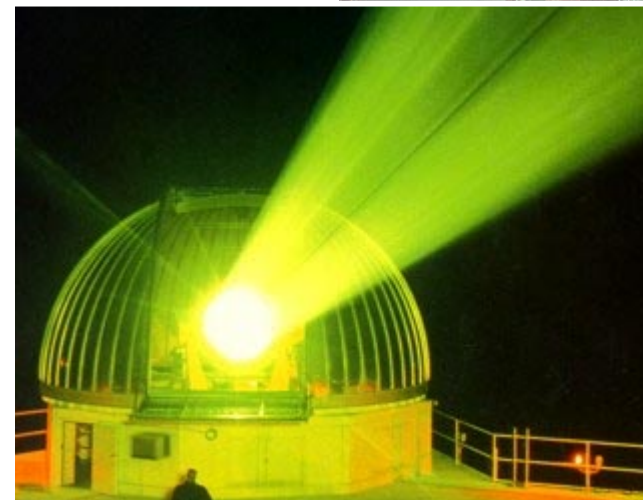
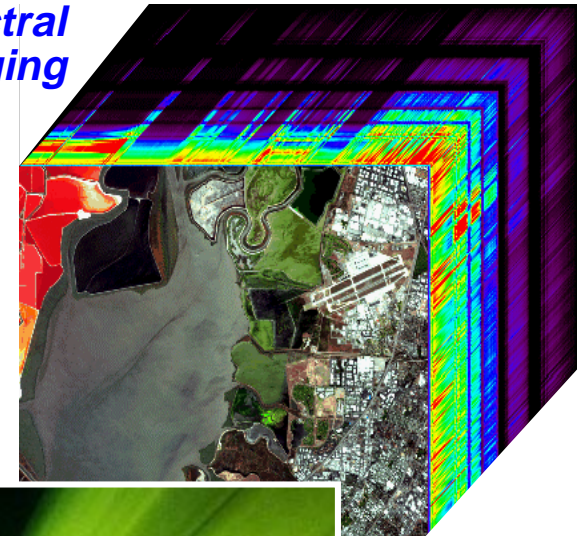
*Biolab*



**MEMS**  
*microelectromechanical  
systems*



*Hyperspectral  
Imaging*



*Starfire*

# Future Revolutionary Capabilities



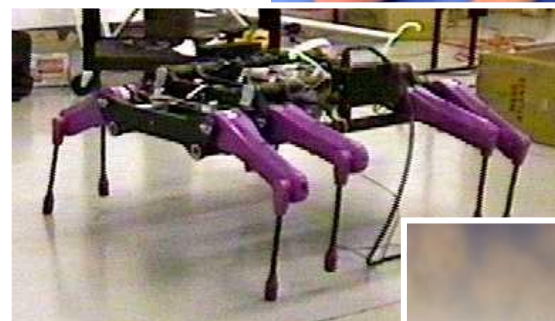
*Microsatellites*



*Joint Strike Fighter*



*Micro Air Vehicles*



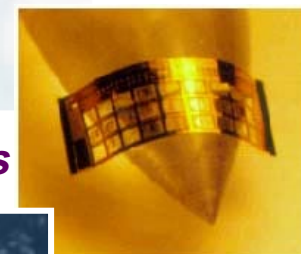
*Micro Robots*



*DD-21*



*Flexible Sensor Skins*



*Augmented Reality*

*Bio Sensors*



**Embedded Biofluidic Chips**



**Handheld**

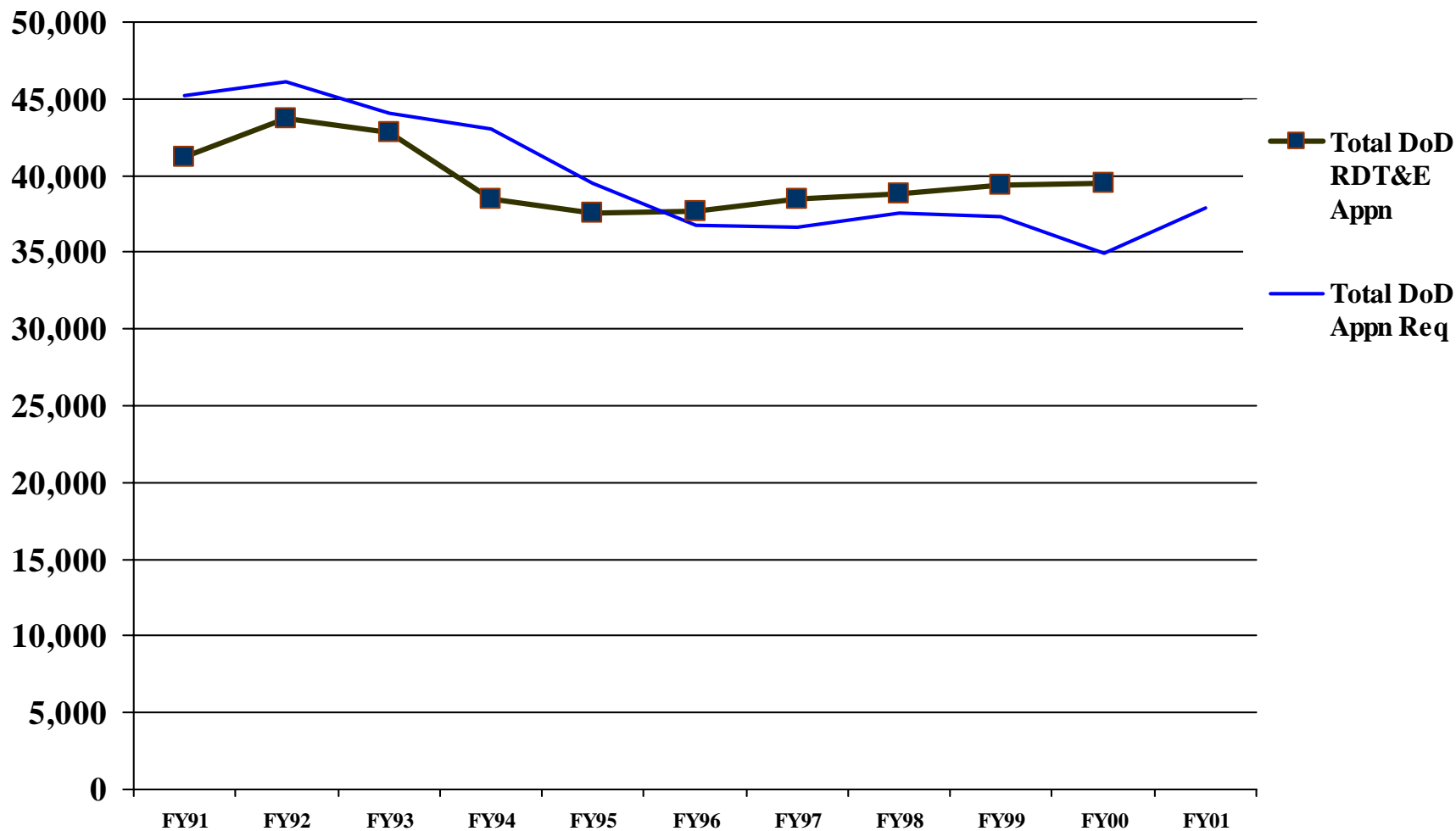


# Comparison of DoD RDT&E Requested to Appropriated Funding



\$ millions

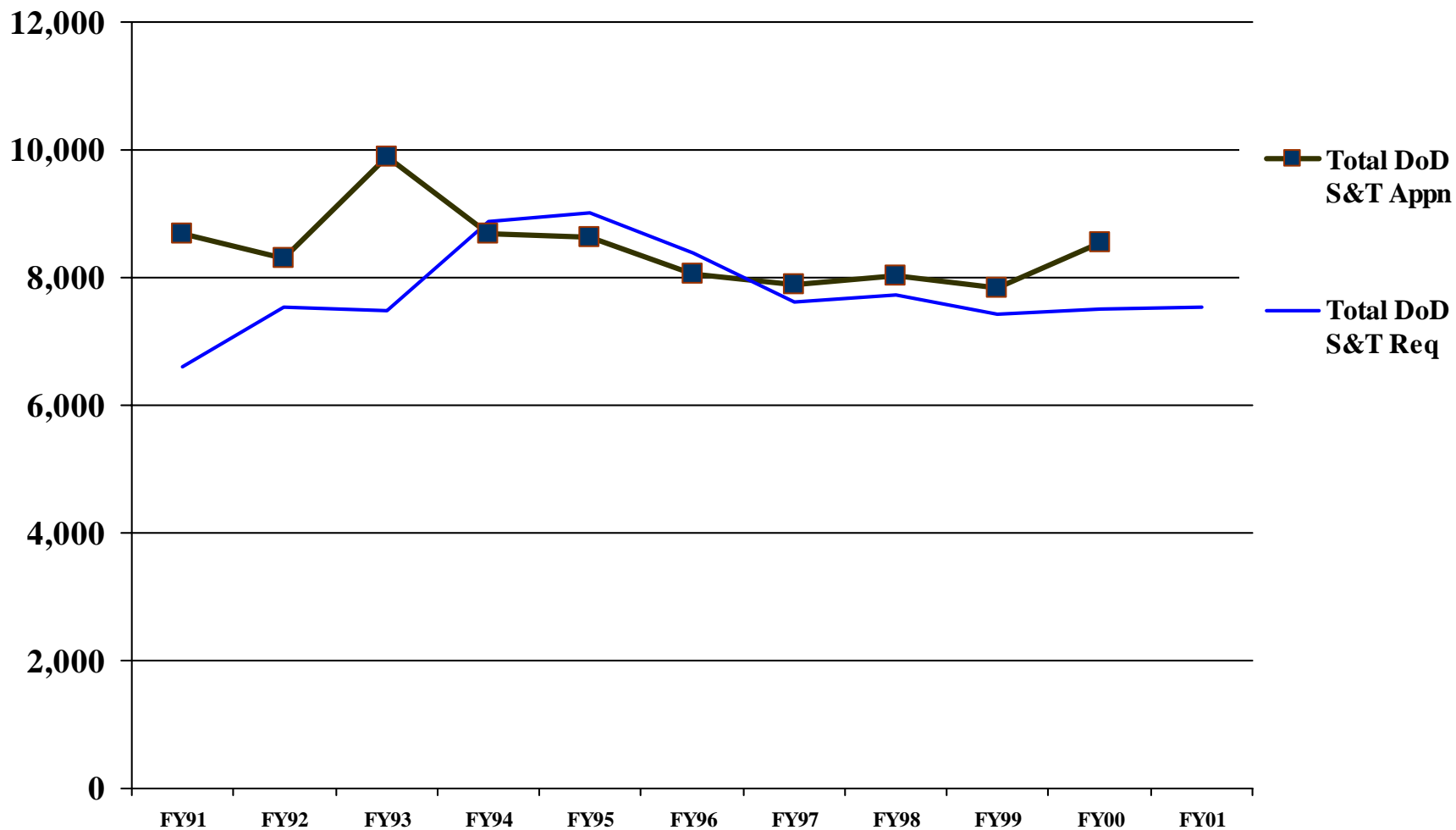
FY01 Constant



# Comparison of DoD S&T Requested to Appropriated Funding

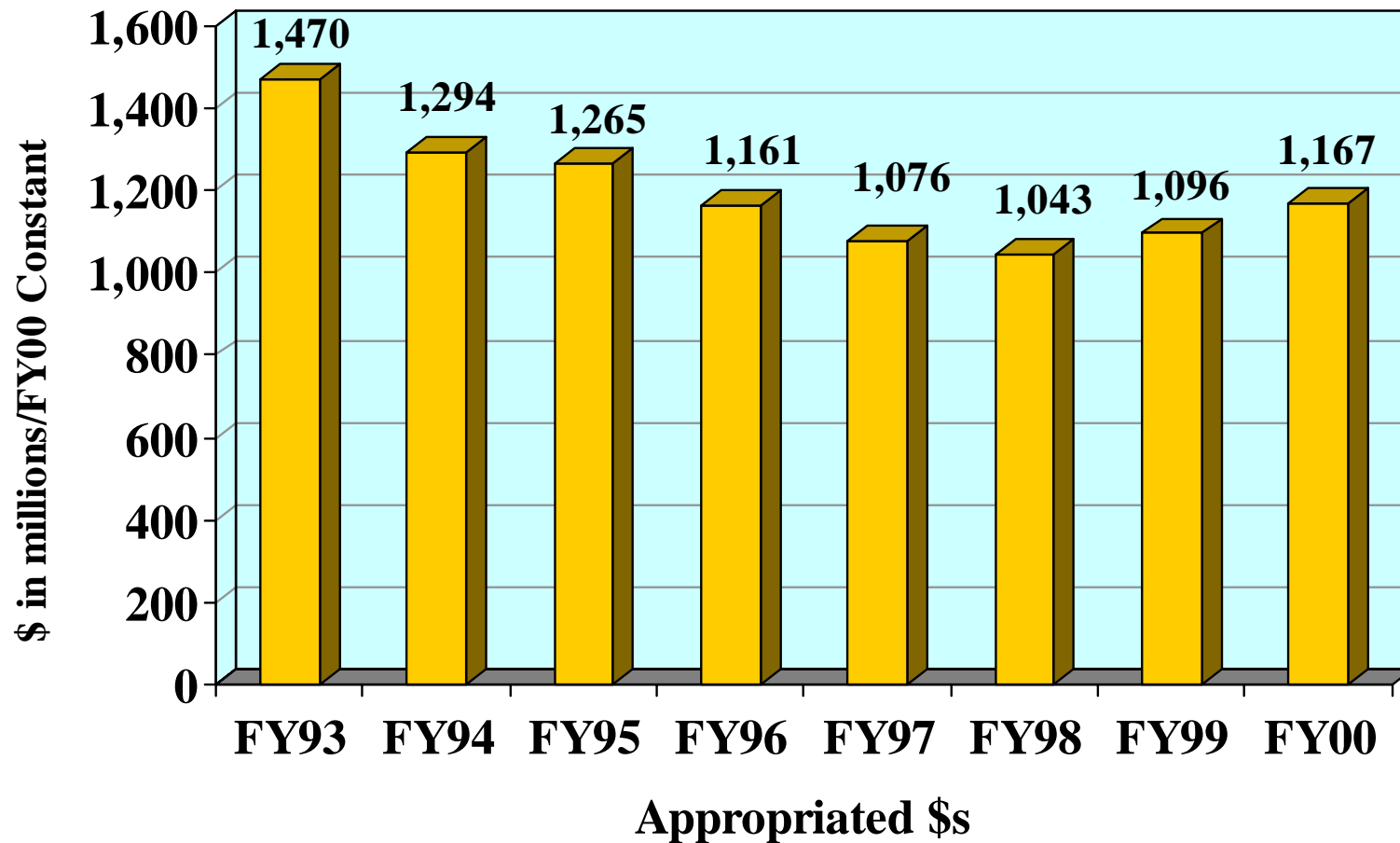


\$ millions  
FY01 Constant





# DoD 6.1 Basic Research



**Basic Research funding down over \$300M  
(~21%) in purchasing power since 1993**

# DoD Percentage of Federal Research Funding to Universities



<b>Electrical Engineering</b>	<b>64%</b>
<b>All Engineering</b>	<b>35%</b>
<b>Computer Science</b>	<b>46%</b>
<b>Metallurgy &amp; Materials</b>	<b>36%</b>
<b>Civil Engineering</b>	<b>35%</b>
<b>Mechanical Engineering</b>	<b>29%</b>
<b>Mathematics</b>	<b>21%</b>

<b>All Federal Funding</b>	<b>9%</b>
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**Note - Estimate FY97 Funding for 6.1 & 6.2 Only**

Source: Federal Funds for R&D NSF Report #97-327

# DUSD (S&T) Priorities (2000)

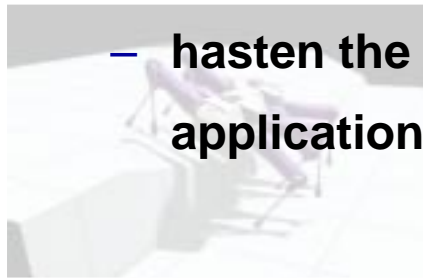
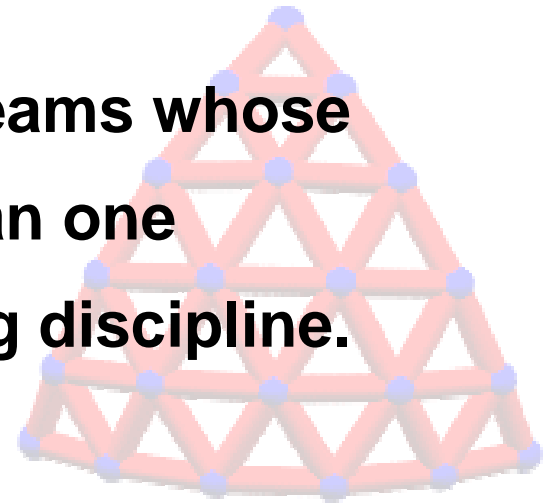


- Basic Research
- Five Focus Areas
  - Chemical & Biological Defense
  - Information Assurance
  - Hardened & Deeply Buried Targets
  - Smart Sensor Web
  - Cognitive Readiness
- Cross Cutting Initiatives
  - Software Intensive Systems
  - High Performance Computing
  - Modeling and Simulation
- Technology Watch/Exposition
- S&T Pilot Laboratory Program

# Multidisciplinary University Research Initiative (MURI)



- **Objective: Support collaborative teams whose research efforts intersect more than one traditional science and engineering discipline.**
- **MURI teams efforts:**
  - accelerate research progress in areas particularly suited to this approach
  - foster cross fertilization of ideas
  - hasten the transition of basic research findings to practical applications





# FY 2000 MURI Topics



- **Data Fusion in Large Arrays of Microsensors (Sensorweb)**
- **Fundamental Principles in Adaptive Learning Technology**
- **Decision-Making Under Uncertainty**
- **Mobile Augmented Battlespace Visualization**
- **Real-Time Fault-Tolerant Network Protocols**
- **Solitonic Information Processing**
- **Quantum Communication and Quantum Memory**
- **Tutorial Dialogue for Artificially Intelligent Training Systems**
- **Adaptive Mobile, Wireless Networks for Highly Dynamic Environments**
- **Ultracold Atom Optics**
- **Science Underpinning Prime Reliant Coatings**
- **Phonon Enhancement of Electronic and Optoelectronic Devices**
- **Programmed Surface Chemical Assembly of Functional Materials**

# Information Technology MURI Topic: Mobile Augmented Battlespace Visualization



## Team Members:

- UC Berkley
- Army Research Office

## Objective:

- Develop fundamental algorithmic principals for mobile communication, visualization, augmented reality, presentation of uncertainty or confidence, and human display interactions.

# Nanoscience MURI Topic:

## Quantum Communication and Quantum Memory

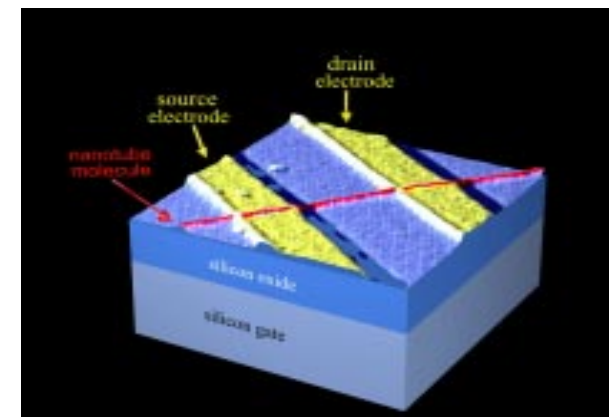
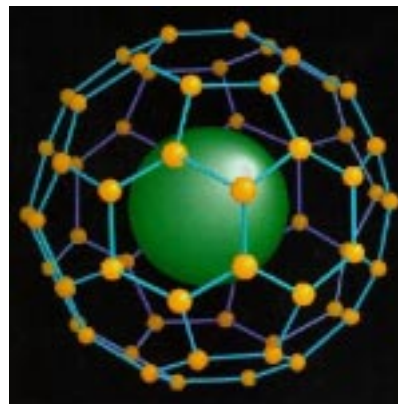
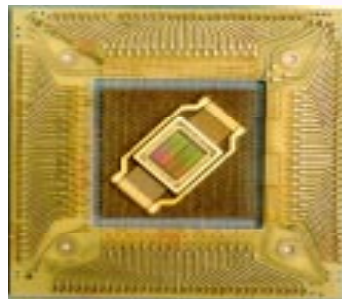
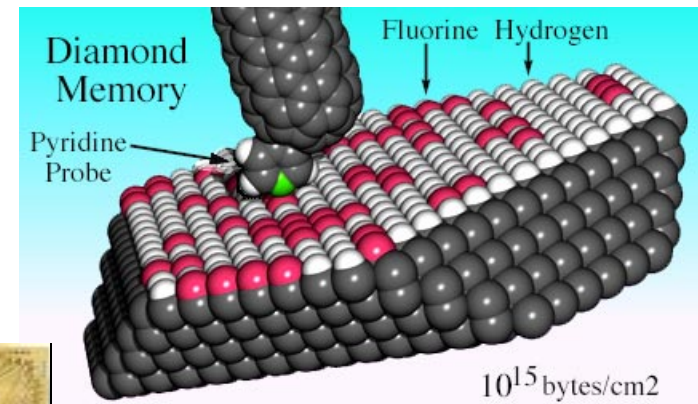


### Team Members:

- Caltech
- Army Research Office

### Objective:

- Demonstrate a functioning quantum communications system, based on quantum teleportation\* and complete with quantum error correction and quantum memory, which can transmit information in a secure manner over 100km.



\*To recreate an input state at a distance without traversing the intervening space.

# DoD S&T is a Partnership

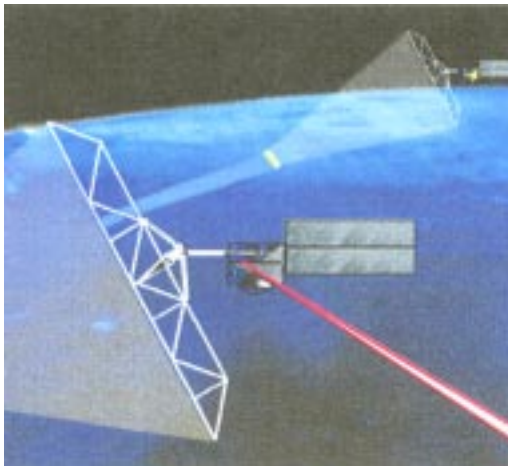


**Stable, Long Term  
Investment**



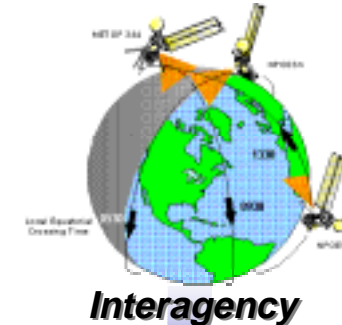
*Service Labs*

**DARPA**



**High Risk, High Payoff**

**Expanded Resource Base**



*Interagency*

**New Ideas, Knowledge**



*Universities*

**Industries**



**Innovation, Transition**

**Maximum National  
Security Payoff**

**International**



**Coalition Capability**