If a great technology is developed in the lab but no one uses it, does it make a difference ....
DoD S&T Has Developed Technologies That Changed Warfighting

- Disruptive technologies resulting from technology push:
  - Internet
  - GPS
  - Night vision
  - Lasers
  - Stealth
  - Predator
  - Global Hawk

- None of these emerged from requirements

Yesterday's Investment in S&T Provided Today's Capability Advantage
The Power of Long-Term Technology Development

1943
- 1500 B-17 sorties
- 9000 bombs (250#)
- 3300 ft CEP
- One 60’ x 100’ target
- W.W.II

1970
- 30 F-4 sorties
- 176 bombs (500#)
- 400 ft CEP
- One Target
- Vietnam

1991
- 1 F-117 sortie
- 2 bombs (2000#)
- 10 ft CEP
- Two Targets per Sortie
- Desert Storm

1999
- 1 B-2 sortie
- 16 bombs (2000#)
- 20 ft CEP
- 16 Targets per Pass
- All Weather

Revolutionary Technologies
- Laser Guidance
- GPS Guidance
DDR&E Vision

VISION: To develop technology to defeat any adversary on any battlefield

Any Battlefield includes physical, cyber, space, undersea, etc

Any Adversary includes both State and non-State actors
Defeat Any Adversary on Any Battlefield

The Pyramid of Strategic Capability

Strategic Interests

- Quadrennial Defense Review
  Driven Shift in Emphasis for Technology Program

II. Strategic Resilience

- Enhance Linkage
  Technologist to Acquisition
- Enhance Prototypes
- Quick Reaction Programs

III. Strategic Awareness

- Global Technology Awareness
Technology Trends and Issues

- Rate of Technology Change is Increasing
- World Becoming Technologically Smarter
- Availability of Global Commercial Technology Increasing; Need to use to Maximum Extent Possible
- Enhanced Use of Prototypes
- New Capability Needs

*Multiple Dimensions Mean Multiple Solutions Needed*
The Pace of Technology Development

“Moore’s Law” Computing doubles every 18 months

“Fiber Law” Communication capacity doubles every 9 months

“Storage Law” Storage doubles every 12 months

Defense Acquisition Pace

F-22 Milestone I: Oct 86 IOC: Dec 05*
Comanche Milestone I: Jun 89 IOC: Sep 09

* Computers at IOC are 2,000 X faster, hold 130,000 X bits of information than they did at MS I

Technology growth is non-linear… Acquisition path has been linear
Comparison of Scientists & Engineers Produced

The World is Getting Smarter

Source: Money Magazine
U.S. No Longer Leads the World in the Generation of New Scientific Knowledge

The Warning

Physical Review & Submission of Technical Papers

Source: American Physical Society - *APS News* August/September 2000
International S&T Trends

- International Science and Technology
- Globalization
- Intellectual Capital Advantage of the US
- Pace of Technology Development
- Disruptive Technology

Net Equation—Uncertainty Increasing
Intellectual Advantage of US Waning
S&T Program Should Offer New Opportunities
The Beginning of Change

- 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
Irregular
- Combating Terrorism
- Urban Operations
- Activities with Non-State Actors

Catastrophic
- Protection Against Weapons of Mass Destruction (WMD)
- Protection Against Chem Bio Attacks

Disruptive
- New Technology Investment that Provides New Capabilities
  - Nanotechnology
  - Biotechnology
  - Information Technology…
- Application of Technology that Provides New Capabilities
  - Directed Energy
  - Hypersonics….
S&T Enabling Technology Priorities  
---Supporting the QDR---

• Potential technology focus areas:
  – Biometrics and Biological exploitation
  – Information technology and applications
  – Persistent Surveillance Technology
  – Networks and Communication
  – Human, Social, Cultural, and Behavioral Modeling
  – Language
  – Cognitive Enhancement
  – Directed energy
  – Autonomous systems
  – Hyperspectral sensors
  – Nanotechnology
  – Advanced Materials
  – Energy and Power
  – Affordability
  – Combating Weapons of Mass Destruction Technologies
  – Energetic Materials
Integrating Intelligence into S&T Planning

- Incorporate S&T Intelligence Products into S&T Planning Process

How do we ensure S&T intelligence information is broadly disseminated and used in S&T Planning?

- Reliance 21
  Revised process incorporates Intelligence analysis into S&T planning process

- S&T Net Assessment Program
  Comparison of US DoD capabilities with foreign technology programs (current and future)

- Project DRUMBEAT
  Weekly intelligence briefing forum on scientific and technical (S&T) topics.

- Global Technology Development Database
  Unclassified database with information on global tech development efforts; will launch in R&E Portal June 2007
S&T Program Changes for Fiscal Year 2008

• In Response to the QDR, the S&T Program Has New Programs Planned for FY2008:
  – Clandestine Tagging, Tracking and Locating;
  – Biometrics;
  – Human, Cultural, Social Behavior Modeling:
  – Networks;
    – Airborne Network Gateways
    – Network Science
  – Persistent Surveillance;
  – Sensor Weapon Pairing

• In Response to the Cost of Acquisition and Operations, the S&T Program Has New Programs Planned for FY2008:
  – Technologies to decrease energy consumption/increase alternatives
  – Manufacturing Technology S&T
  – High Performance Computational Tools for Acquisition Streamlining
Enhanced Linkage Leads to Speed and Resilience

Emerging S&T Model

All Services are moving their acquisition processes

FROM S&T TO Acq

Operational Requirements (Warfighter)

Enhanced Linkage Leads to Speed and Resilience
Prototyping Pays Dividends

- Reduces Technical Risk
- Reduces Cost and Shortens SDD
- Develops Engineering Skills
- Develops PM Skills

- Provides a Tool to Inspire Young People
- Attracts S&E’s to Defense Challenges
- Allows Warfighter Familiarization
- Aids Requirements and ConOps

Prototype programs are not acquisition programs, and should not be science projects.
Understanding Requirements

• Requirements do not create capability
  – In general, requirements evolve the state of the possible
  – Requirements are best set in partnership with the warfighter, program manager, and technologist

• Requirements do create cost

• Requirements are not carved in stone
  – PMs have a right, role, and obligation to push back on requirements
  – PMs should lead the enterprise to joint, interoperable solutions

_We are spending taxpayer money. Spend it like it was your own – part of it is._
Guidelines for Program Management

• PMs are not victims of a process
  – There are good reasons for an acquisition workforce and trained professionals working with accountability through the civilian chain to the President
  – PMs must lead the business to an executable enterprise solution
  – Never agree to “fix” the program in the next POM
  – Never quietly allow the enterprise to leave you with unexecutable requirements, budgets, and schedules

• PMs are not a door-to-door salesperson
  – Listen to new ideas, deal with them on a factual basis, and adapt when necessary
  – PMs should know their program well enough to spend tax dollars on critical path events
DoD S&T is a Partnership

- Stable, Long Term Investment
- Expanded Resource Base
- New Ideas, Knowledge

Service Labs
DARPA

Maximum National Security Payoff

International

High Risk, High Payoff
Coalition Capability

Universities
Industries

Innovation, Transition