



# Reducing Technology Risk in Acquisition Programs

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**Director, Defense Research and Engineering**

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

All provided dominant capability

- None of these emerged from requirements



Stealth



UAVs

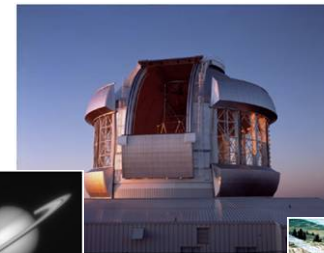
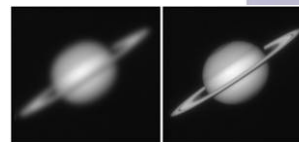


GPS

Advanced Optics and Lasers



Night Vision



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

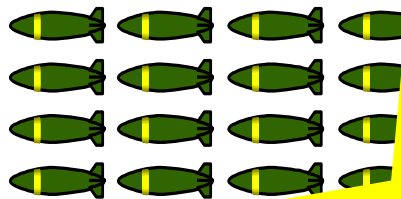


**1 F-117 sortie**  
2 bombs (2000#)  
10 ft CEP  
Two Targets per Sortie  
Desert Storm

1999



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



Accuracy

Accuracy

**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*



# The Pyramid of Strategic Capability



## Strategic Interests

- *Quadrennial Defense Review  
Driven Shift in Emphasis for  
Technology Program*



*Defeat Any  
Adversary on  
Any Battlefield*

## 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

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

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

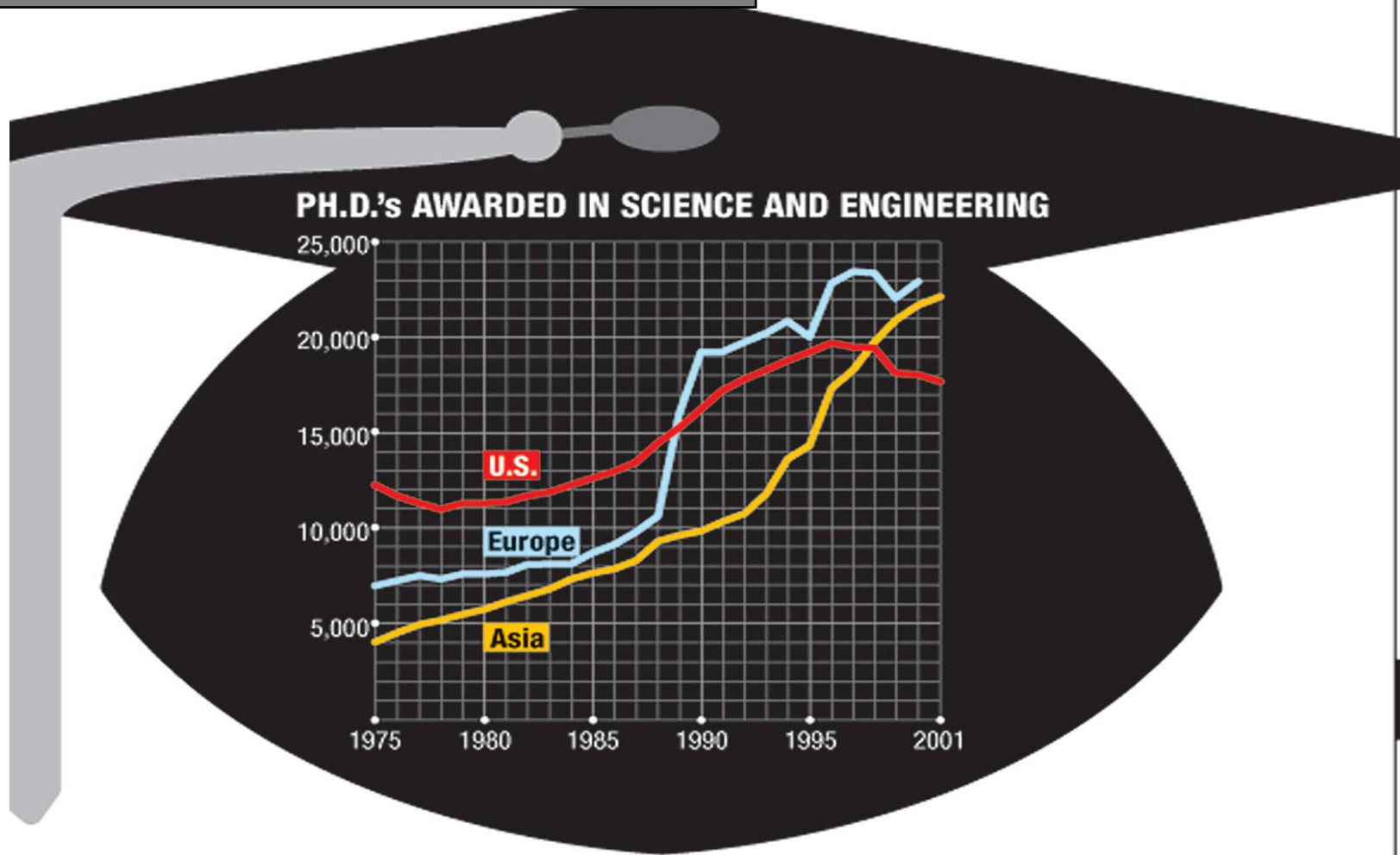
**Technology growth is non-linear...  
Acquisition path has been linear**



# Comparison of Scientists & Engineers Produced



The World is Getting Smarter



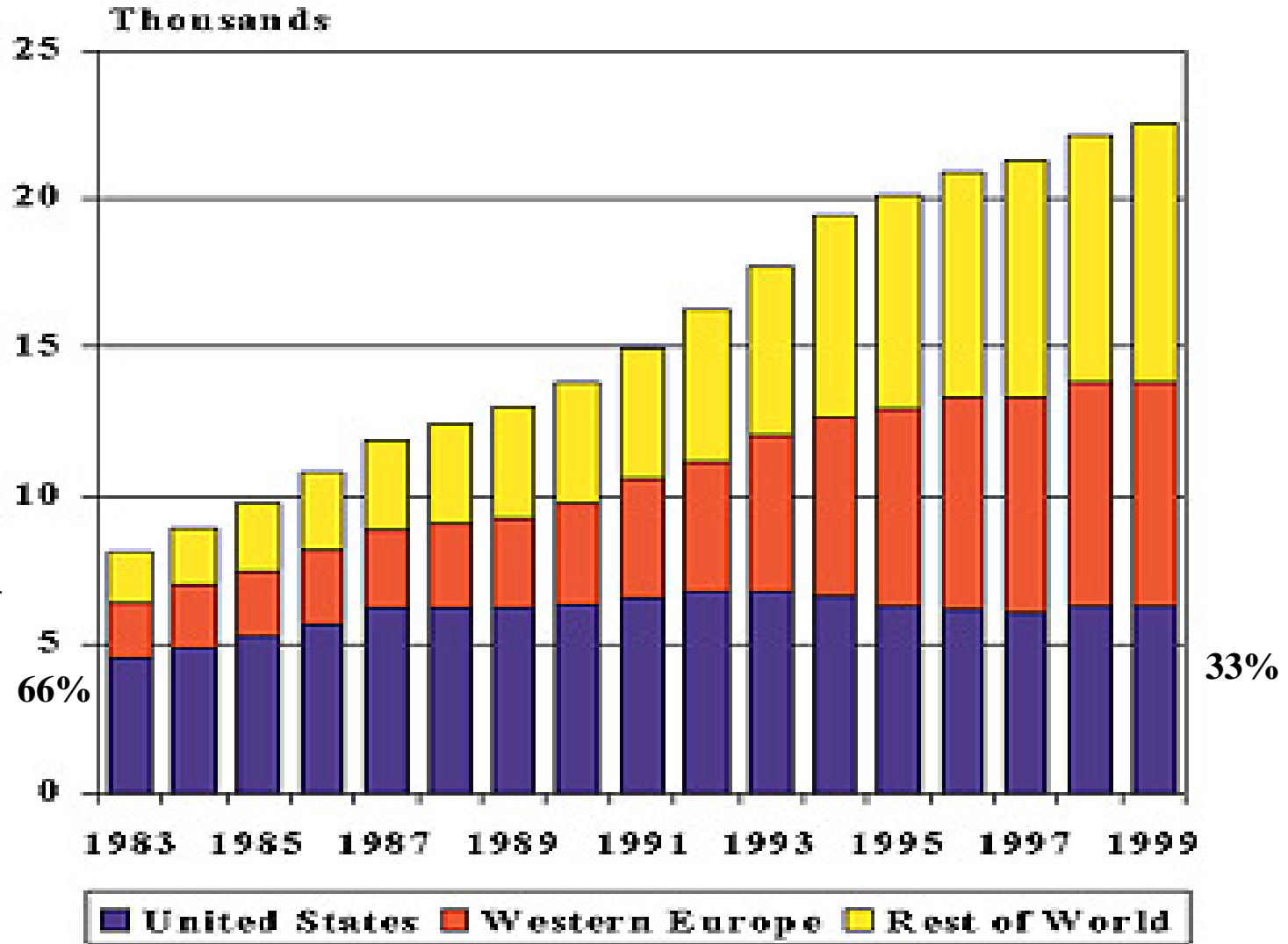
Source: Money Magazine

# 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**



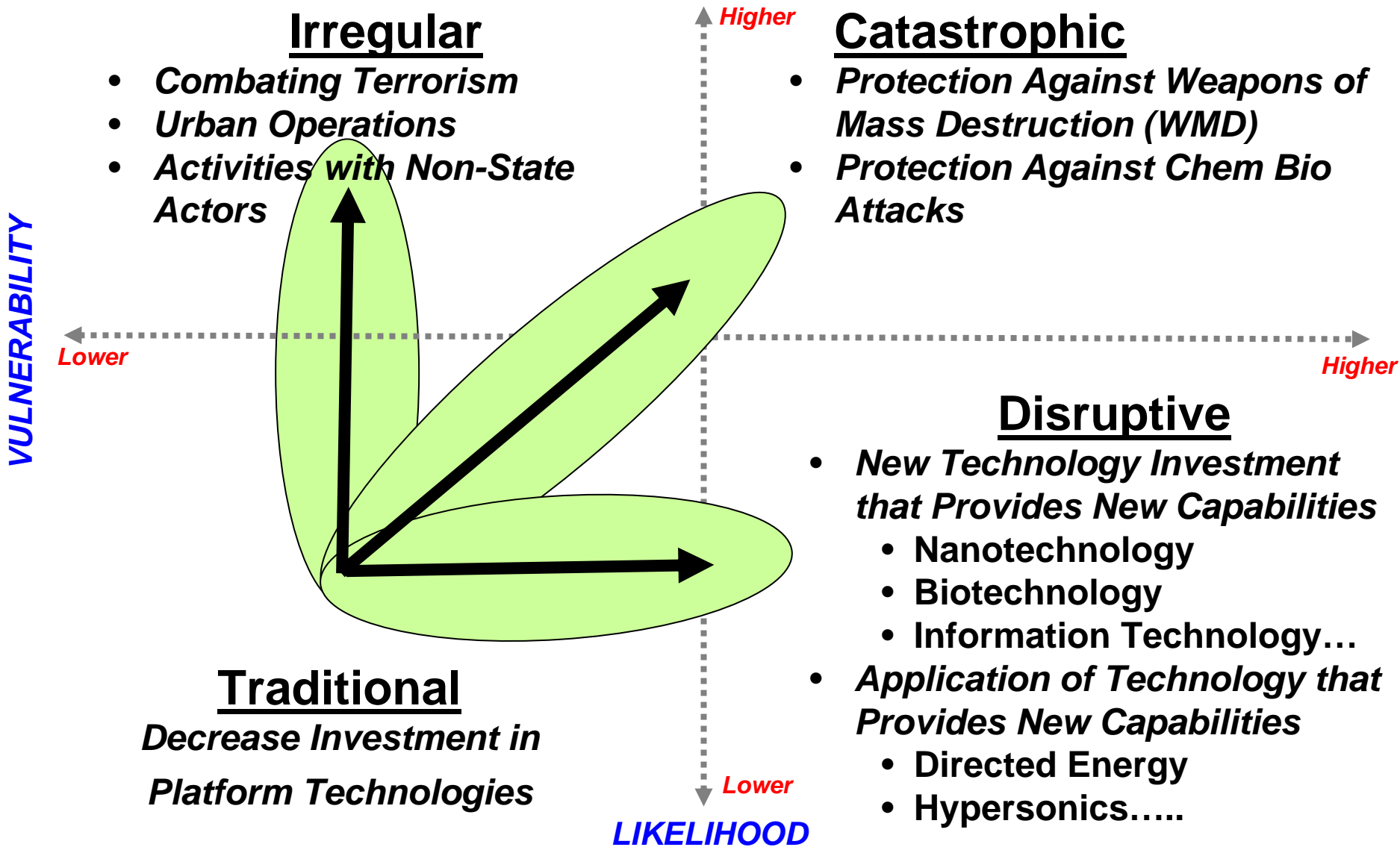
# The Beginning of Change

- **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





# National Defense Strategy Drives Investment Strategy



# **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**





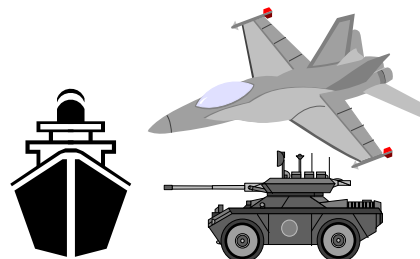
# Emerging S&T Model

All Services are moving their acquisition processes

FROM

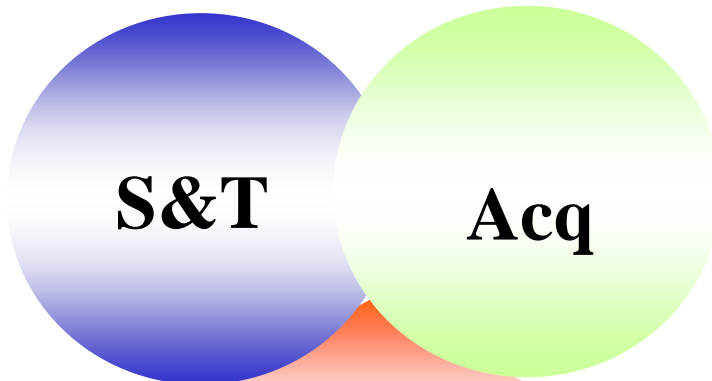


S&T



Acq

TO

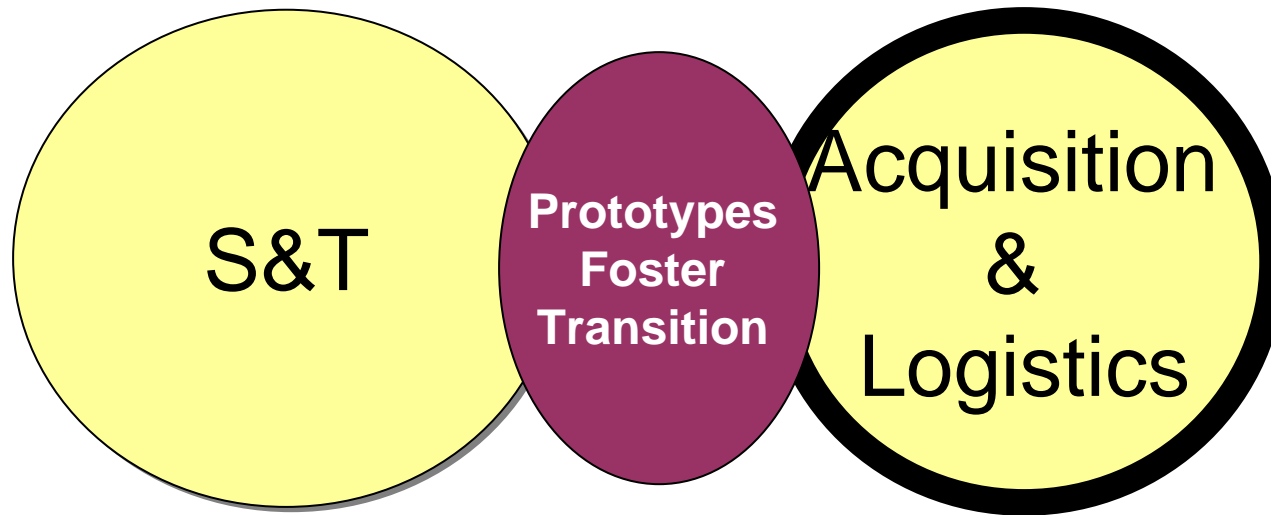


Operational  
Requirements  
(Warfighter)

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

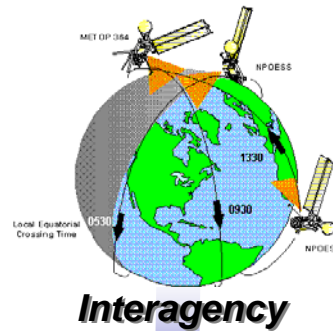


**Stable, Long Term Investment**



*Service Labs*

**Expanded Resource Base**



**New Ideas, Knowledge**

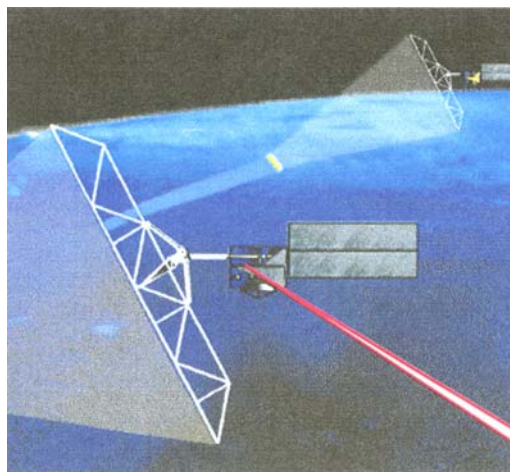


*Universities*

*Industries*

**Maximum National Security Payoff**

**DARPA**



**High Risk, High Payoff**

**International**



**Coalition Capability**



**Innovation, Transition**