

Transitioning S&T Programs

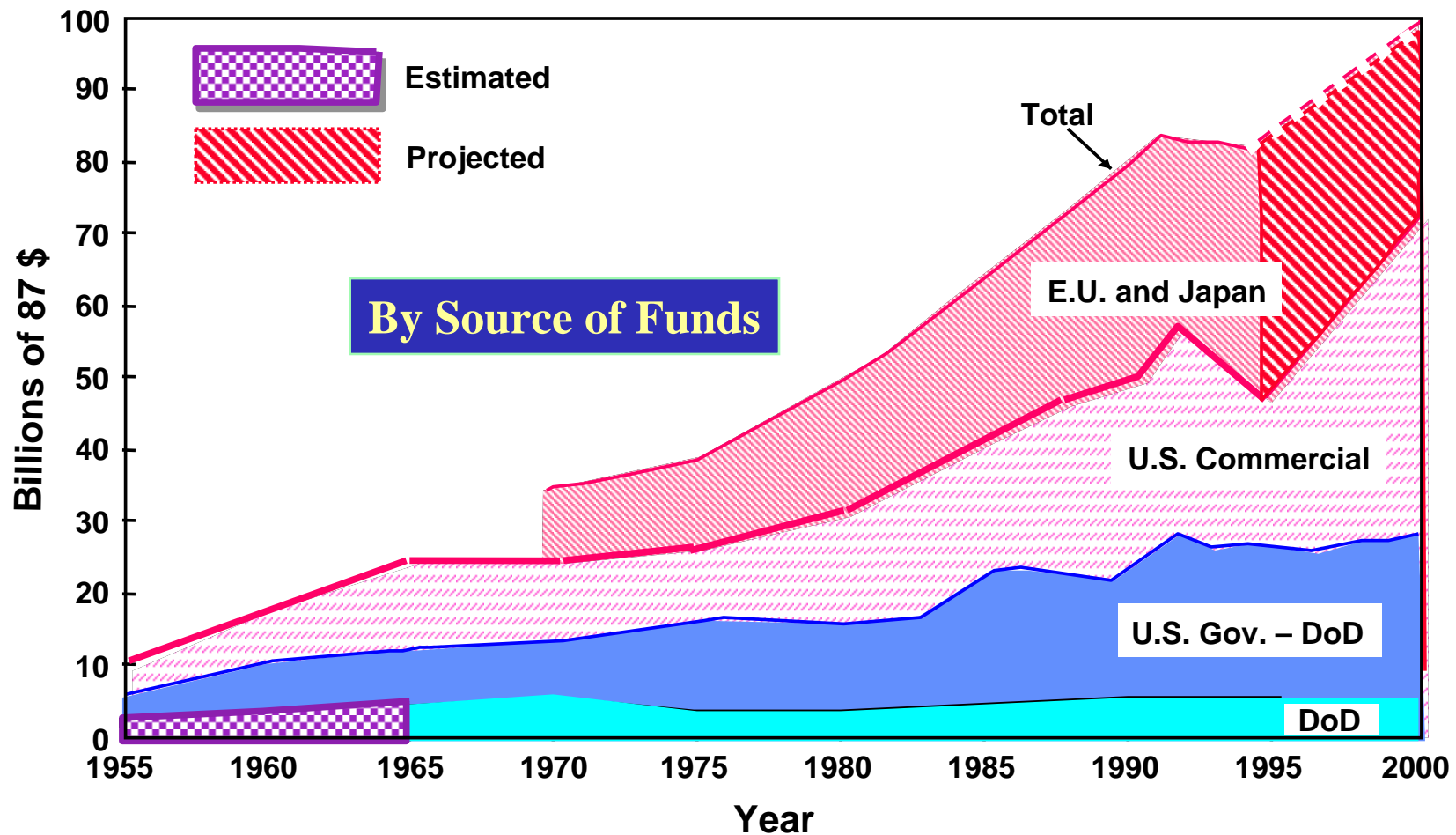
Defense Systems Acquisition Management Course
March 9, 2004

If a great technology is developed
in the lab but no one uses it, does
it make a difference

Overview

- **Why Focus on Transition Issues?**
- **Capabilities Based Acquisition**
- **DoD Best Practices**
 - Army
 - Navy
 - AF
- **Technology Transition Thrusts and Opportunities**
- **Industry Role**
- **Summary**

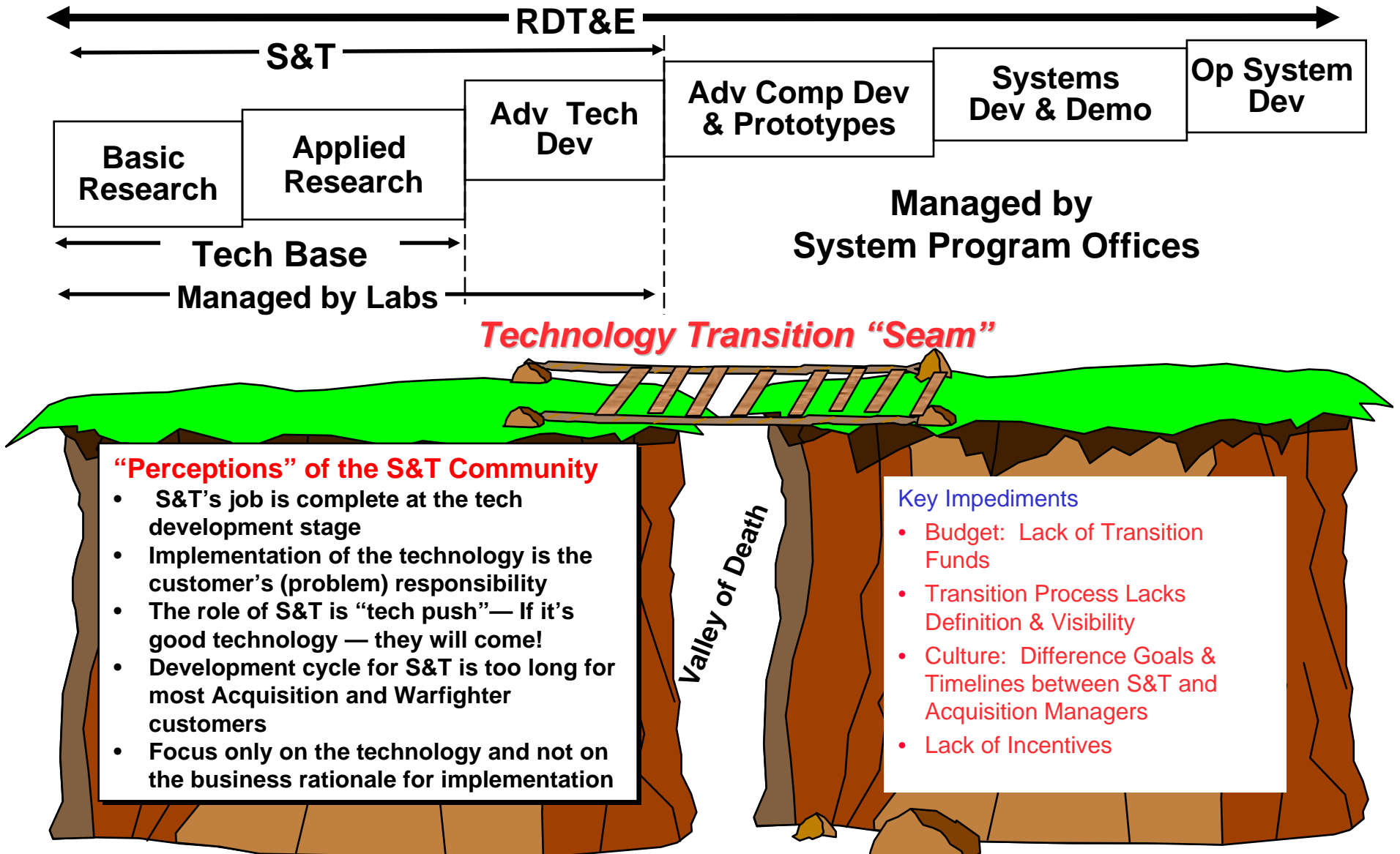
U.S. and Worldwide Research Base Since WWII



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

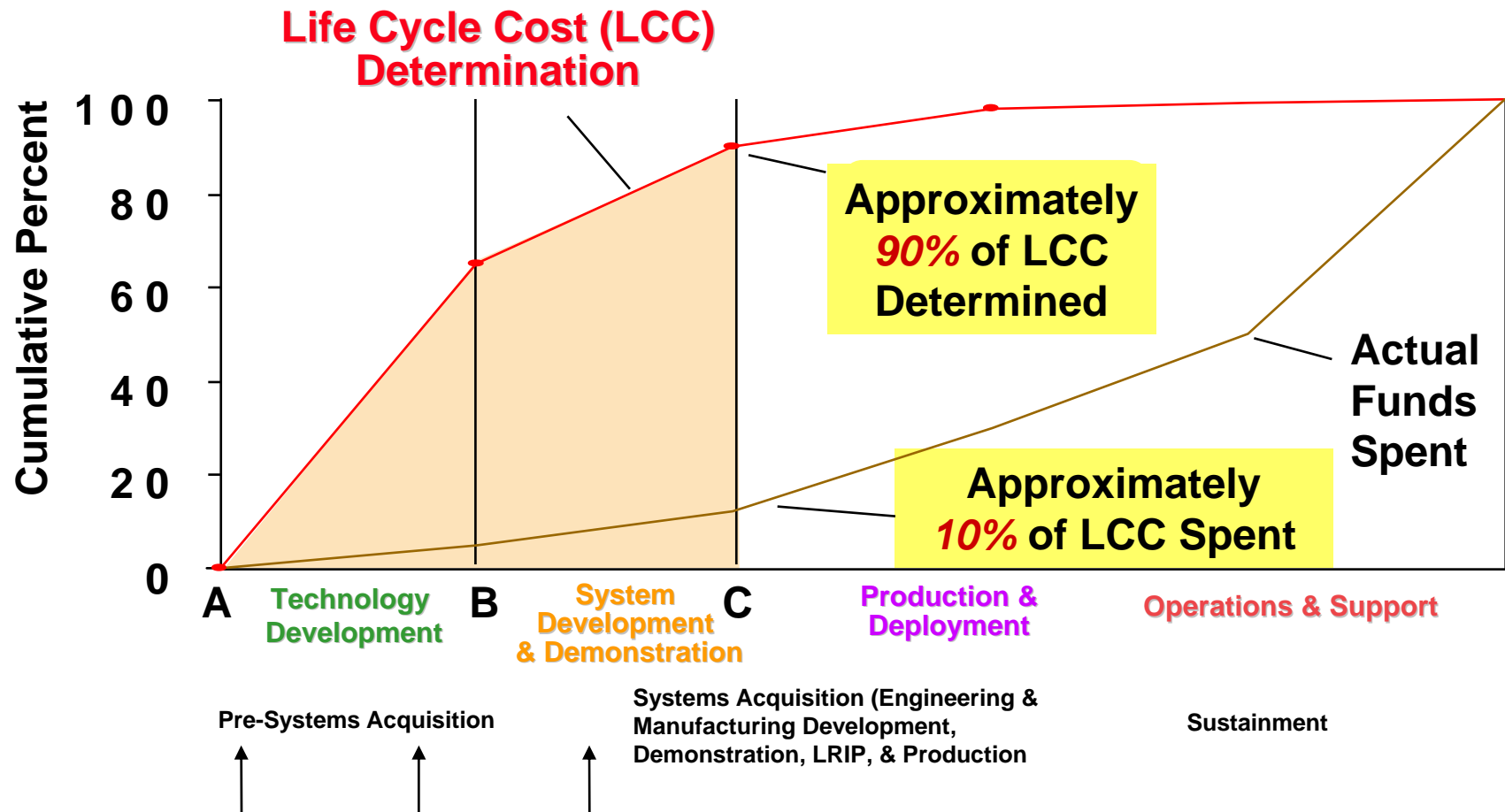
Speeding Technology Transition

“The Challenge”



Why Transition in S&T?

Acquisition Community is Focused on Cost Reduction Throughout Life Cycle



S&T: Technology Opportunities & User Needs

Dimensions to Technology Transition

- Rate of Technology Change is Increasing
- Capabilities-based Planning Acquisition
- Excellence and Spiral Insertion Provides New Transition Model
- Availability of Commercial Technology Increasing; Need to use to Maximum Extent
- Try Before Buy
- Fail Small, Fast, Early

Multiple Dimensions Mean Multiple Solutions Needed

The Challenge: Technology Pace

“Moore’s Law” → Computing doubles every 18 months

“Fiber Law” → Communication capacity doubles every 9 months

“Disk Law” → Storage doubles every 12 months

Defense Acquisition Pace

F-22 Milestone I: Oct 86 IOC: Dec 05*

Commanche Milestone I: Jan 91 IOC: Sep 09

* Computers at IOC are 512 X faster, hold 65,000 X bits of information than they did at MS I

**Technology growth is Non-Linear...
Acquisition path has been**

"Say Hello to the Freshmen"

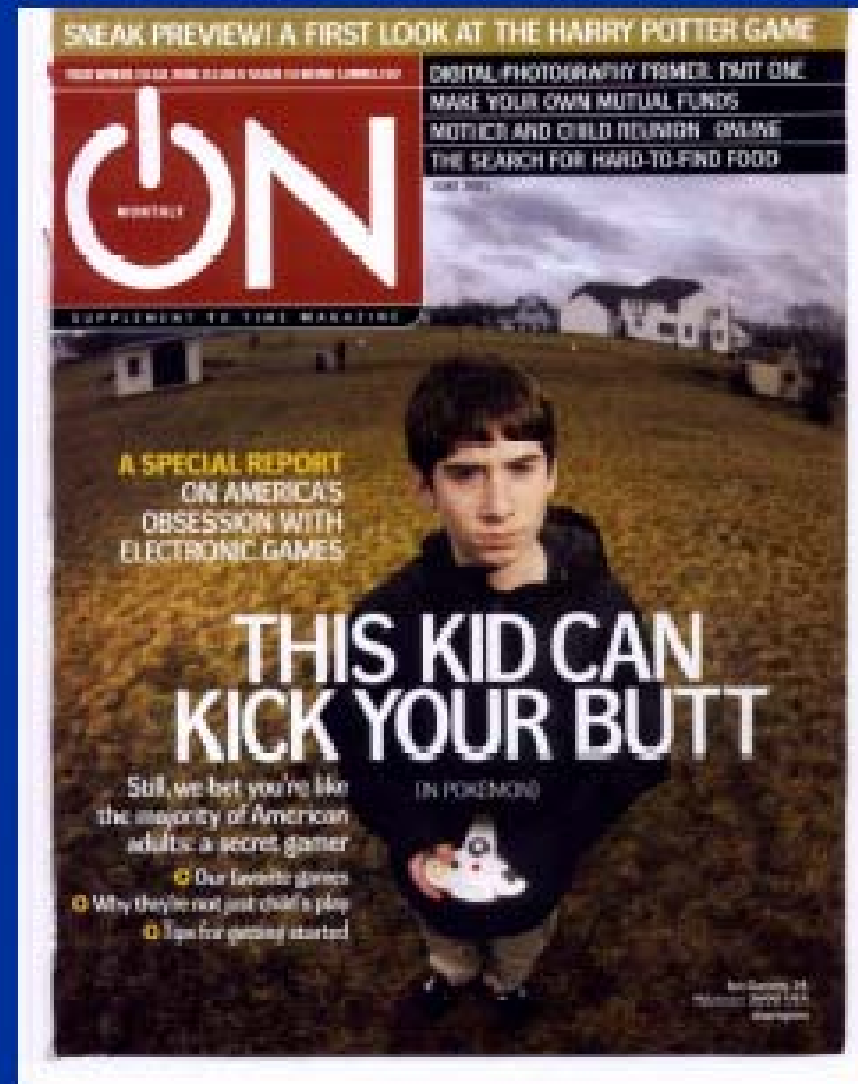
Class of 2004, most ***born in 1982***

- The Kennedy tragedy was a plane crash, not an assassination.
- We have always been able to reproduce DNA in the laboratory.
- There have always been automated teller machines.
- "Spam" and "cookies" are not necessarily foods.
- Joysticks are operated with the left thumb.



The average 18-year old has 1500 hrs in simulated environment

Over 2% of the Korean population subscribes to the MMP game *Lineage*.



Continuous competitive pressure spurs innovation

Source: Military-Related R&D an Academic's View by Peter Lee, Carnegie Mellon University, NDIA S&E Technology Conference, February 2002

Technology and Defense Acquisition

DoD 5000-Series: S&T Role in Evolutionary Acquisition

- **DoDD 5000.1, The Defense Acquisition System**
 - Rapid & Effective Transition From S&T to Products
 - Emphasis on Cost & Affordability in Program Development
- **DoDI 5000.2, Operation of the Defense Acq. System**
 - Identify S&T Solutions in Pre-Systems Acquisition
 - Reduce Technology Risks Before the Acquisition Process
 - Use Mechanisms with User & Acq. Customer to Ensure Transition
 - > ATDs, ACTDs, Service & Joint Experiments
- **Interim Defense Acquisition Guidebook**
 - Establish Technology Readiness Levels (TRLs) for Critical Technologies

Documents Available at <http://dod5000.dau.mil>

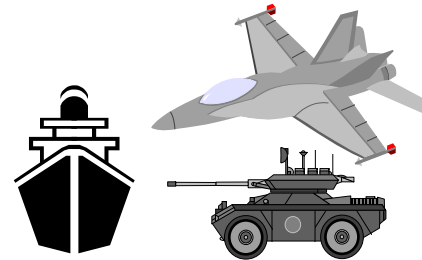
Best Practices

All Services are moving their acquisition processes

FROM

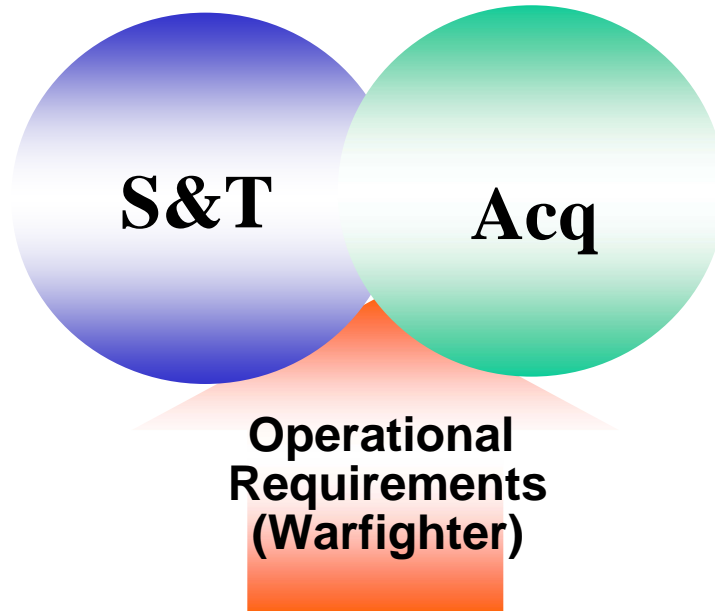


S&T



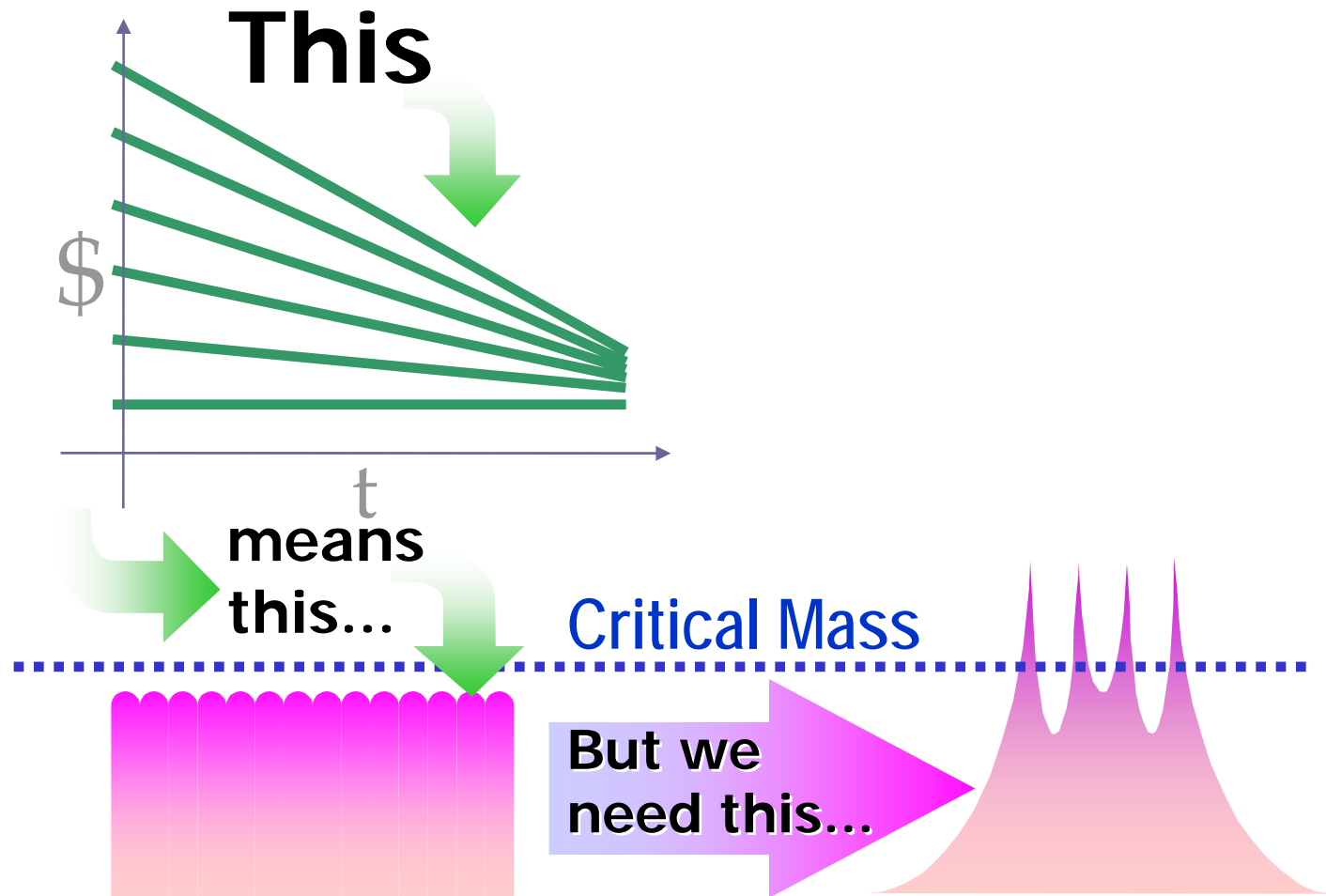
Acq

TO



*Good start:
Need Logistics &
Industry,*

Navy Science & Technology (S&T) Problem / Solution



Programs below critical mass were never ready for transition

12 Future Naval Capabilities (FNCs)

- **Time Critical Strike**
- **Organic Mine Countermeasures (MCM)**
- **Autonomous Operations**
- **Littoral Anti-Submarine Warfare (ASW)**
- **Electric Warship and Combat Vehicle**
- **Littoral Combat/Power Projection**
- **Total Ownership Cost**
- **Missile Defense**
- **Capable Manpower**
- **Warfighter Protection**
- **Fleet Force Protection**
- **Knowledge Superiority and Assurance**

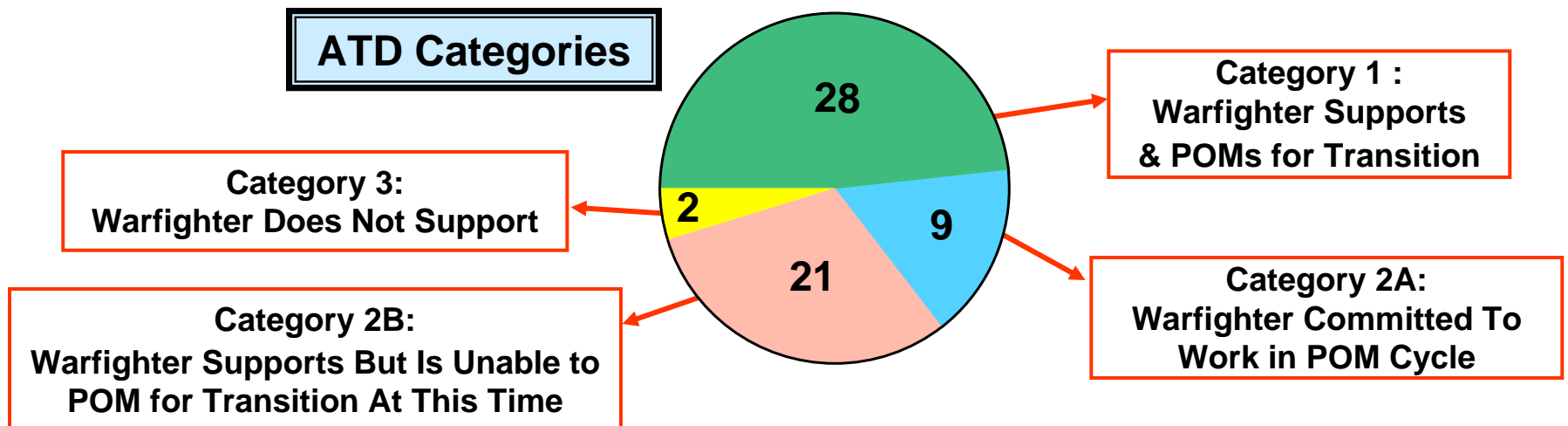
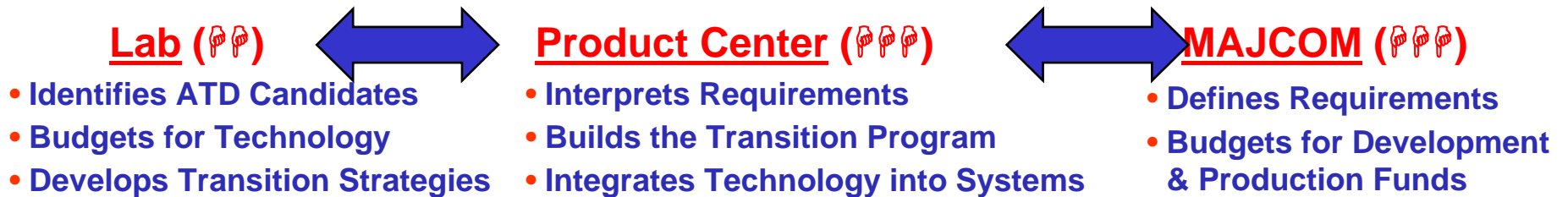
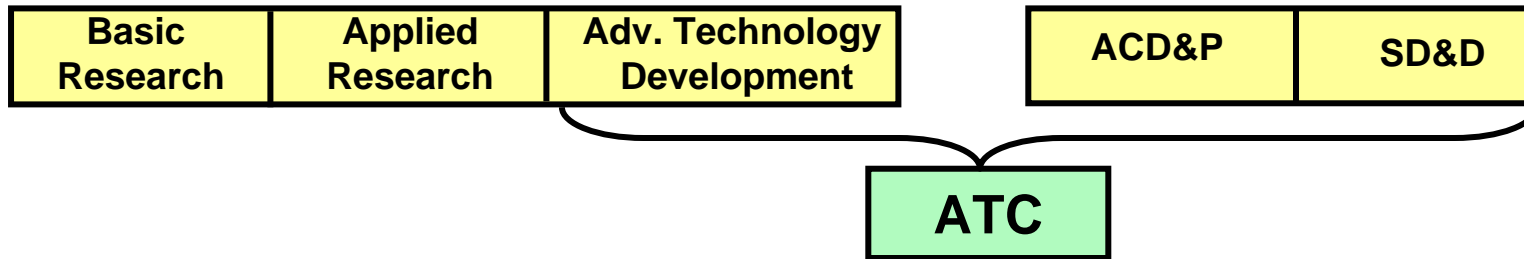
Navy FNC IPT Approach

- **Industry Board of Directors Model**
- **Principal Members:**
 - **Chair** -- Requirements community -- Office of Chief of Naval Operations (OPNAV)/Marine Corp Combat Development Center (MCCDC)/Fleet/Force rep.
 - **Transition Lead** -- Acquisition community -- Systems Command (SYSCOM)/Program Executive Officer (PEO) rep.
 - **Execution Manager/Technical Working Group Leader** -- S&T community rep.
 - **Executive Secretary** -- S&T Resource Sponsor Rep.

Air Force Applied Technology Council (ATC)

- Tech transition process should be a 3-legged stool
 - AFRL, Product Centers, and Users
- Recurring participation at senior levels is mandatory
 - MAJCOM/CVs, Product Center/CCs, and AFRL/CC
- Funding commitments for both S&T and transition program development are the key to technology transition
- Process Focuses on Advanced Technology Demonstration (ATD) Programs
- Developing an Air Force Instruction to standardize procedure

Air Force ATC



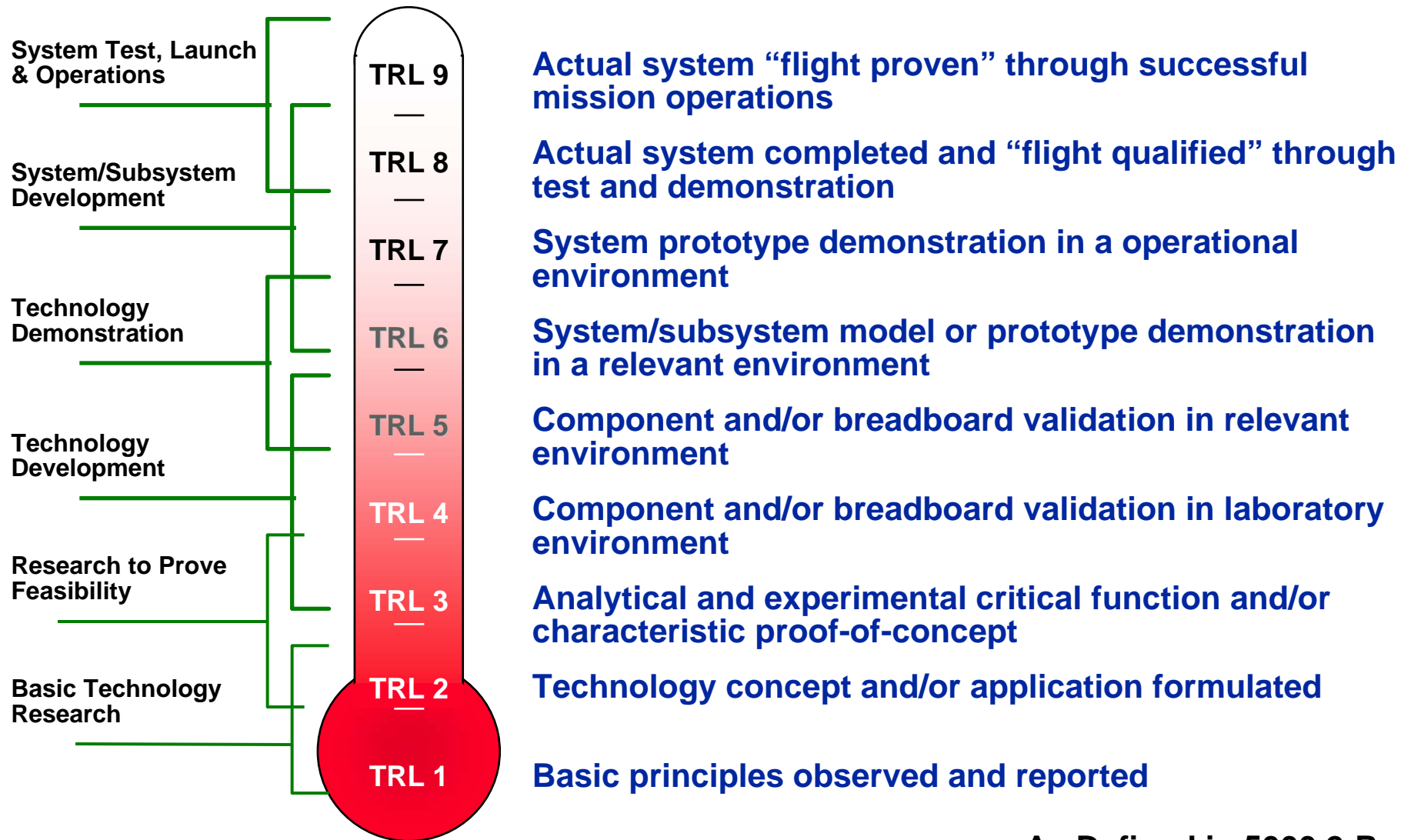
Technology Readiness Levels (TRLs) Background

- **GAO report, “ Best Practices- Better Management of Technology Development Can Improve Weapons System Outcomes”**
- **Inclusion in DoD 5000-Series Acquisition Documents**
- **Defense S&T Advisory Group Recommended Establishment of a TRL IPT**
 - **Develop a framework and guidelines for consistent implementation**

Consensus: Proper Use of TRLs Provides Effective Acquisition Assessment Tool

Measuring Technology Maturity

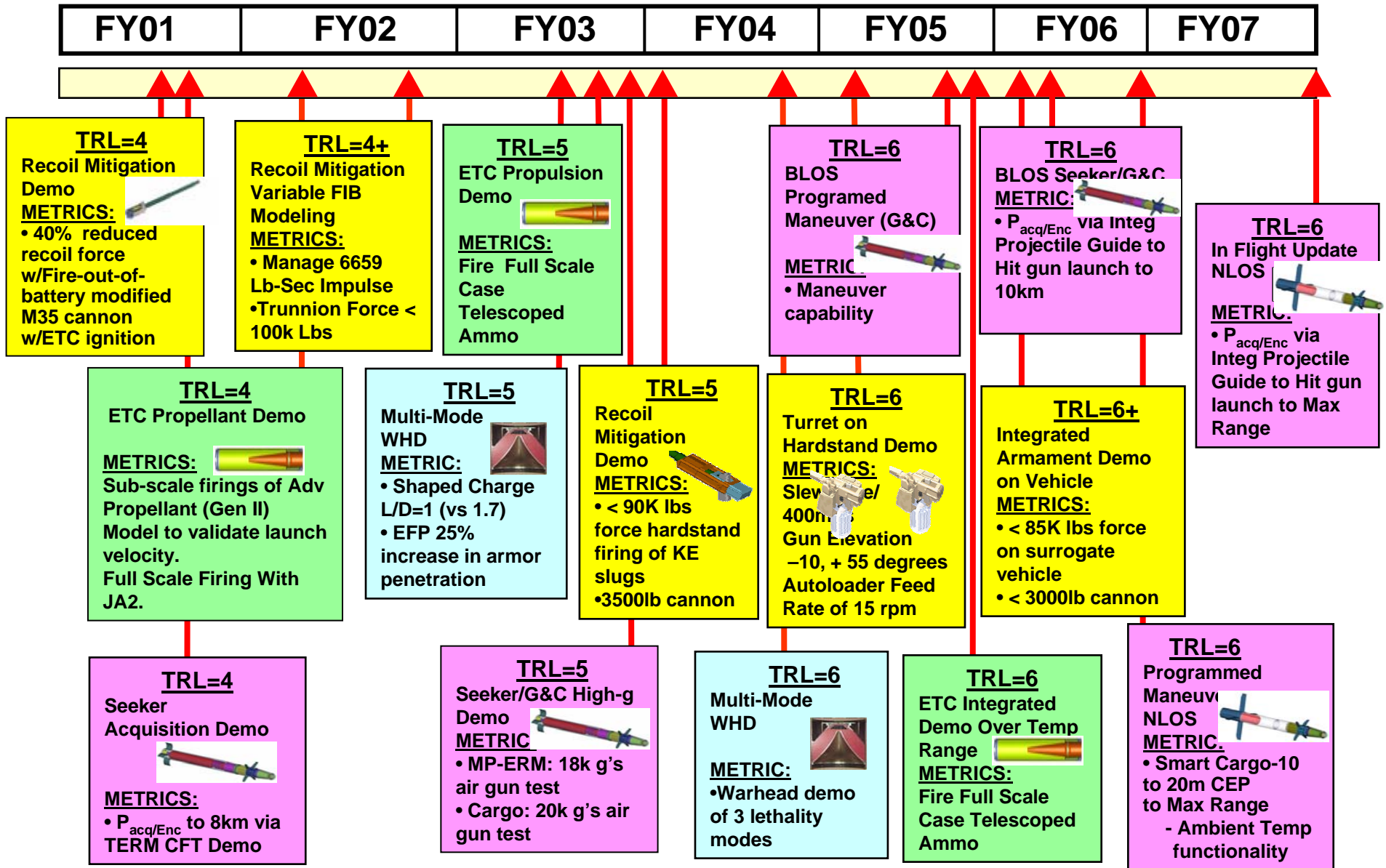
Technology Readiness Levels



As Defined in 5000.2-R

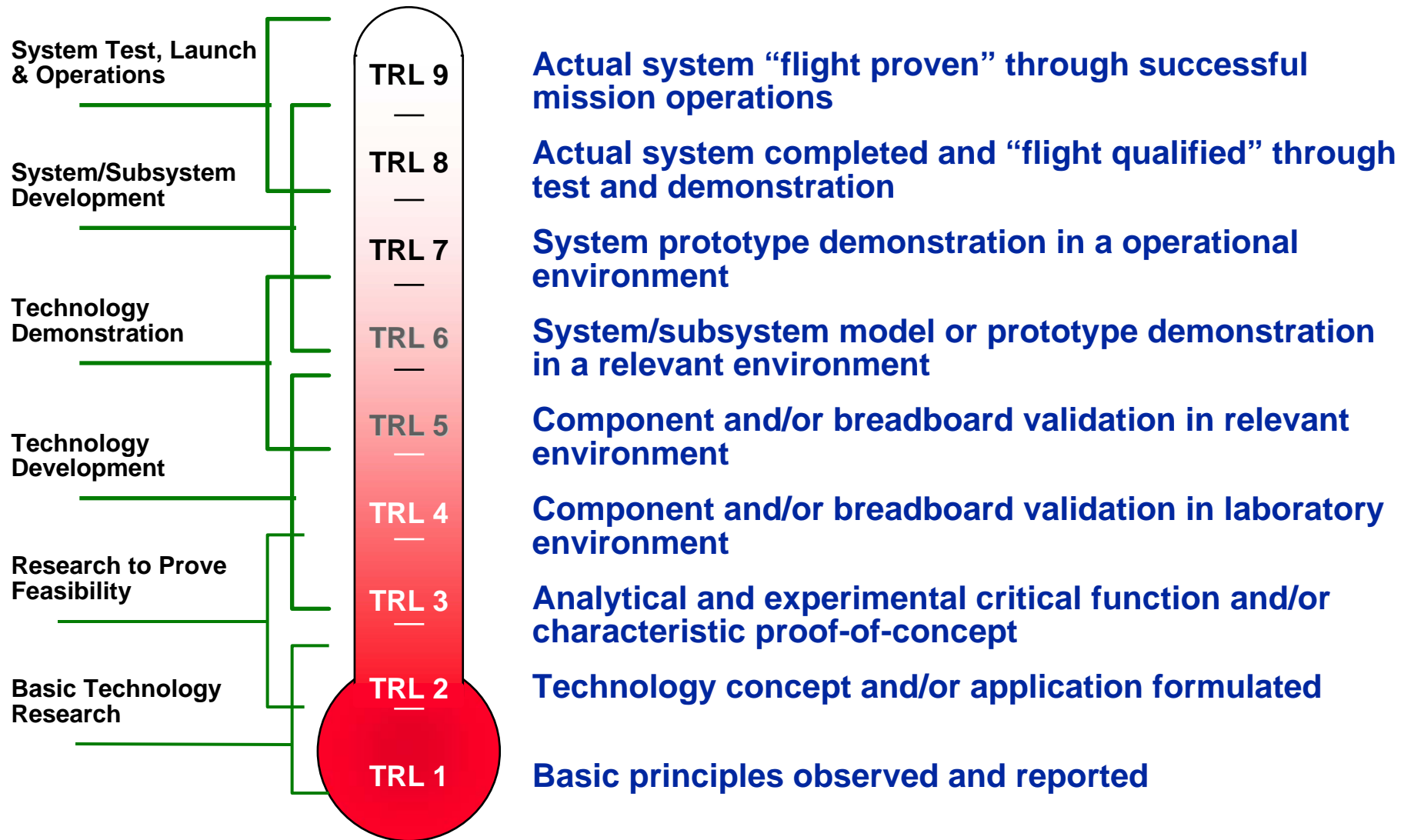
FCS Multi-Role Armament & Ammunition ATD

(III.WP.1999.01)



Measuring Technology Maturity

Technology Readiness Levels



Transition Thrusts

SYSTEM / COMPONENT DEVELOPMENT

- Quick Reaction Projects (less than 12 months)
- Advanced Concept Technology Demonstration (1-5 years)

SYSTEM ACQUISITION

- Warfighter Rapid Acquisition Fund
- Spiral Acquisition

CONCEPT EXPLORATION

- Joint Experimentation
- Modeling & Simulation

COMMERCIAL OPPORTUNITIES

- Defense Acquisition Challenge
- Venture Capital Fund

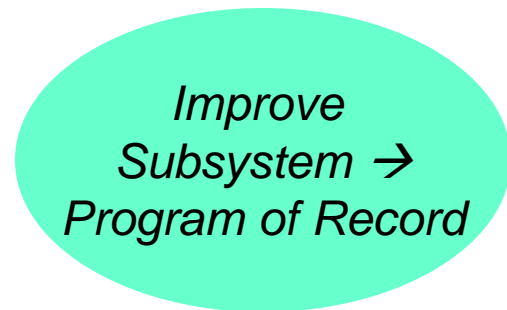
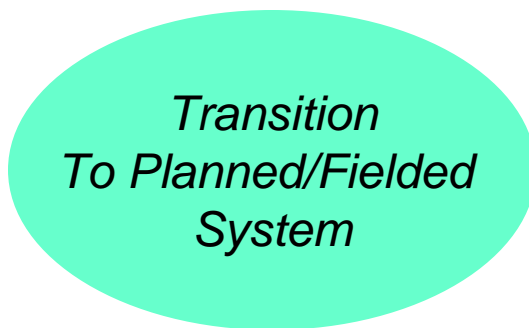
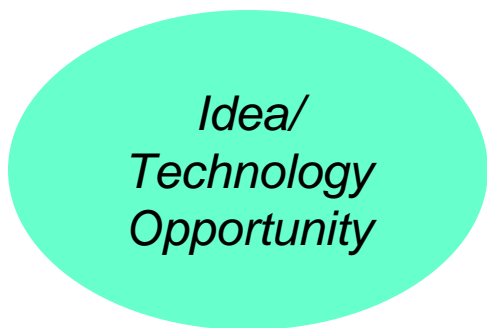
Objective
Speed Rapid Technology Development



Quick Reaction Fund

Technology Transition Initiative

Defense Acquisition Challenge



***Three Complementary Projects to Develop
Technology at Different Maturity Levels***

QUICK REACTION FUND PROGRAM DESCRIPTION

- **Initiate high priority or high leverage technology efforts during the execution year**
- **Provide opportunity to execute within technology cycle in rapidly maturing technology**
- **Provide flexibility to respond to emergent DoD issues and address surprises and needs in real time**
 - **Technology matures in less than a year in some areas**
 - **Responds to technology opportunities in major acquisition programs**
- **Address cycle time discontinuity between DoD-programming and execution for rapidly evolving civil sectors**

Examples of Quick Reaction Efforts

Thermobaric Hellfire Enhanced Capability

Chemistry to the Field in one year - Increased Blast Lethality in Multi-Room Structures

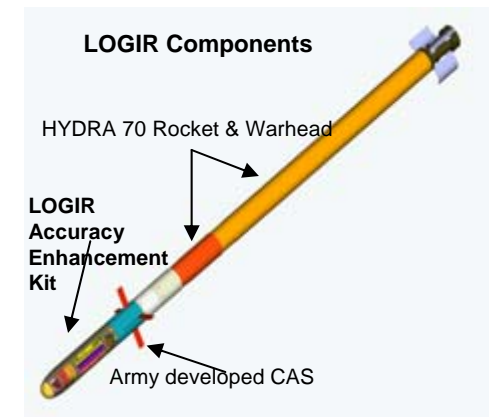
- Rapid Reaction to War Fighter Need; start Jan 02
- Form/Fit/Function Drop-In Warhead Section
- Unique Enhanced Explosive Formulation (metal augmented charge)
- Retains Effectiveness in Remaining Hellfire Blast-Frag Target Set
- Available for possible global war on terrorism



Low-Cost Imaging Rocket (LOGIR)

Making 2.75" Rocket Smart – Fire and Forget

- Rapid reaction to integrate precision guidance with developing weapon; start May 02
- Improve ability to kill moving and fixed targets
- Reduce warfighter exposure while increasing success
- Increase lethality while reducing collateral damage
- First flight Jan 03; Complete System ~4QFY03



Examples of Quick Reaction Efforts - Thermobaric Weapons

Rapid Technology Transition



- A “Quick Reaction” type development, enabled by base S&T program and ACTD Framework
- Chronology: Program Approved 21 Sept
 - **Small Quantity Lab Testing – Oct 01**
 - **Full Up Static Test – Nov 17**
 - **Flight Tested - Dec 14**
- Funding: Approximately \$6M

Theory → *Weapon*
3 months

Defense Acquisition Challenge Program

Authorized by Title 10, USC, Sec 2395b

- **Established to provide opportunities for increased introduction of innovative and cost-saving technology or products into existing Department of Defense (DoD) acquisition programs.**
- **Provides any person or activity within or outside DoD the opportunity to propose alternatives, known as “Challenge Proposals”, at the component, subsystem, or system level of an existing DoD acquisition program that would result in improvements in performance, affordability, manufacturability, or operational capability of that acquisition program.**

Defense Acquisition Challenge Program Schedule

- FY 2003/2004 Program Process/Schedule
 - Release of Broad Area Announcement – 15 March
 - Receipt of draft vendor proposals – 1 April
 - Receipt of final vendor proposals – 2 June
 - OSD level Review Panel – 3-5 June
 - Funding of selected FY 2003 DACP projects – 1 August
- FY 2005/2007 Program Process/Schedule
 - Biannual solicitation, appraisal, selection and execution process continued

<http://www.acq.osd.mil/cto/>

DoD Technology Transition Programs



***Dual Use Science & Technology
DUS&T***

Small Business Innovative Research - SBIR

Manufacturing Technology - ManTech

Title III / Defense Production Act

Independent Research & Development *

Dual Use Science & Technology (DUS&T)

Objective - Partner with Industry to Jointly Fund the Development of Dual Use Technologies Needed to Maintain DoD's Technological Superiority on the Battlefield & by Industry to Remain Competitive in the Marketplace

Basic Tenets:

- Cost sharing between the Military Services & Industry (Traditional and Non-Traditional)
- Use of “Other Transactions” in lieu of standard contracting to attract commercial firms
- Formation of partnerships with industry to develop dual use technologies

Example: Active Brake System for the HMMWV & Commercial Trucks



Manufacturing Technology (ManTech)

Objective: Improve Affordability of DoD Systems by Investing in New & Improved Manufacturing Processes & Equipment Across The Weapon System Life Cycle

Program Attributes

- Improve Cycle Time & Process Capabilities
- Demonstrate Key Information Technologies
- Adopt Best Commercial Practices for Military Applications

Example: Optics Manufacturing



1990



- Optics Processing Was Labor Intensive
 - Artisan Based
- Industry Was Moving “Off Shore”



2000

- Processing uses CNC Machines
- U.S. has become a world leader
- 5x grinding + 4x better surface = 4x faster polishing

Defense Production Act / Title III

Purpose: Create, expand, modernize, and maintain domestic production capacity for essential items and industrial resources needed for national defense

Incentives to Industry:

- DoD shares cost of capital investments
- Process improvements
- Material qualification
- Purchase commitments

Example: Gallium Arsenide Wafers

- Wafer prices reduced by 40%
- U.S. producers global market share increased from 25% to 60%
- Systems using GaAs - Cheaper, more reliable, and more capable



Small Business Innovation Research (SBIR)

- Stimulates Technological Innovation
- Increases Small Business Participation in Federally Funded R&D
- Encourages Commercialization of Technology

FY00 Funding

- Federal Agencies: \$1.1B
- DoD: \$564M
- DUSD(S&T): \$26M
 - Cognitive Readiness
 - Advanced Distributed Learning
 - Smart Sensor Web
 - Biomedical Programs

Program Phases

- **Phase I:** Six months/\$100,000 (feasibility study)
- **Phase II:** Two years/\$750,000 (prototype development)
- **Phase III:** Commercialize for military & private sector markets

- **Example: Acoustic Mouthpiece Using Terfenol-D**
 - Low Voltage Transducer Embedded Inside a SCUBA Diver's Mouthpiece
 - Allows Diver to Hear Through Dental Sound Conduction
 - Capability Will Be Available for Special Forces Divers Without Full Face Masks

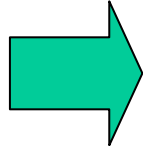


Independent Research & Development (IR&D)

DoD/Industry Interaction

DoD

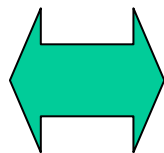
Provide information on DoD's R&D activities & plans, mission needs, & operational requirements



Industry

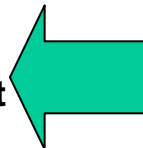
Plan, fund, and conduct IR&D

Review IR&D activities and provide feedback to contractors



Provide technical information about IR&D

Review IR&D database to identify IR&D of interest



Provide IR&D project descriptions

Example: Army After Next



- Program efforts in areas of battery technology, hybrid electric vehicle programs, and energy storage technologies
- Estimate savings: \$50M

Bottom Line: Warfighter Confidence



*Right Materiel, Right Place,
Right Time, at the Right Cost -*

All The Time