Transitioning S&T Programs

Defense Systems Acquisition Management Course
June 19, 2003

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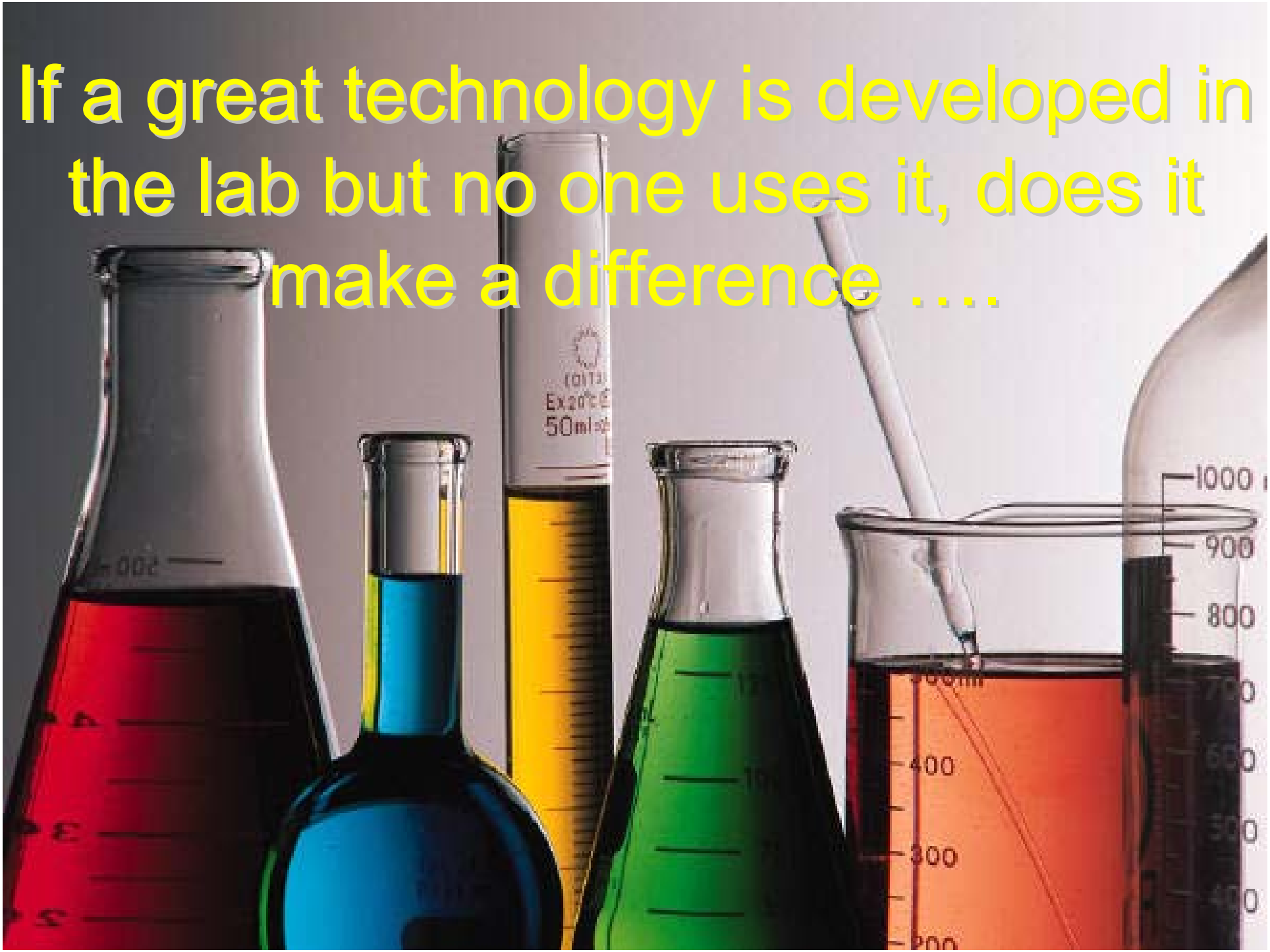
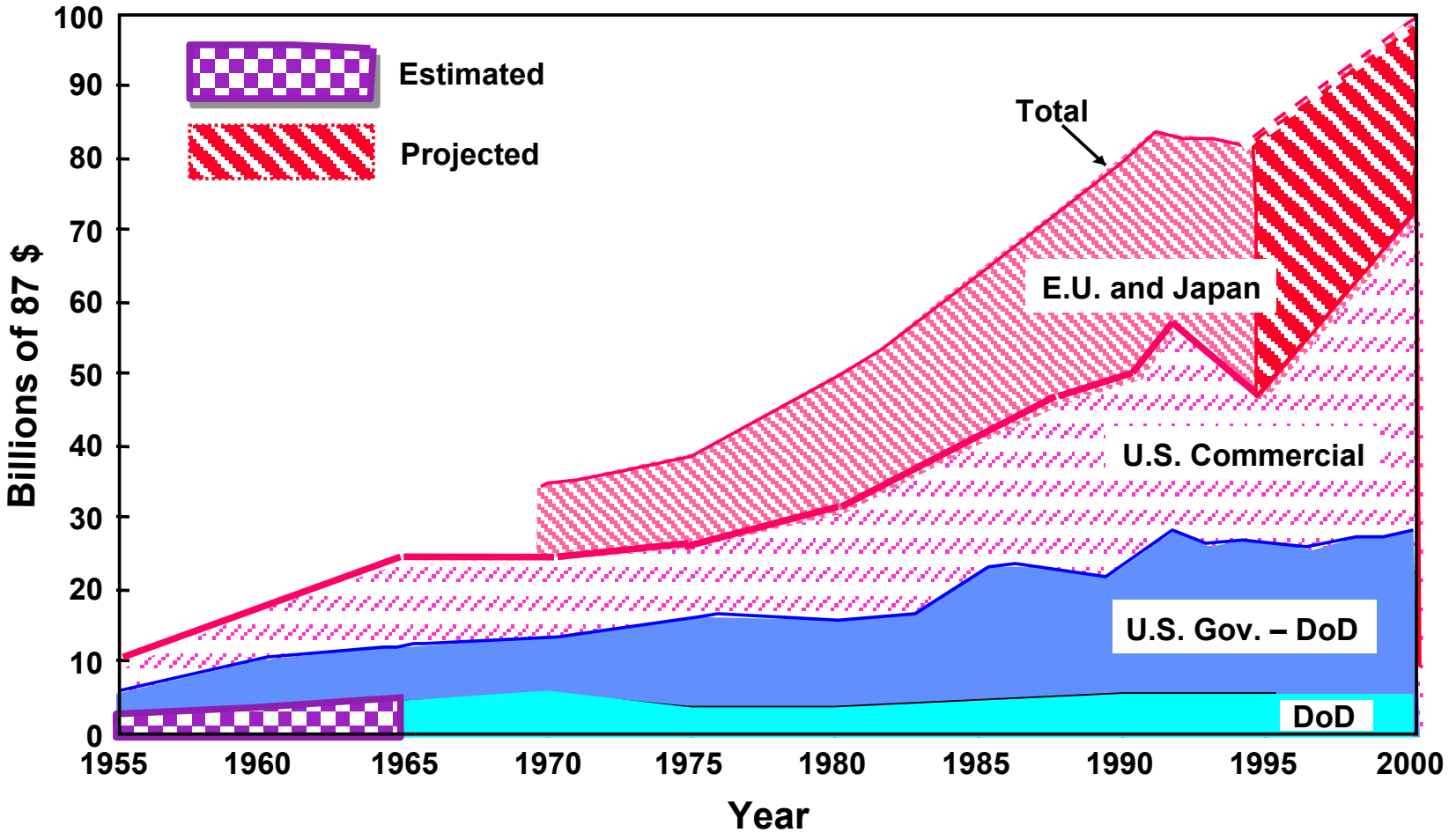
Director, Plans and Programs
Office of Director, Defense Research and Engineering


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

Overview

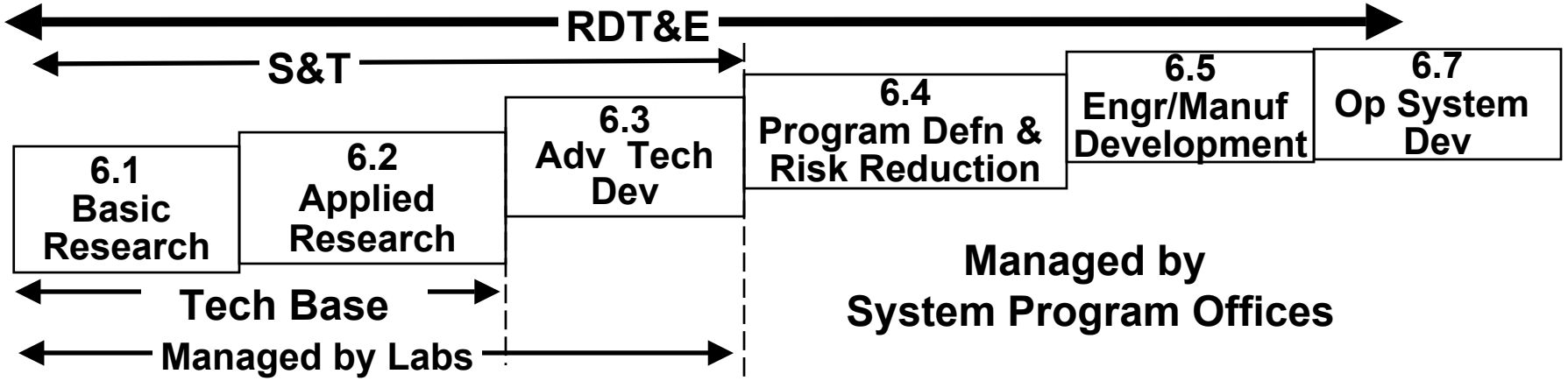
- Why Focus on Transition Issues?
- DoD Best Practices
  - Army
  - Navy
  - AF
  - DoD-Wide
- Technology Readiness Levels
- Technology Transition Thrusts and Opportunities
- Industry Role
- Summary

U.S. and Worldwide Research Base Since WWII

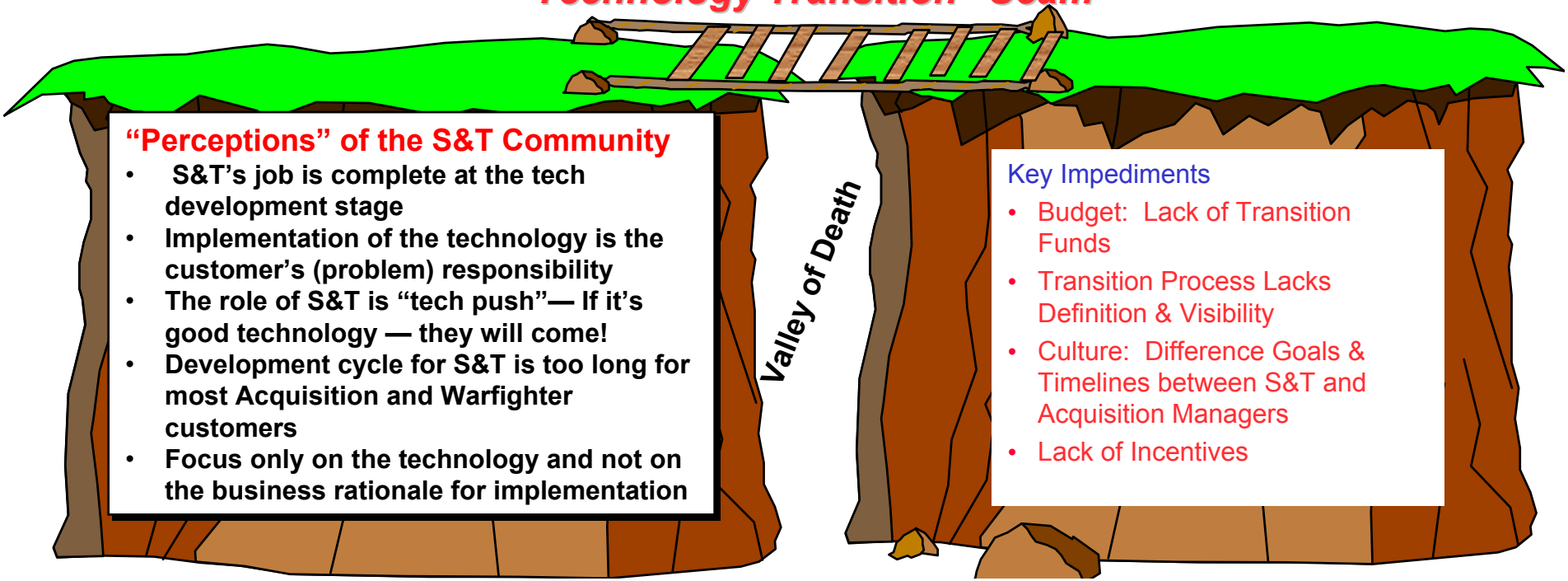


Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation

Speeding Technology Transition
"The Challenge"



Technology Transition "Seam"



"Perceptions" of the S&T Community

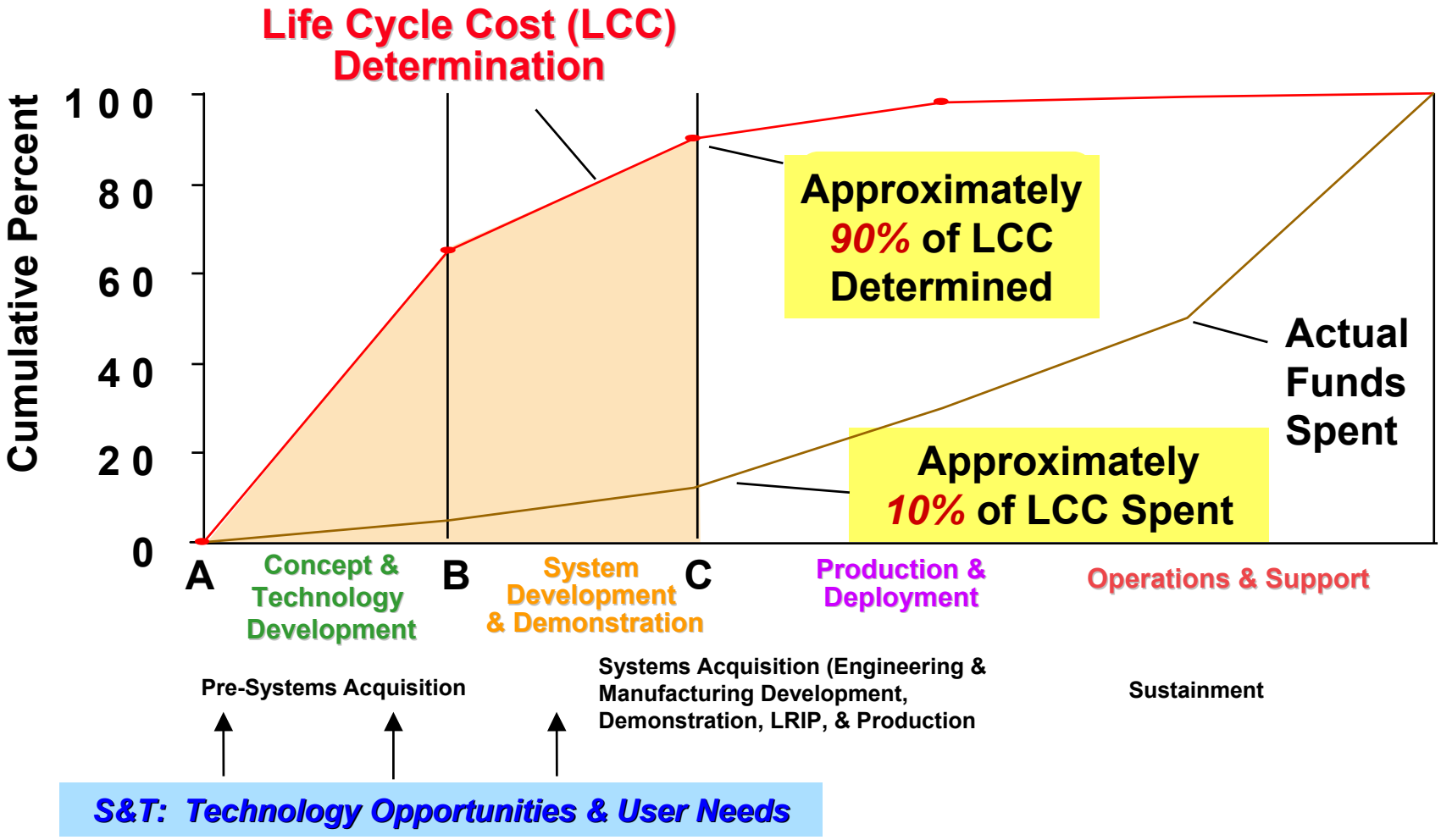
- S&T's job is complete at the tech development stage
- Implementation of the technology is the customer's (problem) responsibility
- The role of S&T is "tech push"— If it's good technology — they will come!
- Development cycle for S&T is too long for most Acquisition and Warfighter customers
- Focus only on the technology and not on the business rationale for implementation

Key Impediments

- Budget: Lack of Transition Funds
- Transition Process Lacks Definition & Visibility
- Culture: Difference Goals & Timelines between S&T and Acquisition Managers
- Lack of Incentives

Why Transition in S&T?

Acquisition Community is Focused on Cost Reduction Throughout Life Cycle



Dimensions to Technology Transition

- Rate of Technology Change is Increasing
- Capabilities-based Planning Changes Requirements/Needs Process
- 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:**	**Jun 98**	**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.

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

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
As of April 2002

- **DoDD 5000.1, The Defense Acquisition System**
  - Rapid & Effective Transition From S&T to Products
  - Emphasis on Cost & Affordability in Program Development
- **DoDD 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
- **DoD 5000.2-R, Procedures for Acquisition Programs**
  - Establish Technology Readiness Levels (TRLs) for Critical Technologies

Documents Available at http://www.acq.osd.mil/ara/

Changes to Defense Acquisition Regulation

- **DoDD 5000.1, The Defense Acquisition System**
  - Rapid & Effective Transition From S&T to Products
  - Emphasis o ent
- **DoDD 5000.2**
  - Identify S&T
  - Reduce Tec ss
  - Use Mechanisms with User & Acq. Customer to Ensure Transition
    - ATDs, ACTDs, Service & Joint Experiments
- **DoD 5000.2-R, Procedures for Acquisition Programs**
  - Establish Technology Readiness Levels (TRLs) for Critical Technologies

Cancelled By DepSecDef Oct 2002

Why? "To create an acquisition policy environment that fosters efficiency, flexibility, creativity, and innovation"

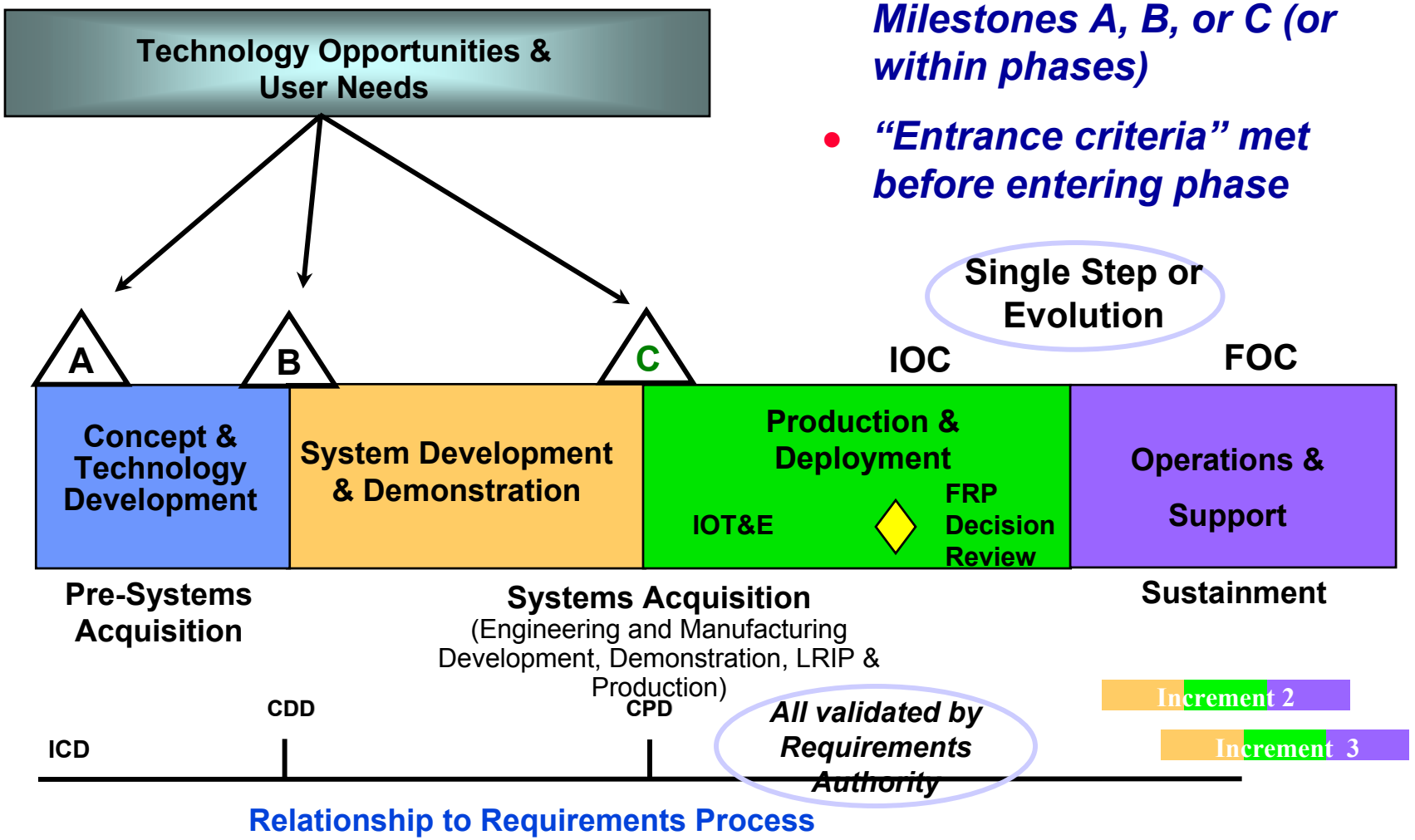
Additional DepSecDef Guidance 30 Oct 2002

- DepSecDef Issued Interim Guidance (~40 Pages):
  - Reaffirmed the Importance of Technology Transition
  - Reaffirmed Evolutionary Acquisition
  - Reaffirmed Technology Development as a Continual Process
  - Directed Continuation of Technology Readiness Assessments and Independent Technology Assessments (Milestones B/C)

DEPSECDF Intent: Streamline Acquisition, with increased flexibility for technology insertion

The Acquisition Model

- *Process entry at Milestones A, B, or C (or within phases)*
- *"Entrance criteria" met before entering phase*



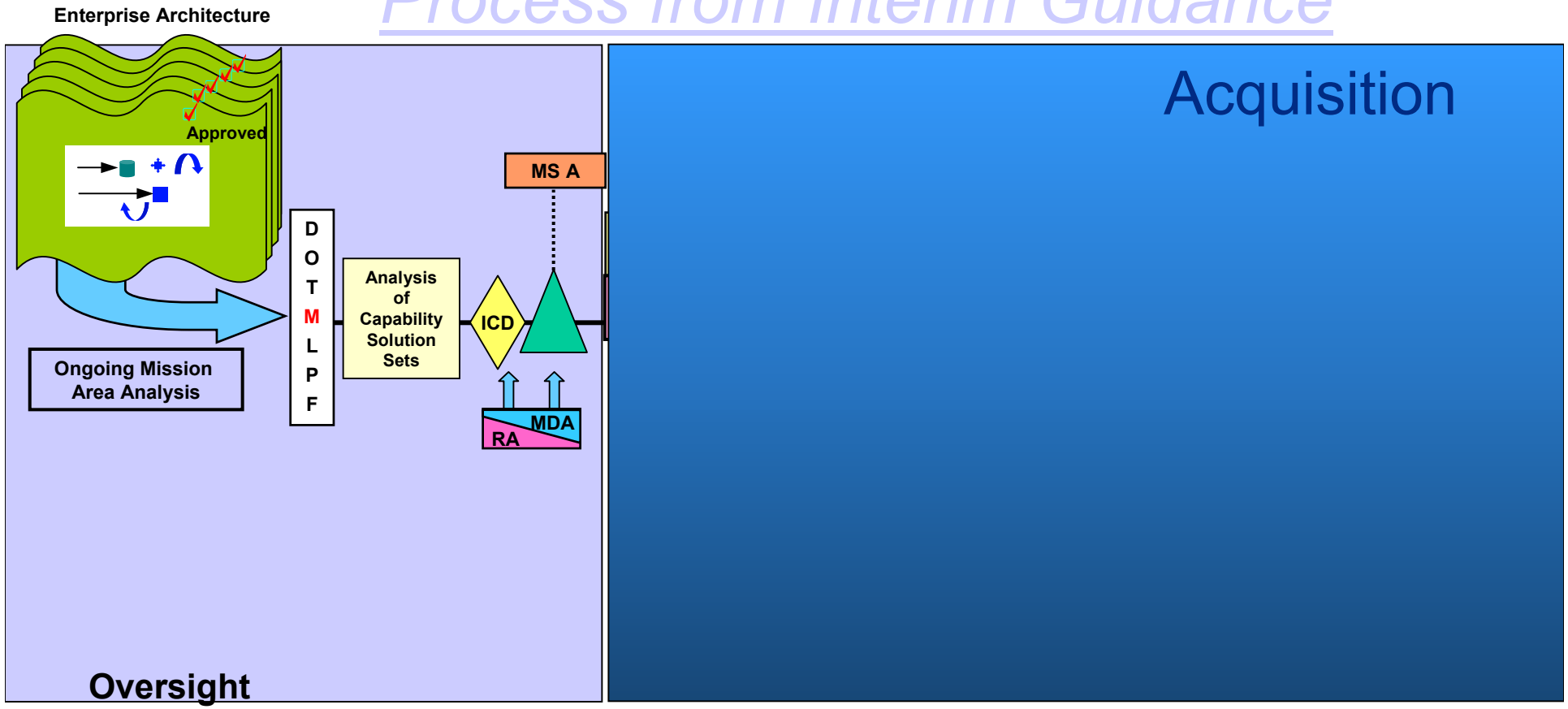
Relationship to Requirements Process

Changes to Requirements Process

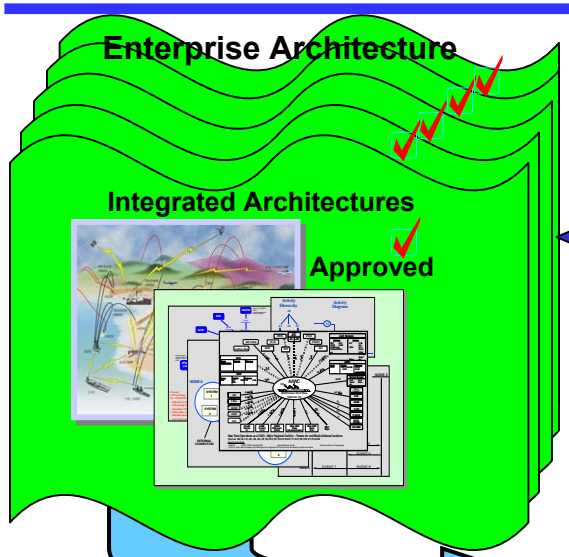
- Warfighter “owns” the Requirements Process
- Moving to Top-Down “Joint Capabilities Integration”
- Key Documents:
  - Joint Integrating Architecture (JIA) (Pre MS-A)
  - Initial Capabilities Document (ICD) (Pre MS-A)
  - Capability Development Document (CDD) (MS-B)
  - Capability Production Document (CPD) (MS-C)
  - Capstone Requirement Document (CRD)

Possible Future Requirements / Acquisition Process

Process from Interim Guidance



Initial Requirements Process



Multi-Mission Area Analysis

D O T M L P F

Analysis of Capability Solution Sets

Develop Range of Solutions

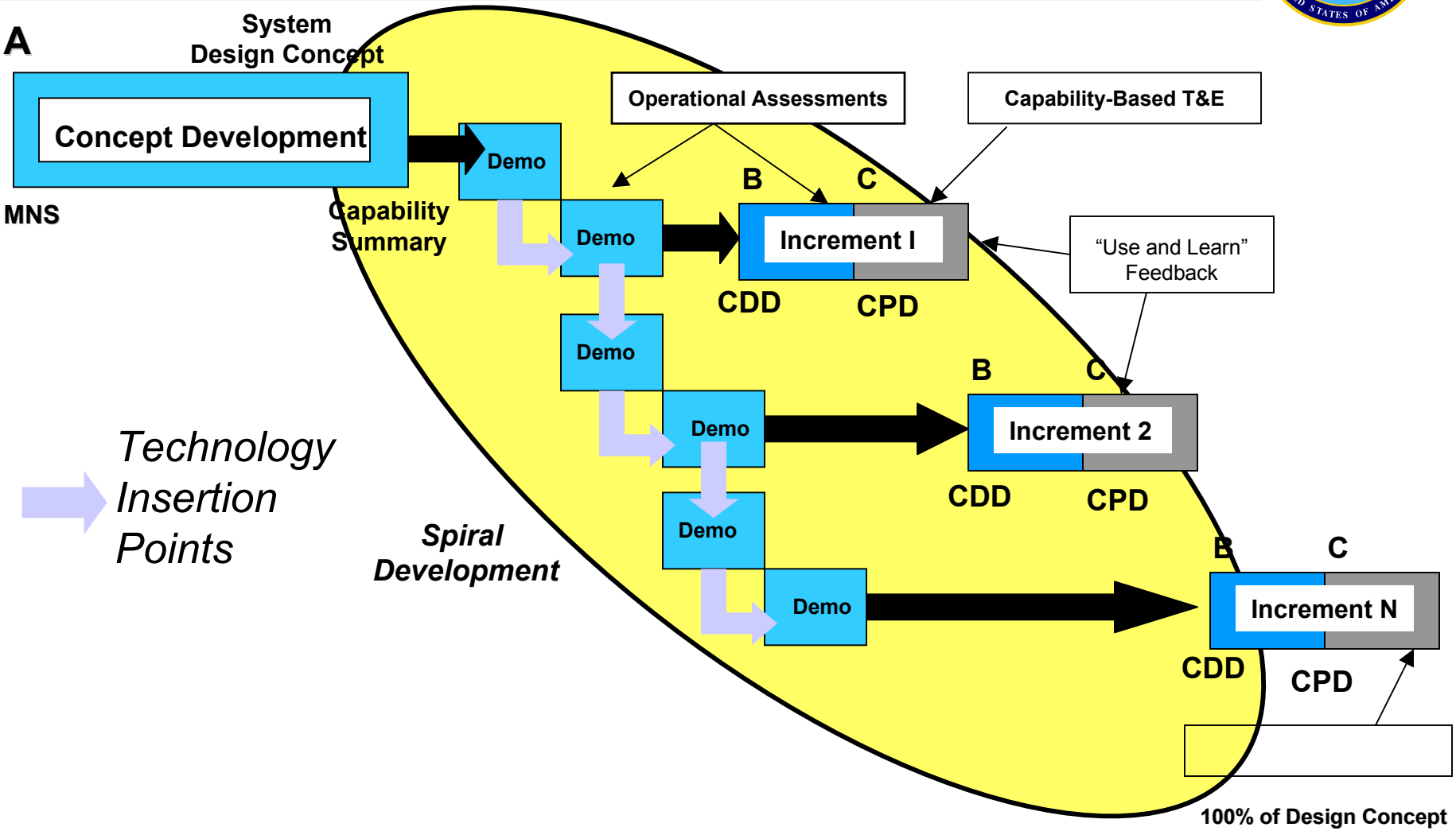
- JWCAs
- Services, Agencies, OSD
- Combatant Commanders
- Laboratories
- Industry
- Considers DOTMLPF

Sets Baseline for Technology Development Strategy

Initial Capabilities Document

- Captures the capability shortfall in terms of the integrated architecture(s)
- Critical capabilities to satisfy the requirement
- "Best" Joint solution
- Service Sponsor
- DOTMLPF

Evolutionary Acquisition and Spiral Development



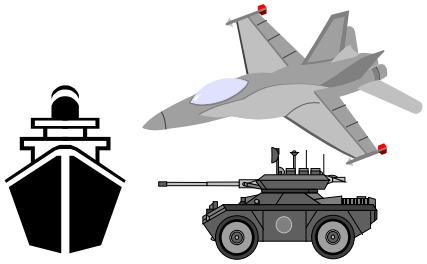
Every Spiral Should Enhance Capability

Best Practices

All Services are moving their acquisition processes

FROM

S&T

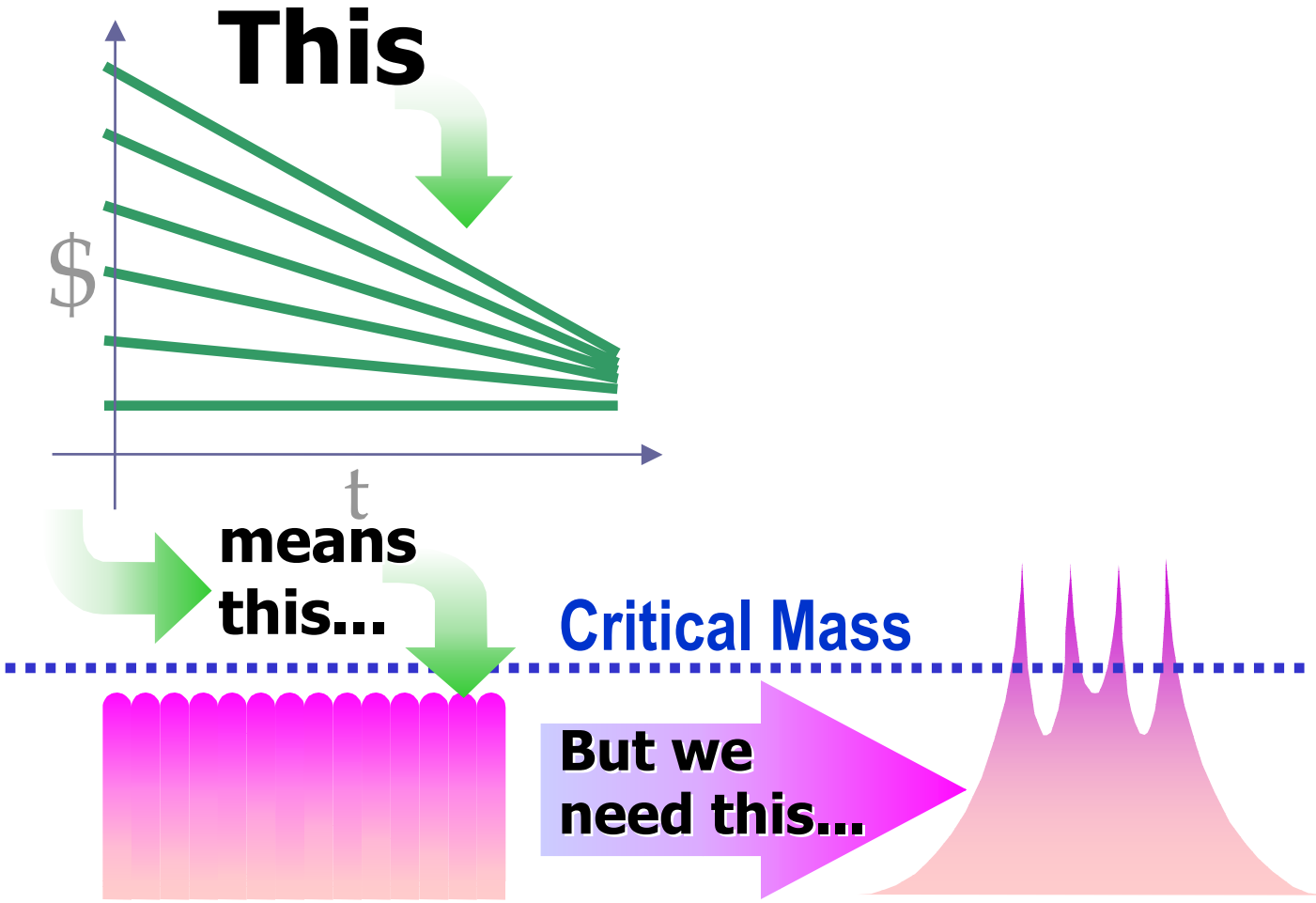


Acq

TO

Right
- *Technology*
- *People*
- *Time*

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

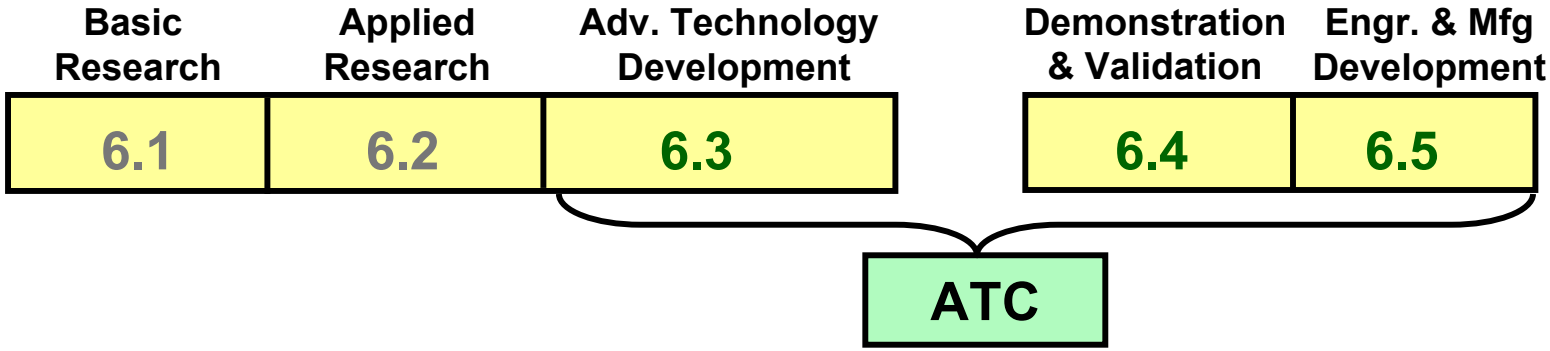
Navy FNC IPT Approach

- **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

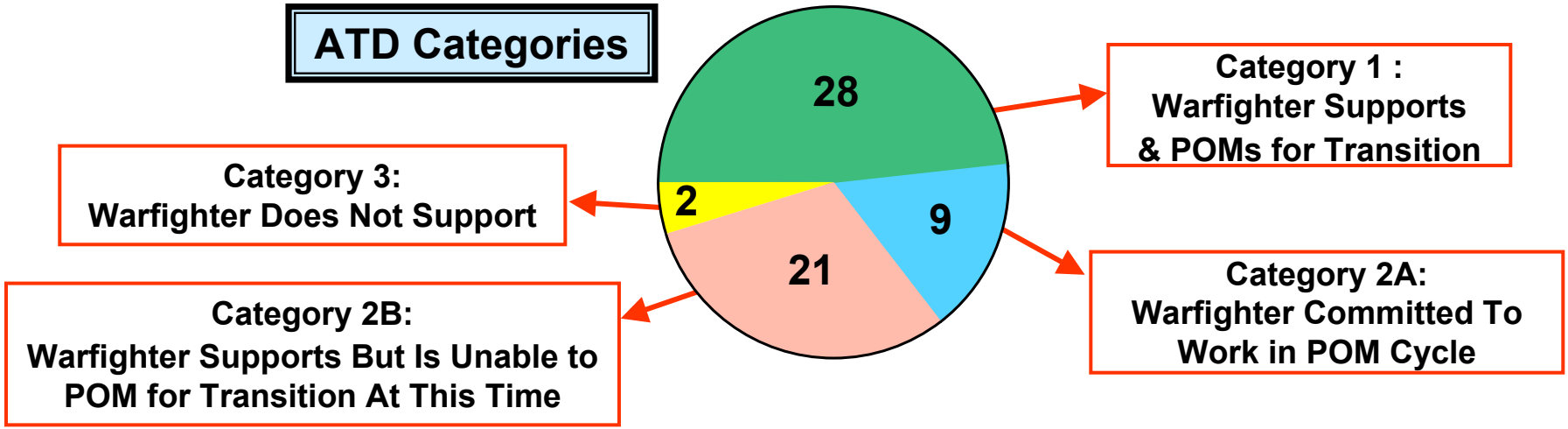
Air Force ATC



Lab (👎👎)
- Identifies ATD Candidates
- Budgets for Technology
- Develops Transition Strategies

Product Center (👎👎👎)
- Interprets Requirements
- Builds the Transition Program
- Integrates Technology into Systems

MAJCOM (👎👎👎)
- Defines Requirements
- Budgets for Development & Production Funds



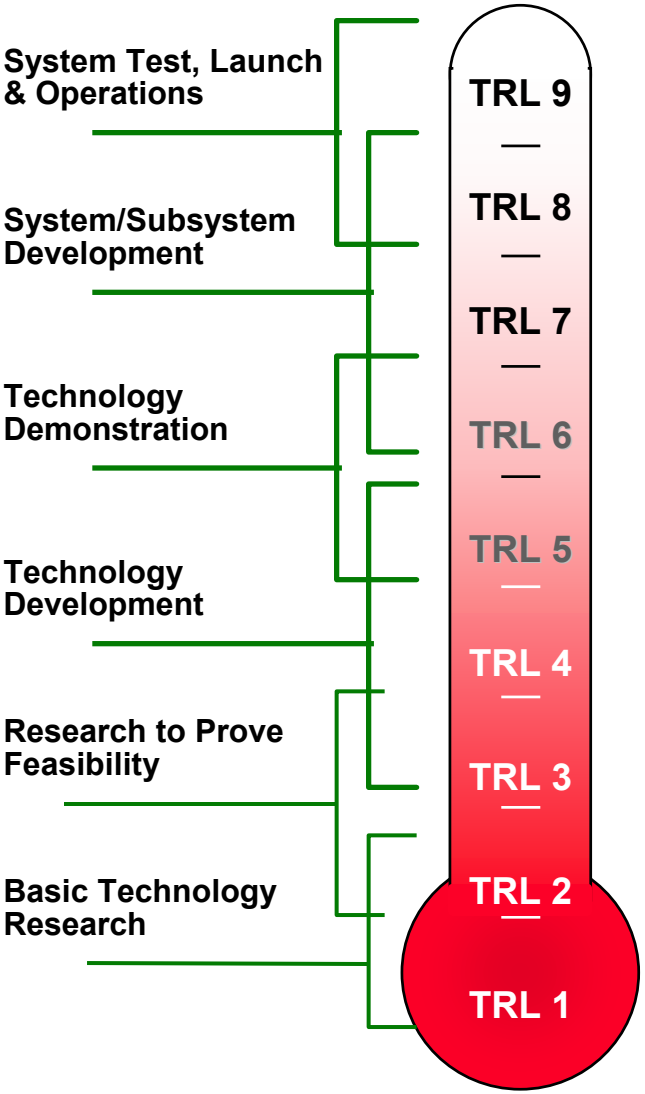
Technology Readiness Levels (TRLs)
Background

- 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



TRL 9 — Actual system "flight proven" through successful mission operations

TRL 8 — Actual system completed and "flight qualified" through test and demonstration

TRL 7 — System prototype demonstration in a operational environment

TRL 6 — System/subsystem model or prototype demonstration in a relevant environment

TRL 5 — Component and/or breadboard validation in relevant environment

TRL 4 — Component and/or breadboard validation in laboratory environment

TRL 3 — Analytical and experimental critical function and/or characteristic proof-of-concept

TRL 2 — Technology concept and/or application formulated

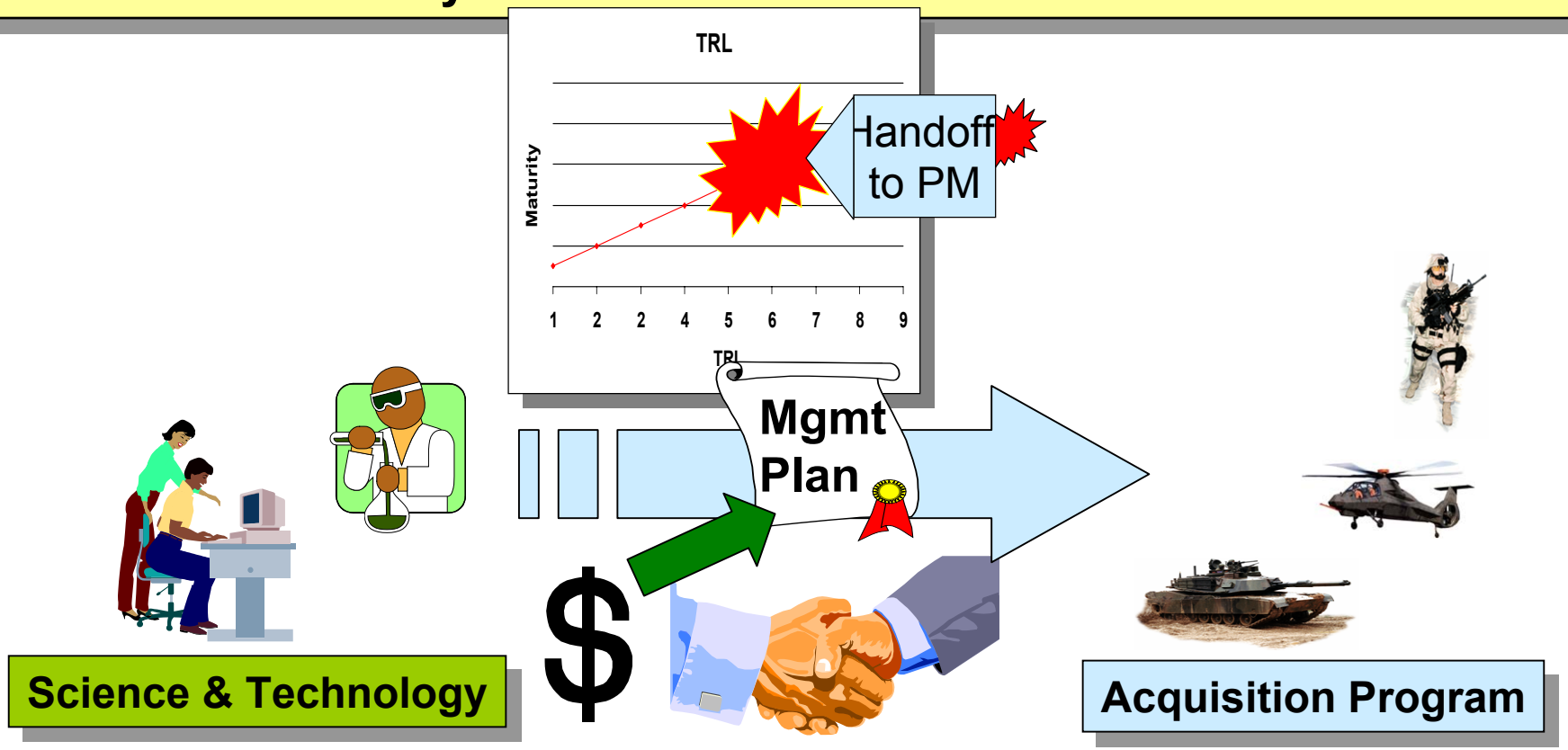
TRL 1 — Basic principles observed and reported

As Defined in 5000.2-R

Army Transition Plans

Develop directive from senior stakeholders requiring:

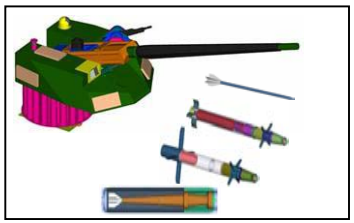
- Transition plans synchronized/supported in S&T & PM budgets
- Achievement of key Technology Readiness Levels as an exit criteria
- Use of affordability as an exit criteria



Army ATD Management Plans
Accelerating Transition

- ***Coordinated and Documented partnership between Warfighting Customer, Technology Developer and Acquisition Buyer***
- ***Proposed by Technologists and Tacticians***
- ***Approved by GO/SES***
  - ***HQ TRADOC Combat Developer***
  - ***HQDA Chief Scientist***
  - ***HQDA, G8 Force Development***
  - ***PEO/PM***

ATD Management Plan



Commitments to Transition needed Technology as Fast as Possible

FCS Multi-Role Armament & Ammunition ATD

(III.WP.1999.01)

FY01	FY02	FY03	FY04	FY05	FY06	FY07

TRL=4
Recoil Mitigation Demo

METRICS:
• 40% reduced recoil force w/Fire-out-of-battery modified M35 cannon w/ETC ignition

TRL=4+
Recoil Mitigation Variable FIB Modeling
METRICS:
• Manage 6659 Lb-Sec Impulse
•Trunnion Force < 100k Lbs

TRL=5
ETC Propulsion Demo

METRICS:
Fire Full Scale Case Telescoped Ammo

TRL=6
BLOS Programed Maneuver (G&C)

METRIC
• Maneuver capability

TRL=6
BLOS Seeker/G&C

METRIC:
• $P_{acq/Enc}$ via Integ Projectile Guide to Hit gun launch to 10km

TRL=6
In Flight Update NLOS

METRIC:
• $P_{acq/Enc}$ via Integ Projectile Guide to Hit gun launch to Max Range

TRL=4
ETC Propellant Demo

METRICS:
Sub-scale firings of Adv Propellant (Gen II) Model to validate launch velocity.
Full Scale Firing With JA2.

TRL=5
Multi-Mode WHD

METRIC:
• Shaped Charge L/D=1 (vs 1.7)
• EFP 25% increase in armor penetration

TRL=5
Recoil Mitigation Demo

METRICS:
• < 90K lbs force hardstand firing of KE slugs
•3500lb cannon

TRL=6
Turret on Hardstand Demo
METRICS:
Slew Rate/ 400m

Gun Elevation –10, + 55 degrees
Autoloader Feed Rate of 15 rpm

TRL=6+
Integrated Armament Demo on Vehicle
METRICS:
• < 85K lbs force on surrogate vehicle
• < 3000lb cannon

TRL=4
Seeker Acquisition Demo

METRICS:
• $P_{acq/Enc}$ to 8km via TERM CFT Demo

TRL=5
Seeker/G&C High-g Demo

METRIC
• MP-ERM: 18k g's air gun test
• Cargo: 20k g's air gun test

TRL=6
Multi-Mode WHD

METRIC:
•Warhead demo of 3 lethality modes

TRL=6
ETC Integrated Demo Over Temp Range

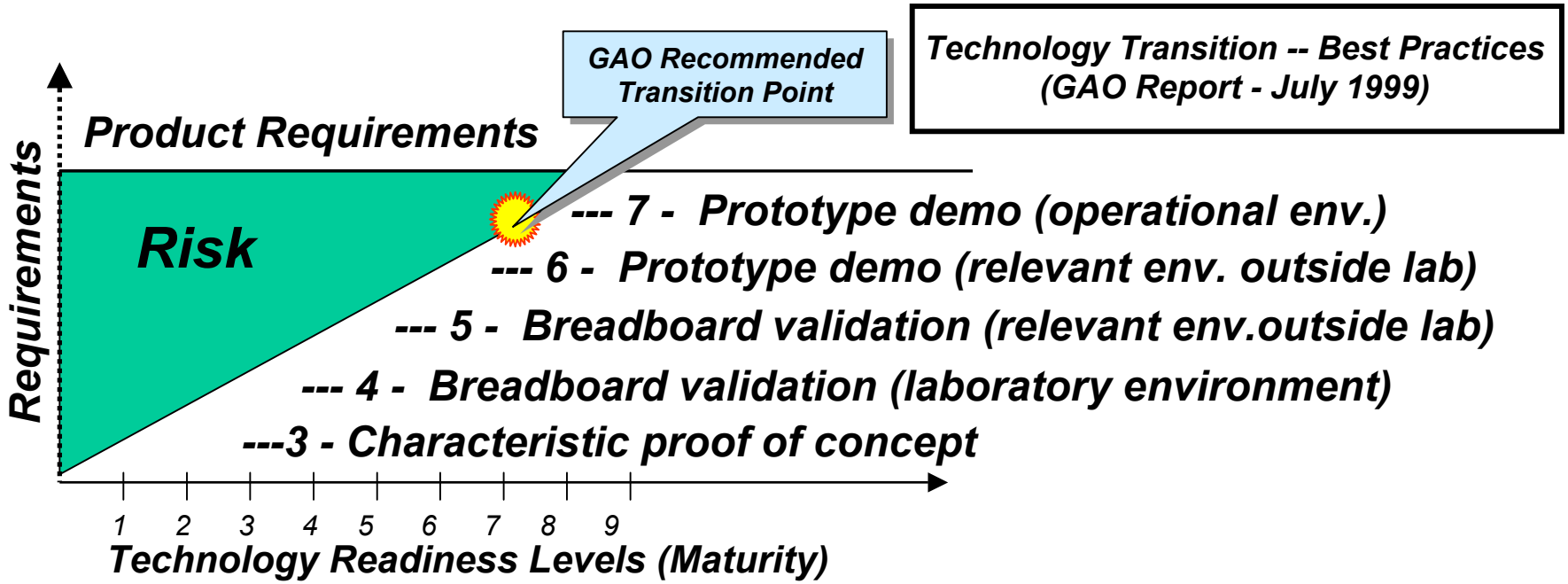
METRICS:
Fire Full Scale Case Telescoped Ammo

TRL=6
Programmed Maneuv

NLOS
METRIC:
• Smart Cargo-10 to 20m CEP to Max Range
- Ambient Temp functionality

Army - Providing Rigor In Technology Transition Management

GAO [http://searchpdf.adobe.com/proxies/2/16/11/77.html]

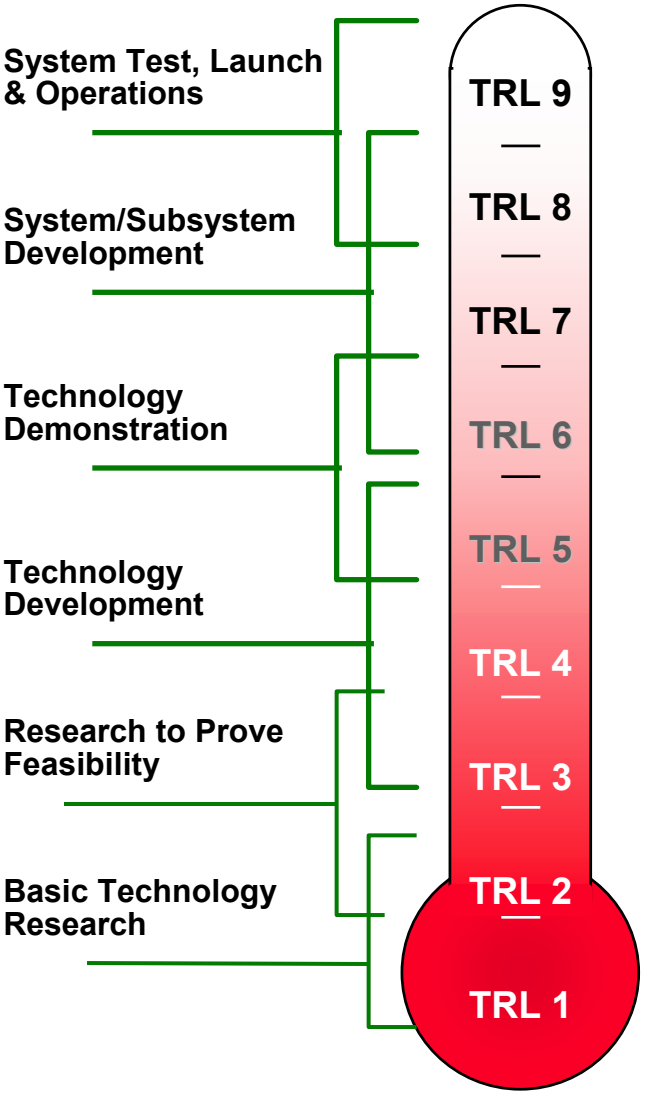


- Technology Readiness synchronized with FCS Schedule
  - > TRL 5 Components/ Subsystems by PDR (FY03)
  - > TRL 6 Components/ Subsystems by CDR (FY04)
  - > TRL 6 System of System Demonstration by end FY05

Army S&T IS using TRLs

Measuring Technology Maturity

Technology Readiness Levels



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As Defined in 5000.2-R

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 EXPLOITATION

- Building Partnerships
- Venture Capital Fund

SPEED OF TECHNOLOGY CHANGE

QRSP was established in FY 03 at $25.4M

FY 2003 Congressional language directed 3 elements to accelerate technology transition

- **Defense Acquisition Challenge Program**
  - Provides opportunities for inserting innovative and cost-saving technology into acquisition programs
  - Funds used only for review and evaluation of proposals, not implementation
- **Quick Reaction Fund**
  - Provides flexibility to respond to emergent DoD needs within budget cycle
  - Takes advantage of technology breakthroughs in rapidly evolving technologies
  - Completion of projects within a 6-12 month period
- **Technology Transition Initiative**

Objective
Speed Rapid Technology Development

Technology Maturity

Quick Reaction Fund	**Technology Transition Initiative**	**Defense Acquisition Challenge**
Idea/ Technology Opportunity	*Transition To Planned/Fielded System*	*Improve Subsystem → Program of Record*

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

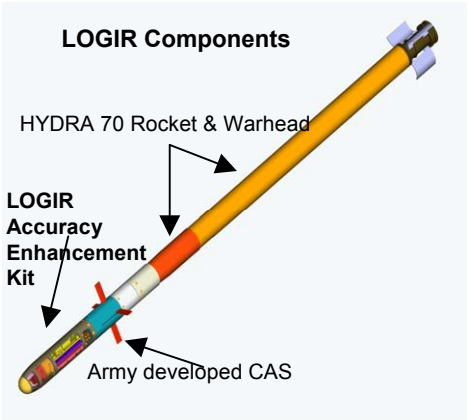
Chemistry to the Field in one year - Increased Blast Lethality in Multi-Room Structures

- 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

Technology Transition Initiative Program Description

- Addresses the gap between the time a technology is demonstrated and the time it gets fielded
- Established by section 242 of the FY 2003 Defense Authorization Act
- Establishes a Technology Transition Manager
- Establishes a Technology Transition Council to provide advice and assistance to the Technology Transition Manager.
  - Science and Technology Executives from each military department and each Defense Agency
  - Acquisition Executives from each military department
  - Members of the Joint Requirements Oversight Council

Technology Transition Initiative Summary

- Promising technological improvements can languish for years waiting for acquisition and operational funding. Technology Transition Initiative (TTI) is the first step toward addressing these challenges.

- TTI provides “seed” funding to accelerate transition of new technology into operational capability.

- Projects will be implemented by a Military Department or Defense Agency.

- OSD to contribute at least 50% of cost from the Technology Transition Initiative Fund

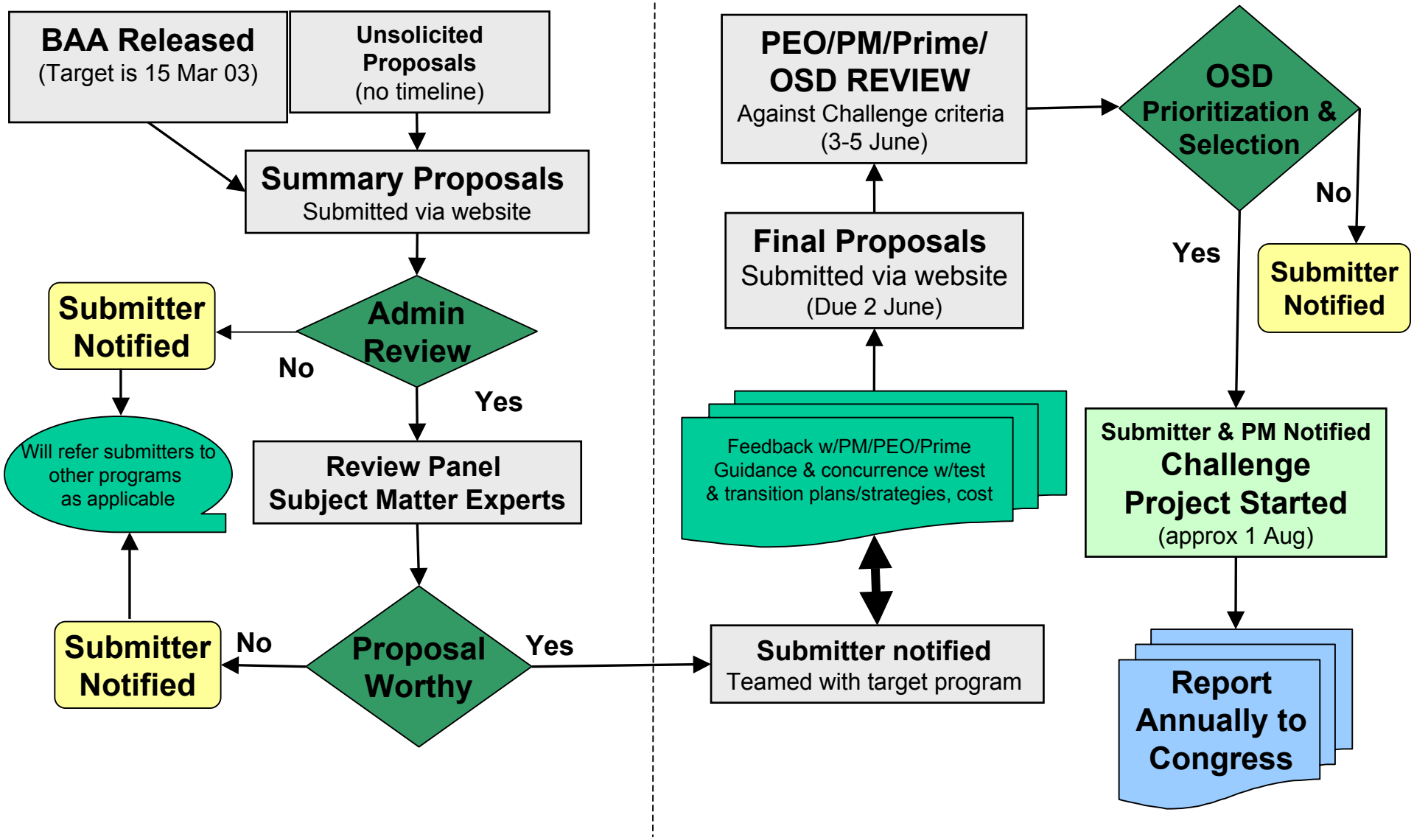
Defense Acquisition Challenge Program
Program Description

- **Authorized by Title 10, USC, Sec 2395b, the Defense Acquisition Challenge Program (DACP) provides increased opportunities for the introduction of innovative and cost-saving technologies into DoD acquisition programs.**

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**

Defense Acquisition Challenge
- Pilot Process



Defense Acquisition Challenge Program Summary

- **This program will provide companies, not already part of the recognized defense industrial base, an opportunity to introduce their innovative technologies into the defense acquisition program.**

DoD Technology Transition Programs

Initial Product/ Process Capability → *Product/Process Development* → *Product/Process Insertion* → *Product/Process Improvement & Sustainment*

Dual Use Science & Technology DUS&T

Small Business Innovative Research - SBIR

Manufacturing Technology - ManTech

Title III / Defense Production Act

Independent Research & Development *

Additional Info: www.dtic.mil/ott

*** Leveraged Industry Funding**

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

BACK UP

Complementary Technology Transition Thrusts

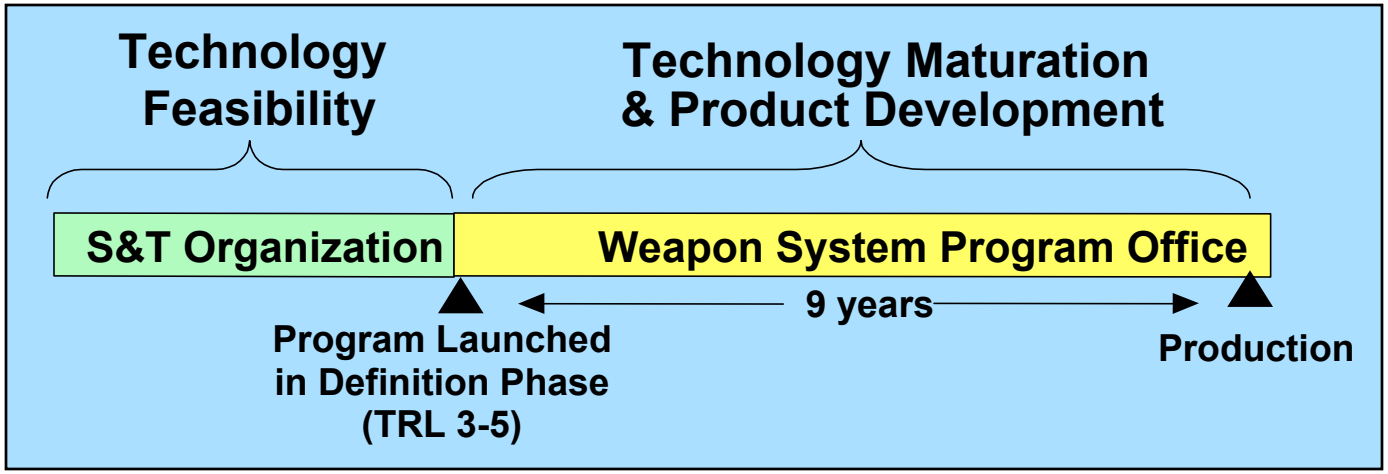
	Time	Deliverable	Cost	Complexity
QRSP *- Anthrax Kill Curves* *- Thermobaric*	Less than 12 months	Components to single or mini systems	$5-10M	Minimal
ACTD *-Predator UAV*	1-5 years	Prototype and Conops	$10-50M	Medium
Acquisition Program *- JSF*	4-20 years	Major Systems	$1B +	Large

Ancillary Programs

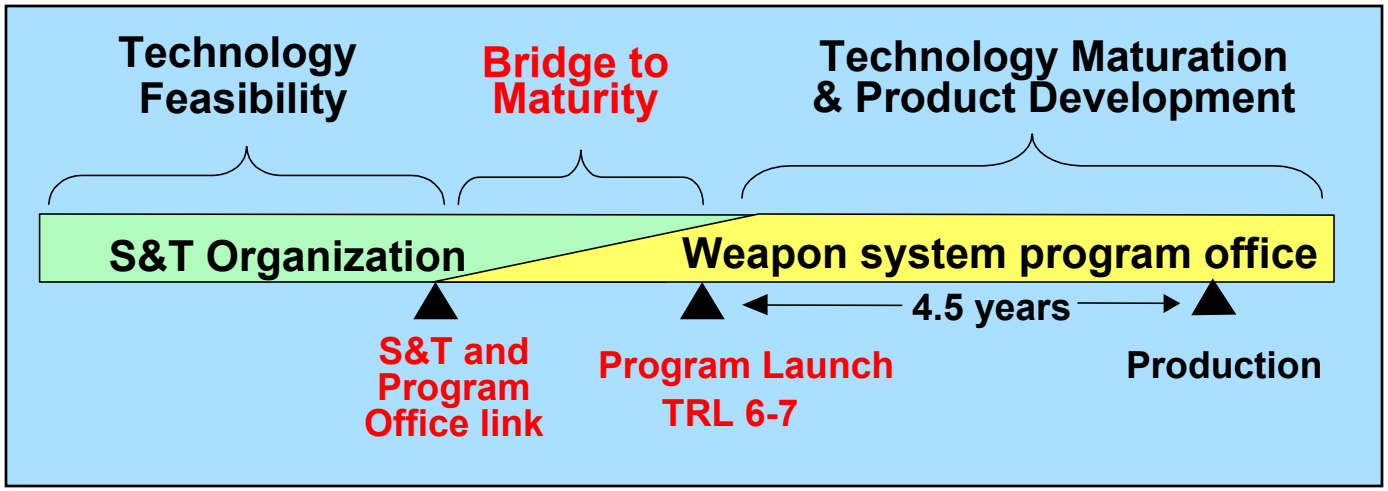
WRAP	Up to 2 Years	Spiral Insertion Component/ System, into formal ACQ	Undef	Requires MAJCOM follow on $
Joint Experimentation	2 years between	CONOPS	N/A	N/A
Venture Capital Fund	Indet.	Commercial Technology	N/A	N/A
Industrial *ManTech, DUS&T, SBIR, Title III*	6 mon to 3 yrs	Enabling capabilities	$1-20M	Medium

IPPD in S&T

Traditional Approach

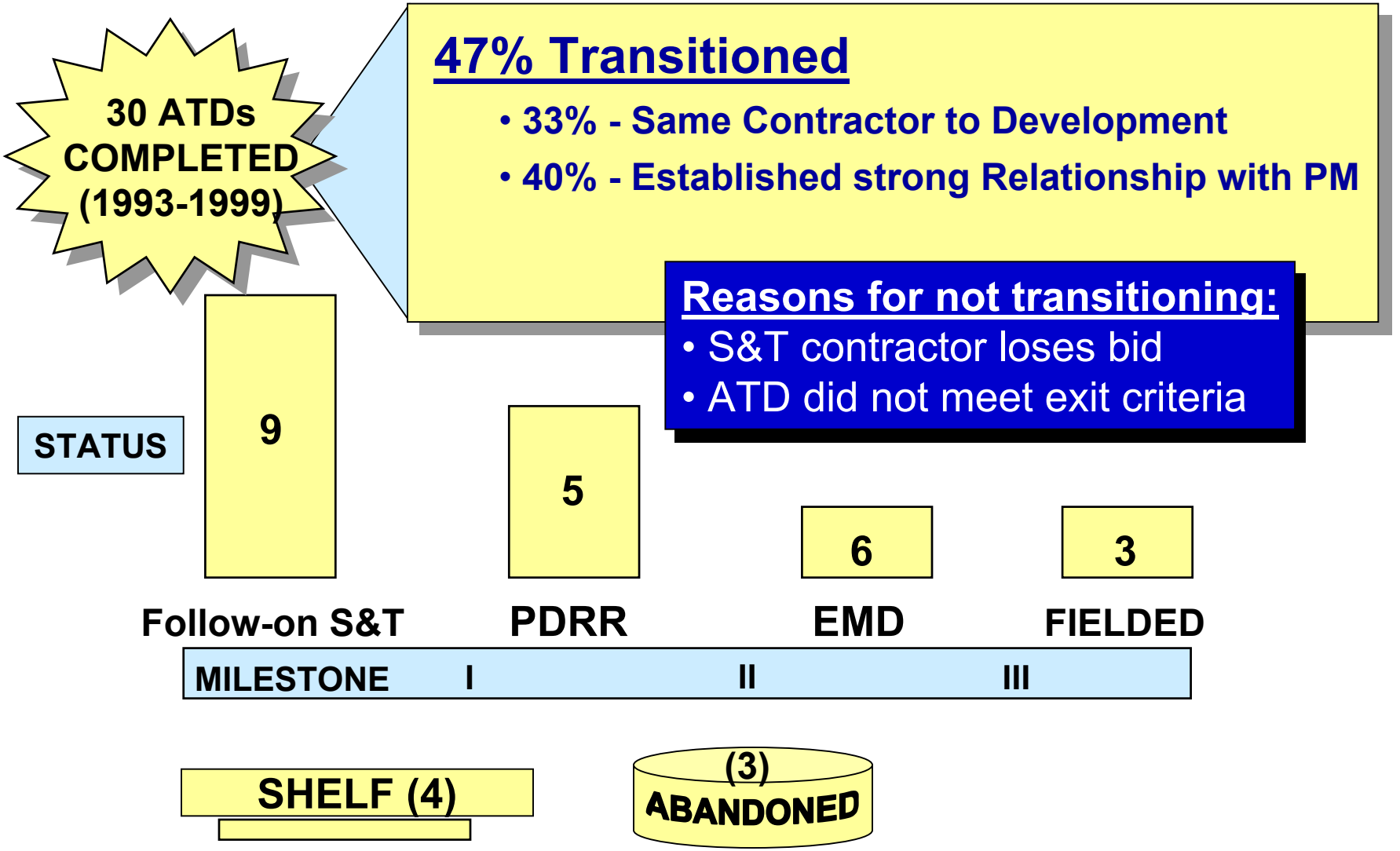


Best Practices: DoD



Source: BEST PRACTICES: Better Management of Technology Development Can Improve Weapon System Outcomes (GAO/NSIAD-99-162) July 1999

Army Technology Transition

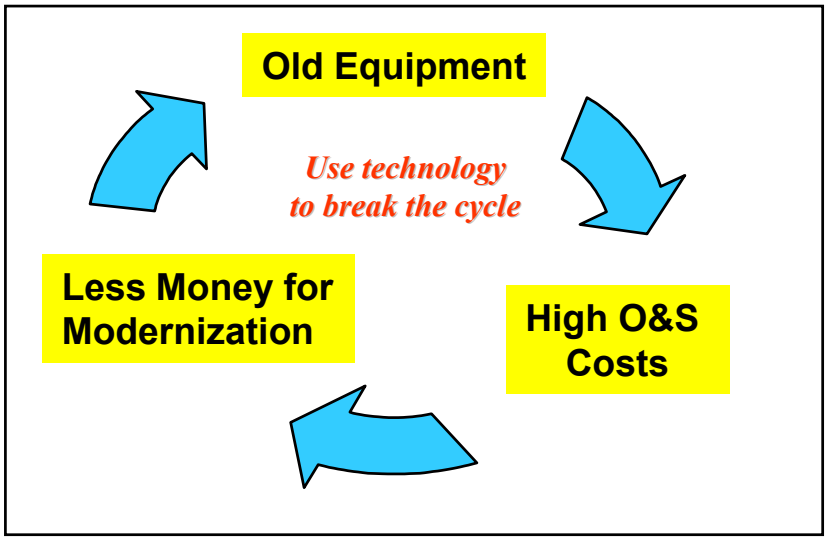


Technology Transition Initiative Highlights

- First year provides a "proof of concept" model, allowing DoD to establish appropriate guidelines for implementation.
  - Process must provide an incentive to program managers to accept projects into program's of record.
- Technology transition council will act as a blue ribbon panel. Review process ensures high visibility for joint projects of greatest potential for successful transition to joint capabilities.
- Joint Staff & JFCOM reflect voice of Unified Combatant Commanders for the transition of Joint Capabilities.

Commercial Operations & Support Savings Initiative (COSSI)

The Problem



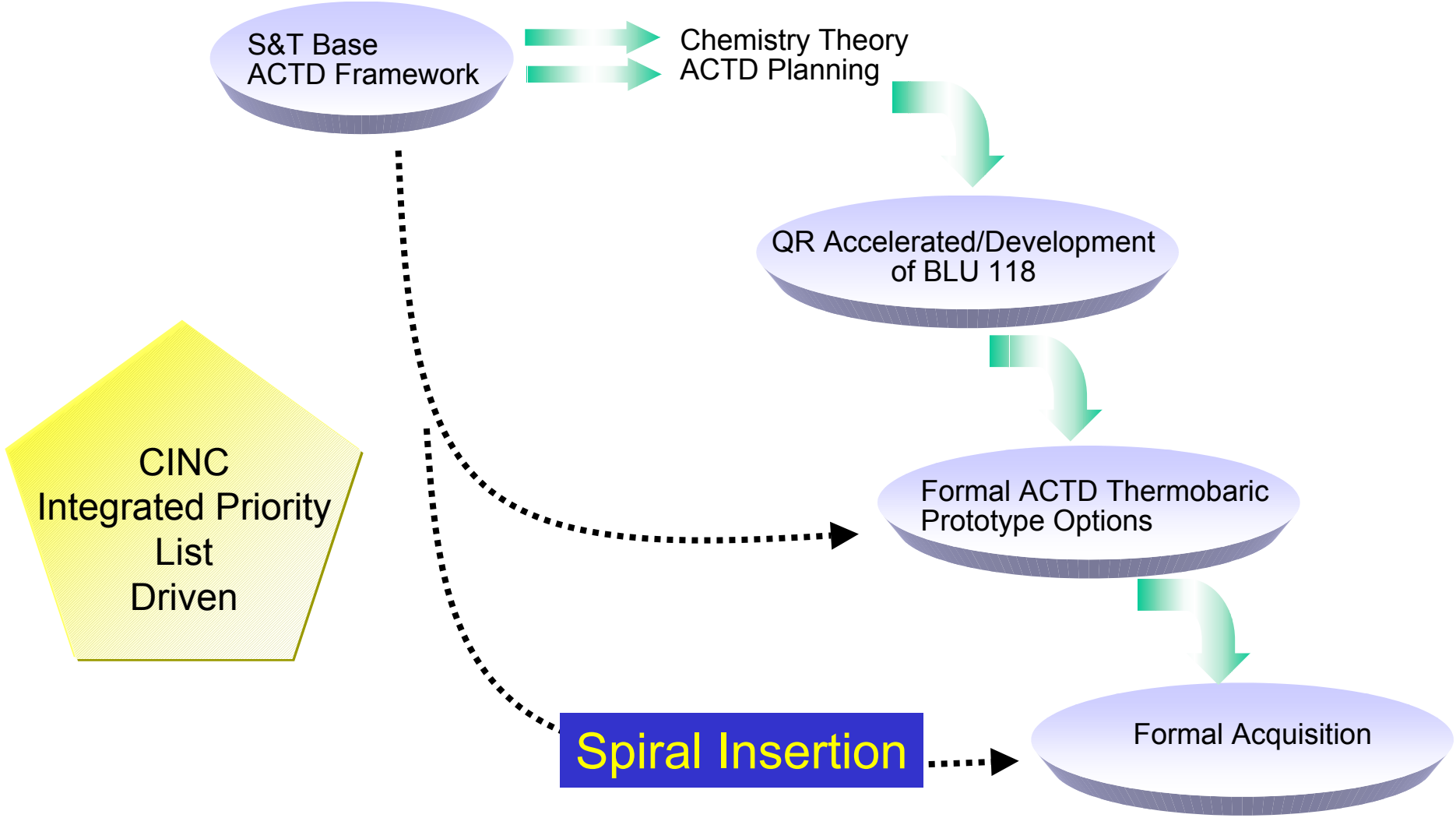
Purpose:

- ***Provide funding for the nonrecurring engineering, testing, & qualification needed to insert a commercial technology into a legacy system***
- ***Reduce operations and support costs***

Example: Diagnostic System for Helicopter Monitoring & Maintenance

- ***Issue:*** **Current Diagnostics are Done Manually - Labor Intensive, Inexact, Leading to Unnecessary Removals**
- ***Solution:*** **Adapt Commercial System that Automatically Collects & Analyzes In-Flight Data**

Case Study
"Thermobaric Weapons" Acceleration
Complementary Transition Effort



Affordable Transition

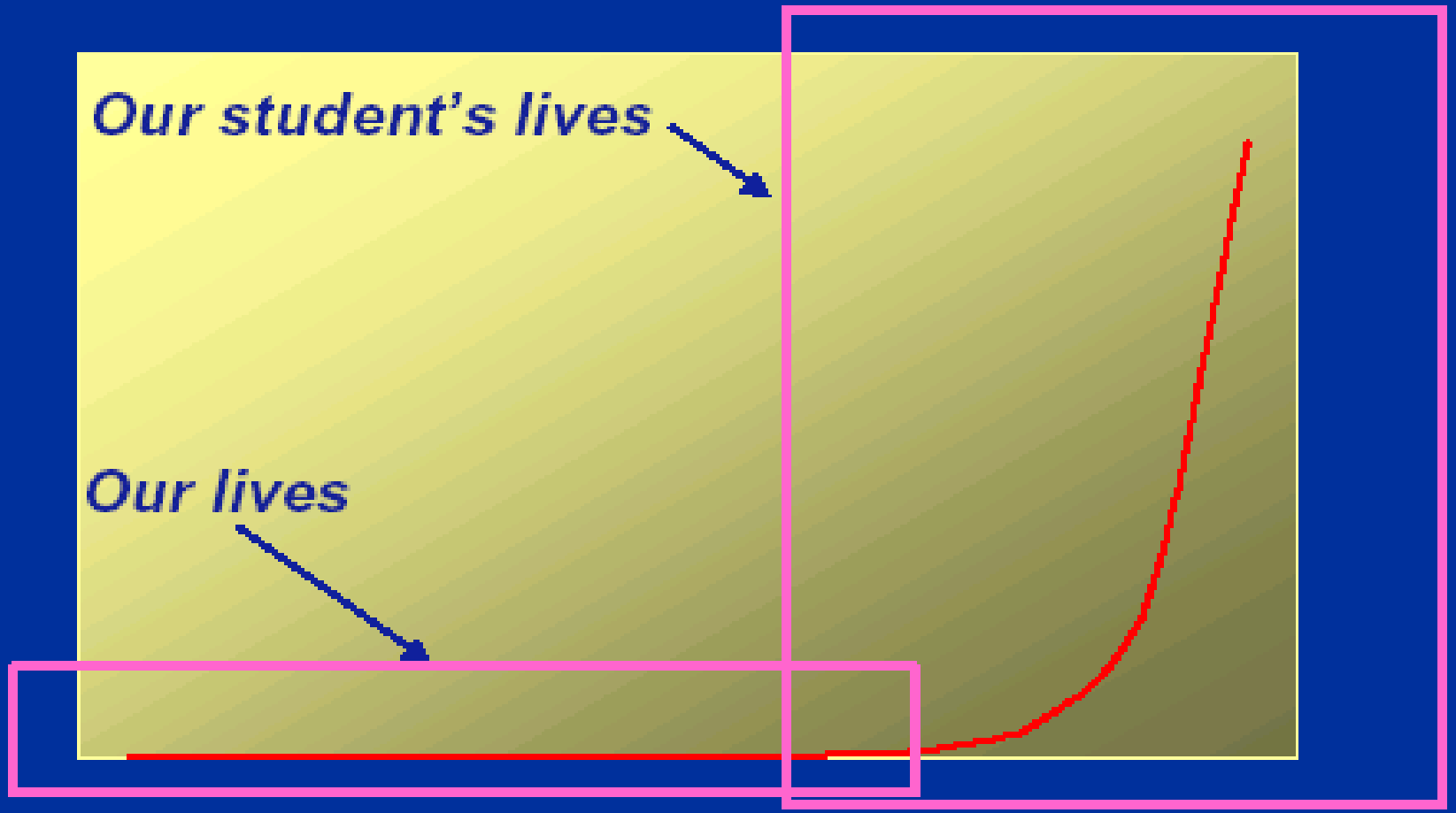
Objectives

- ***Improve Dialogue Between S&T, Acquisition, Logistics & Industry***
- ***Improve Technology Transition from S&T to the Next Stage of Acquisition***

Key Elements to Achieve Technology Transition

- **Identify the Customer**
- **Team with the Customer**
- **Consider Impact of Affordability & Technology Decisions**
- **Plan for Transition**

Moore's Law and our students



Processor speeds from 1981 to 2015 (projected).

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

Why Transition in S&T?

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
- **DoDD 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
- **DoD 5000.2-R, Procedures for Acquisition Programs**
  - Establish Technology Readiness Levels (TRLs) for Critical Technologies

Documents Available at http://www.acq.osd.mil/ara/

Air Force Affordability Policy

- **Use Integrated Product & Process Development (IPPD) on all Integrated Technology Transition Programs (ITTPs) and ATDs**
  - **Exceptions Approved by AFRL Affordability Director**
- **Invest in tools to implement affordability metrics, assess best value, and balance performance with cost**
  - **Goal is a common cost modeling tool set across AFRL**
- **Develop a Return on Investment approach for every 6.3 project**
  - **Refine as project matures**

Signed by Commander, AFRL (February 2000)

"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.

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

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

OUSD (AT&L) Goals

1. Achieve credibility and effectiveness in the acquisition and logistics support process
2. Revitalize the quality and morale of the DoD Acquisition, Technology, and Logistics workforce
3. Improve the health of the defense industrial base
4. Rationalize the weapon systems and infrastructure with defense strategy
5. Initiate high leverage technologies to create the warfighting capabilities, systems, and strategies of the future

Defense Research and Engineering

- Robust S&T Investment Enables Transformation
  - S&T Investment aligned with critical DoD goals/capabilities (QDR)
  - New transformation initiatives focus on intersection of transformation, joint, and combating terrorism
  - Maintain balanced S&T investment (between Service / Agencies and near through far term research)
- Accelerate Technology Transition to the Warfighter
  - On-going, stable S&T investment allows technologies to be ready for transition
  - Complementary programs necessary (i.e. Quick Reaction Funds, Advanced Concept Technology Demonstration, Formal spiral acquisition)
  - Technology transition a focus for AT&L leadership under Acquisition Excellence
- Enhance National Security Workforce and Laboratories
  - Increase DoD investment in University-based research (knowledge and workforce in critical technology areas)
  - Expanded use of workforce pilot programs will strengthen labs
  - Laboratories supporting national security need to modernize infrastructure

Quick Reaction Special Projects

- Initiate high priority or high leverage technology efforts during the execution year
- Provide flexibility to respond to emergent DoD issues and address technical surprises and needs in real time
  - Technology matures in less than a year in some areas
  - Need some funds to apply to rapidly needed technology
  - Respond to technology opportunities in major acquisition programs
- Projects would be initiated at the direction of USD(AT&L) and DDR&E
- Projects would be conducted by a military department and/or defense agency
- Typically smaller scale / limited scope prototypes

ACTD Program Description

- Initiate high priority or high leverage prototypes in response to CINC requirements
- Develop and operationally exercise prototype system; then
  - Transition to Acquisition Program
  - Return to S&T Development
  - Discard after Military Value Assessment
- Projects initiated after formal selection process through the JROC
- Projects sponsored by Service or Agency
- Demonstration projects with Conops Development

Try Before You Buy

Army Venture Capital Fund

- Directed in FY 02 Conference Report 107-350 (Section 8150)
- Intent:
  - Encourage exploitation of advanced science and technology developed in the commercial sector
  - Establishes a “not-for-profit” company modeled after CIA venture capital fund, In-Q-Tel Corporation
  - Corporation makes equity investments in early-stage companies developing technologies that are important to the Army
  - Army still evaluating how to handle
    - One limitation is still have disconnect between S&T and Acquisition community
  - Does not clearly allow rapid technology development and insertion

Outsourced S&T

Warfighter Rapid Acquisition Funds

- Both Army/Air Force programs are Budget Activity 7 (Operational System Development), not S&T
- Intent is to identify mature technologies from Experiments at Battle Labs, major field experiments, etc
- Provide bridge funds until formal acquisition dollars programmed
- Directly tied to formal acquisition follow-on

Joint Experimentation

- Conduct high priority Exercises to Validate Emerging Operational Concepts
  - Mostly Command And Control Centric
  - Validates, through Constructive Simulation, the impact on operations of:
    - New Equipment
    - New Command & Control Systems
    - New Force Structure
- Built around major Exercises every two years with embedded "Limited Objective Experiments" (mini-experiments)
- Little to no technology development

Validate Concept Before Buy