



# ***Air Force Efforts to Reduce Acquisition Response Time***

***Secretary of the Air Force (Acquisition)  
Acquisition Management Policy Division***

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# *Overview*

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- **Recurring themes in Air Force Acquisition Reform**
- **Impact of Long Development Times**
- **AF Cycle Time Reduction Action Plan**
- **Actions to date**



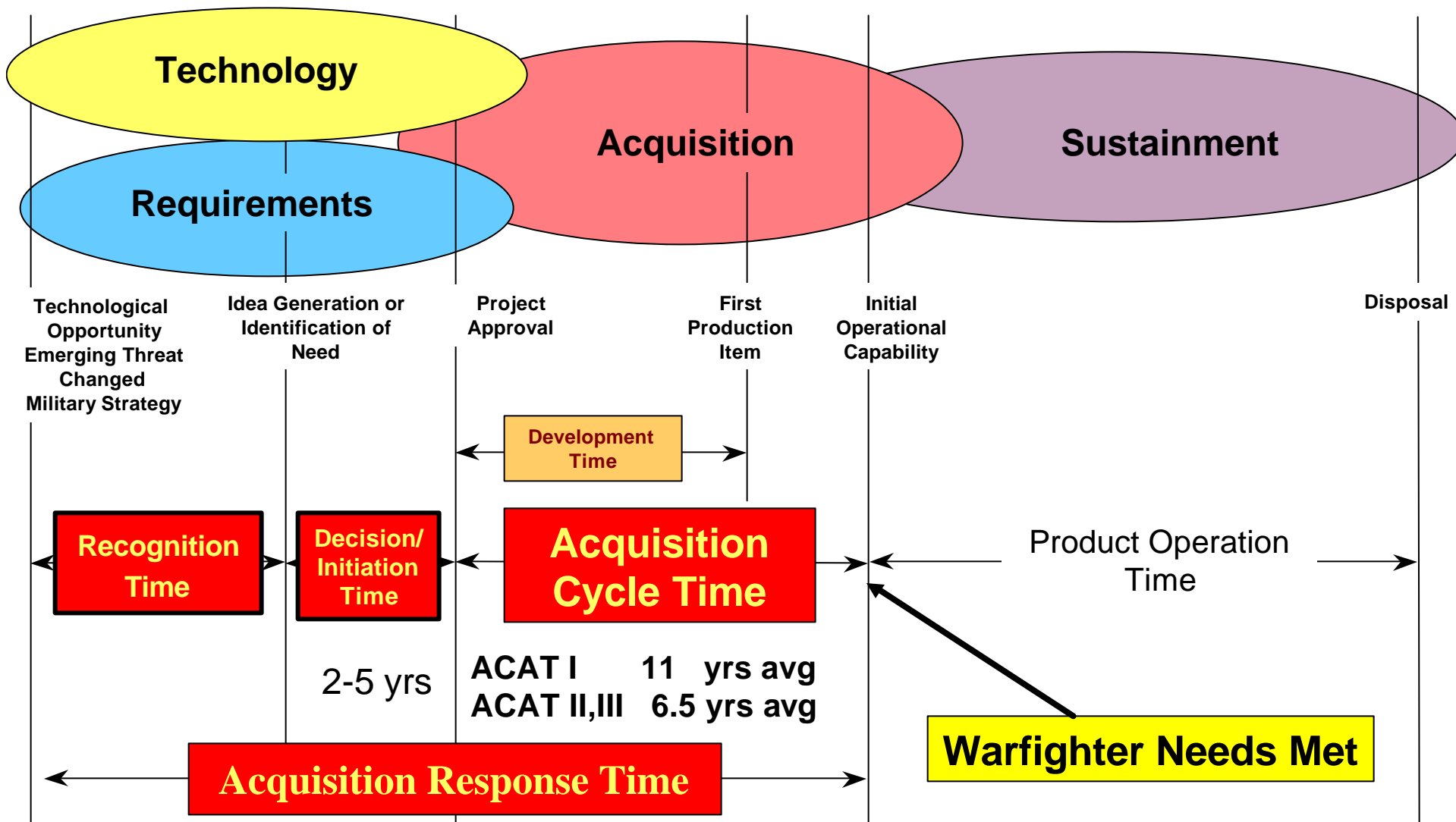
## ***Recurring Themes in Acquisition Reform***

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- **Reduce Acquisition / Logistics Response Time**
- **Reduce Total Ownership Cost**
- **Improve Business Relations**
- **Acquisition Workforce Excellence**

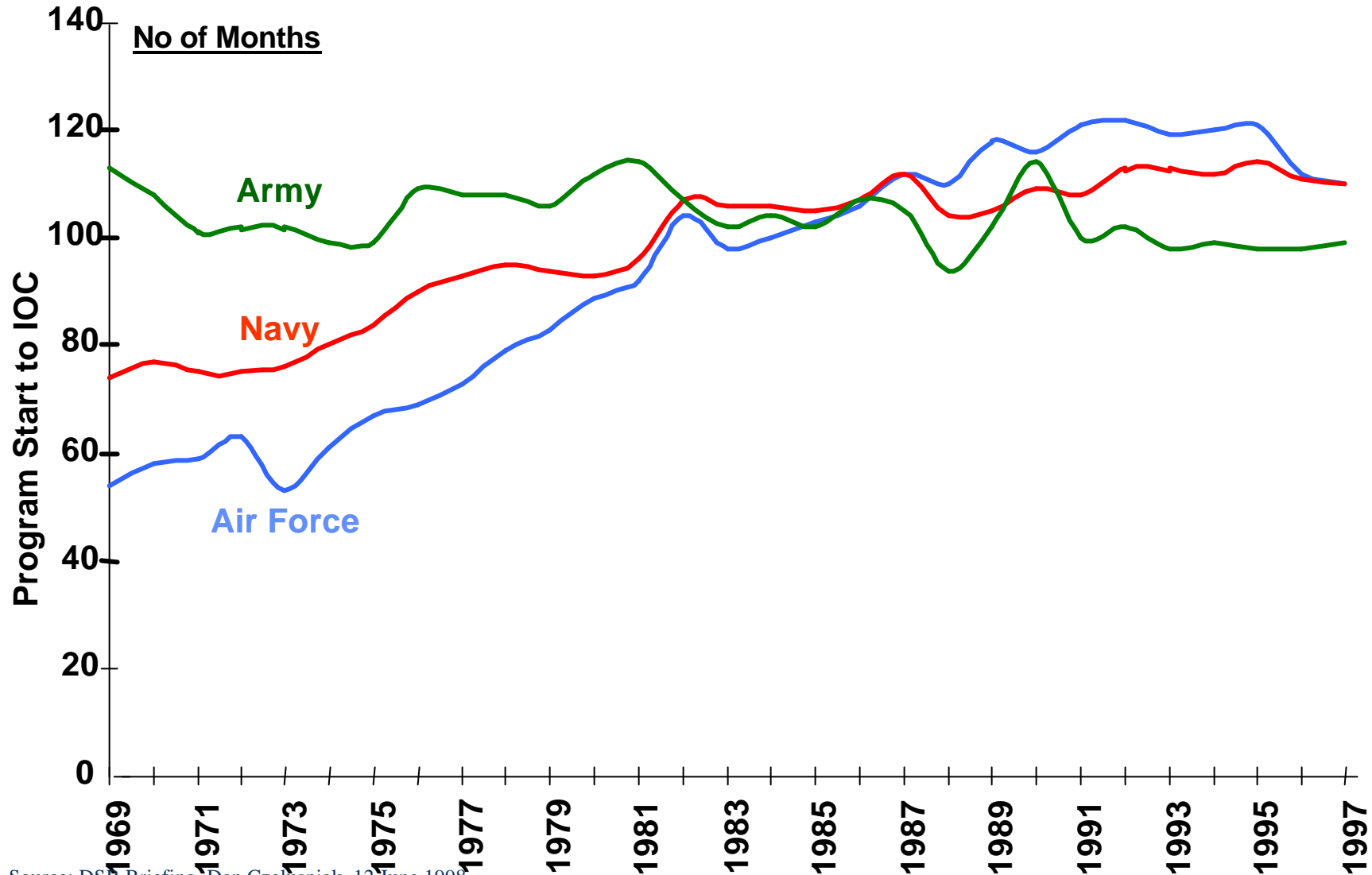


# Acquisition Response Time





# Average Acquisition Cycle Times (By SAR Reporting Years)



Source: DSB Briefing, Dan Czelusniak, 12 June 1998



*Acquisition Response Time*

# ***Packard Commission Conclusions (1986)***

**“An unreasonably long acquisition cycle - ten to fifteen years for our major weapon systems ... is a central problem from which most other acquisition problems stem:**

- It leads to unnecessarily high cost of development...**
- It leads to obsolete technology in our fielded equipment...**
- And it aggravates the very gold plating that is one of its causes...”**

**“We believe it is possible to cut this cycle in half”**



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***Impact of Long Development  
times on the Warfighter, budget,  
acquisition and sustainment***



# Capability: Too Late for Desert Storm

## JTIDS - Secure Digital Data Link

Purpose: Sharing of near real-time information

Desert Storm Capability: AWACS - Joint STARS Aircraft

Impact: Limited SA for pilots  
 Limited NRT targeting data to fighters  
 - To Scud/Tank Hunters  
 Did not allow new fighter tactics to be used

**19 years into 20 year development**

## LANTIRN - Targeting Pod

Purpose: Precision Bombing

Desert Storm Capability: 6 targeting pods available

Impact: No precision attack capability on most aircraft  
 Decreased lethality of air attack  
 - Increased aircraft required per target  
 - Fewer targets per strike package  
 Limited standoff attack range of most aircraft

**11 years into 12 year development**

## GPS - Position/Navigation

Purpose: World Wide Navigation

Desert Storm Capability: Limited Coverage & Receivers

Impact: Limited navigation availability per day  
 Out of position armored units  
 - Destroyed by friendly fire  
 Soldiers lost in desert  
 - Captured

**21 years into 23 year development**

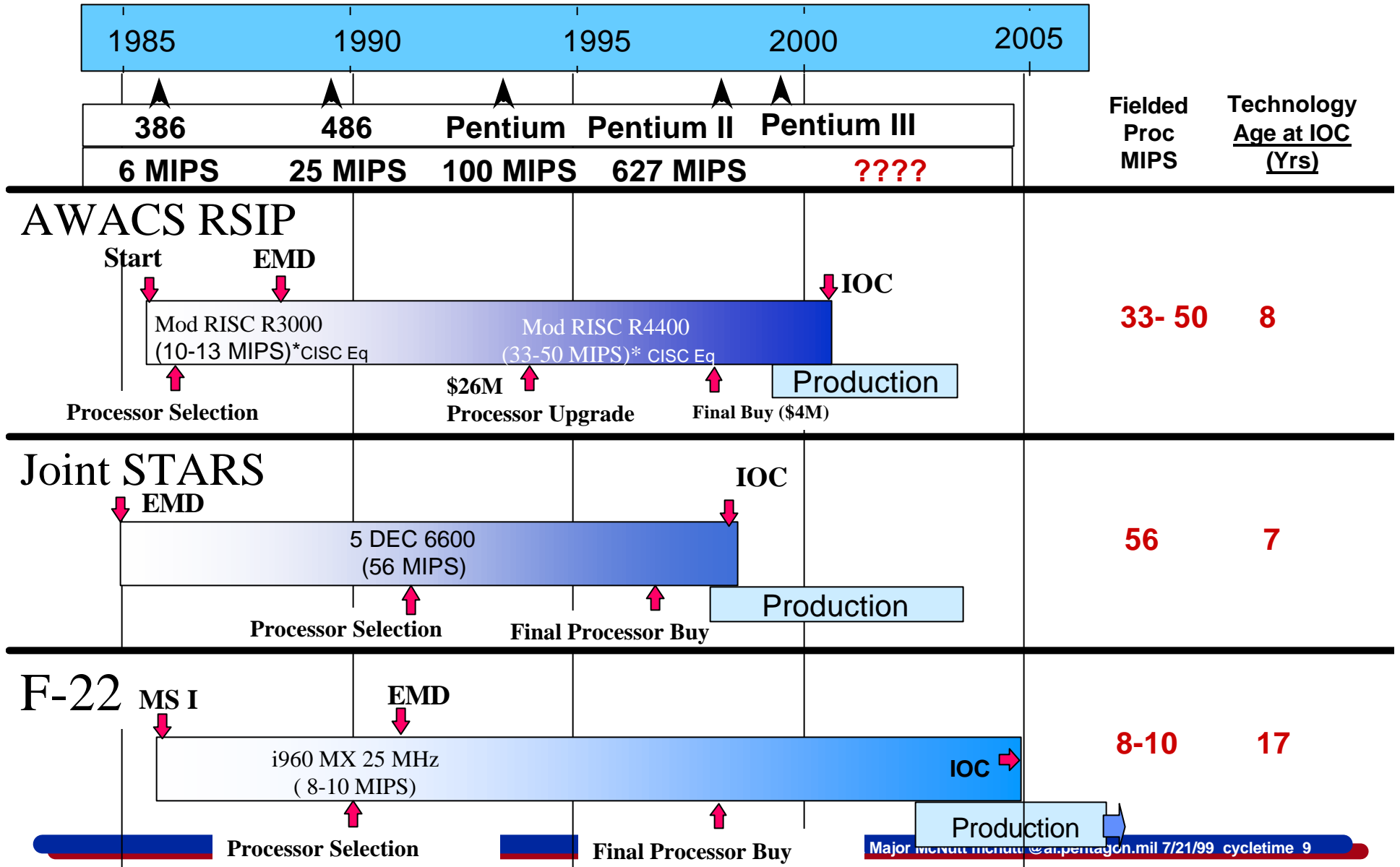
## Other Systems

	<u>Start</u>	<u>IOC</u>
<b>AMRAAM</b>	<b>11/78</b>	<b>3/91</b>
<b>C-17 Globemaster III</b>	<b>10/80</b>	<b>1/95</b>
<b>MILSTAR</b>	<b>5/81</b>	<b>3/96</b>
<b>Sensor Fuse Weapon</b>	<b>1/83</b>	<b>1/97</b>





# Impacts of Long Development Times Dated Technology in Newly Fielded Systems





# ***Predicting Threats is A Gambler's Delight***

## Known State of the World

- 1919: Japan is ally
- 1921: Hitler 12 years from being elected
- 1930: Korea is our ally
- 1945: Vietnam is our ally, France's colony
- 1971: Saddam Hussein 8 years from power
- **1998: Post-Cold War Era**

## World 20 Years Later

- 1939: Japan is major adversary
- 1941: Hitler conquers much of Europe
- 1950: North Korea is an adversary with Chinese support
- 1965: North Vietnam is a major adversary
- 1991: Saddam Hussein is a major adversary
- **2018: ???**

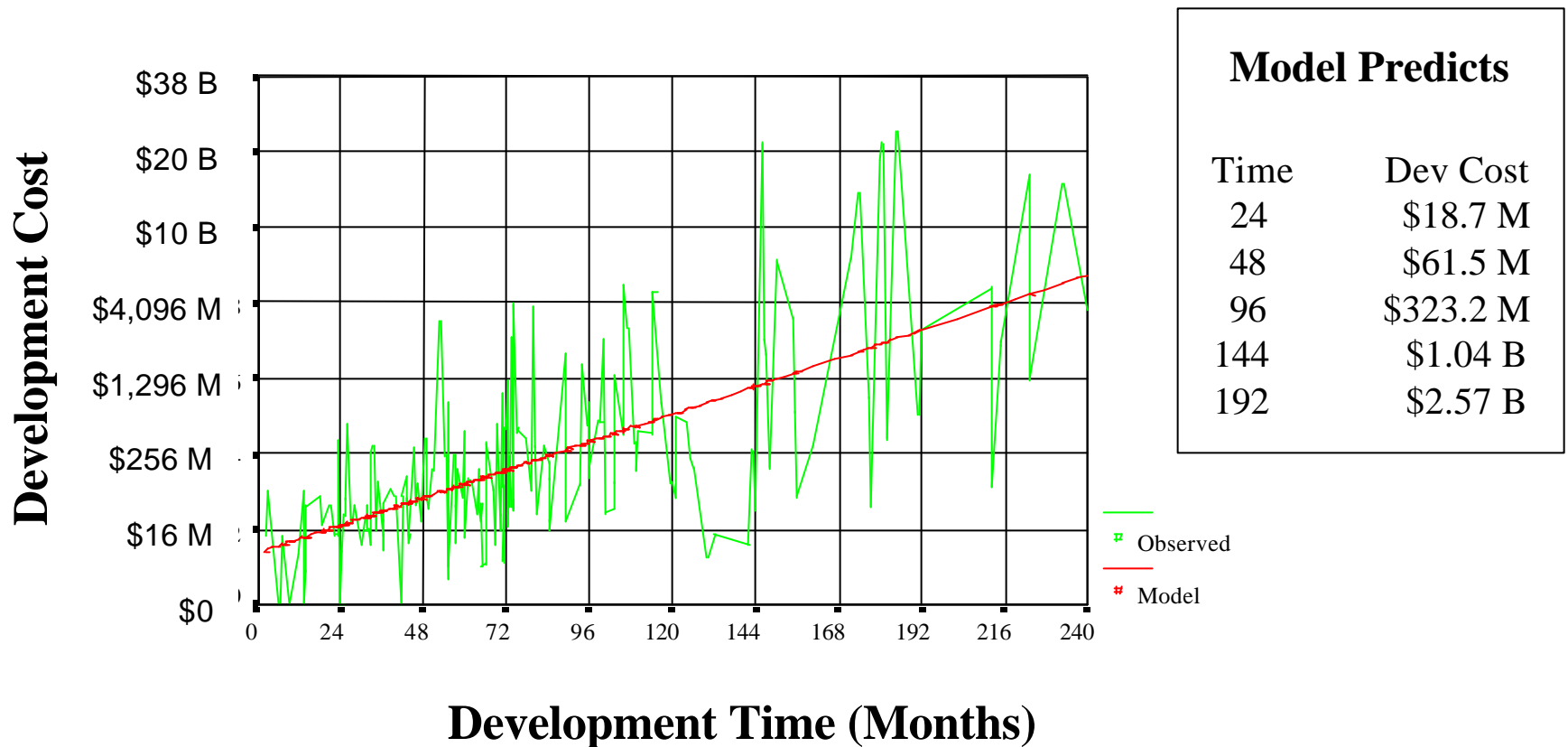
**Predicting future adversaries, 20 years out, is extremely difficult.**



# Impacts of Long Development Times

## Increased Development Cost

$$\text{Dev Cost (\$M)} \sim (1.36 + 0.03 \times \text{Dev Time(months)})^4$$

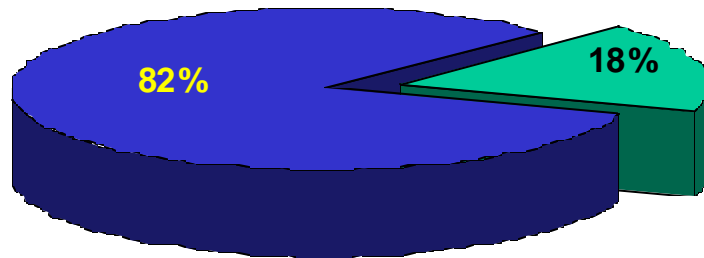


Based on LAI Survey results from Program Offices, Contractors, and PEMs N=154 Adjusted R<sup>2</sup>=0.42

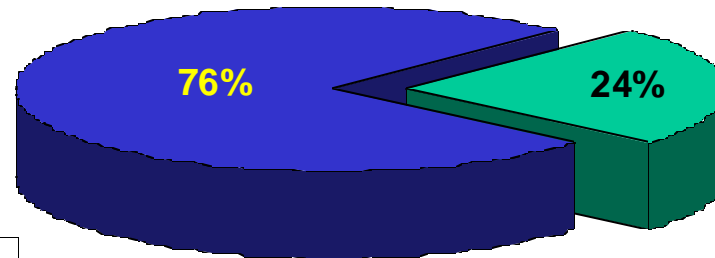


# Increased Development Cost Cont.

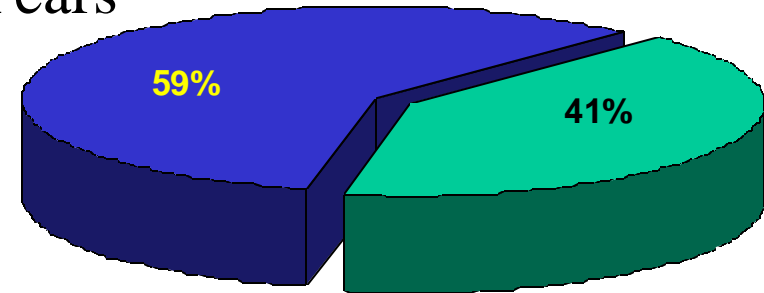
## Development Cost to Investment Cost By Years in Development



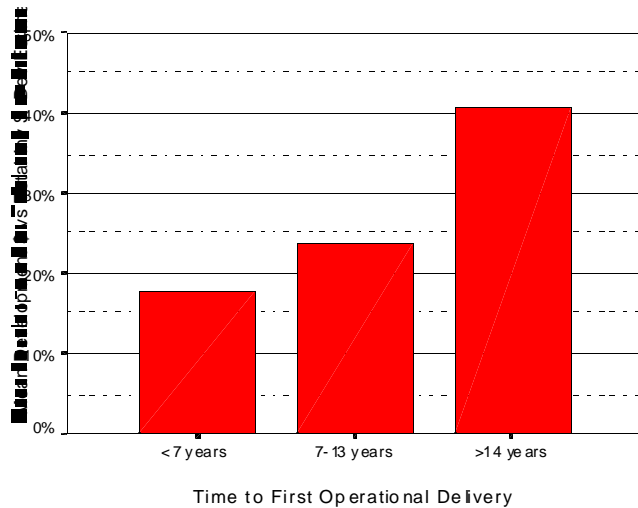
1 to 6 Years



7-13 Years

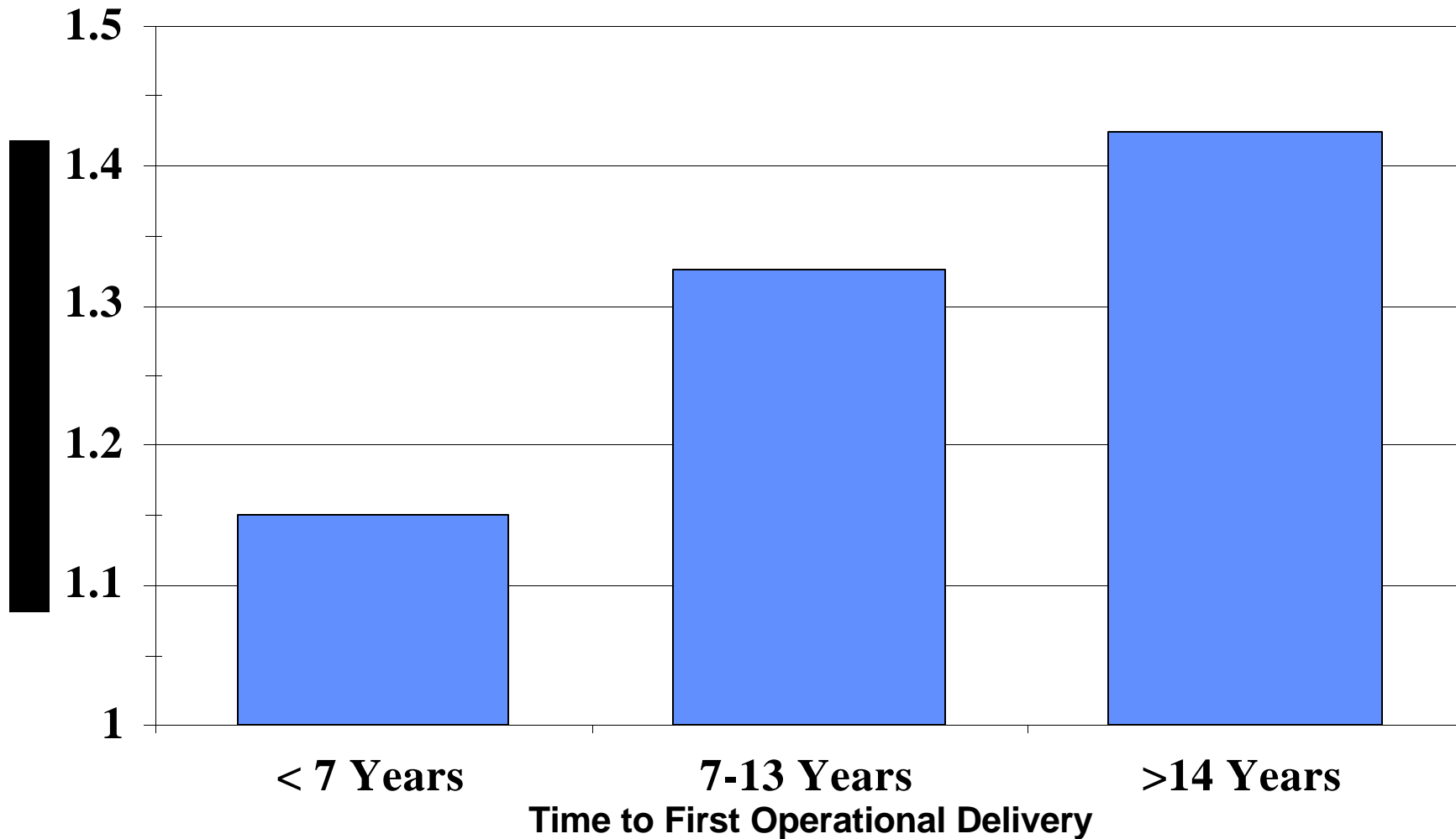


14 or More Years





## Impacts of Long Development Times **Likelihood of Cost Growth**



Rand SAR Database - ACAT I Programs - From Program Initiation to First Operational Delivery



Impacts of Long Development Times

# Work In Progress Money in the Development Cycle

	# of Programs	Prior to FY98	Through FY98	To Initial Operational Capability (IOC)
Army	11	\$9,347.3	\$10,990.1	\$21,074.9
Navy/Marine Corps	13	\$22,372.2	\$27,231.7	\$53,506.0
Air Force	14	\$19,536.6	\$23,197.9	\$55,691.6
BMDO	6	\$9,925.0	\$12,109.5	\$14,521.2
Joint DoD	2	\$1,163.4	\$2,213.6	\$26,918.9
<b>Total</b>	<b>46</b>	<b>\$62,344.5</b>	<b>\$75,742.8</b>	<b>\$171,712.6</b>

~\$75 Billion invested in Work-In-Progress

~\$100 Billion more needed to deliver current projects

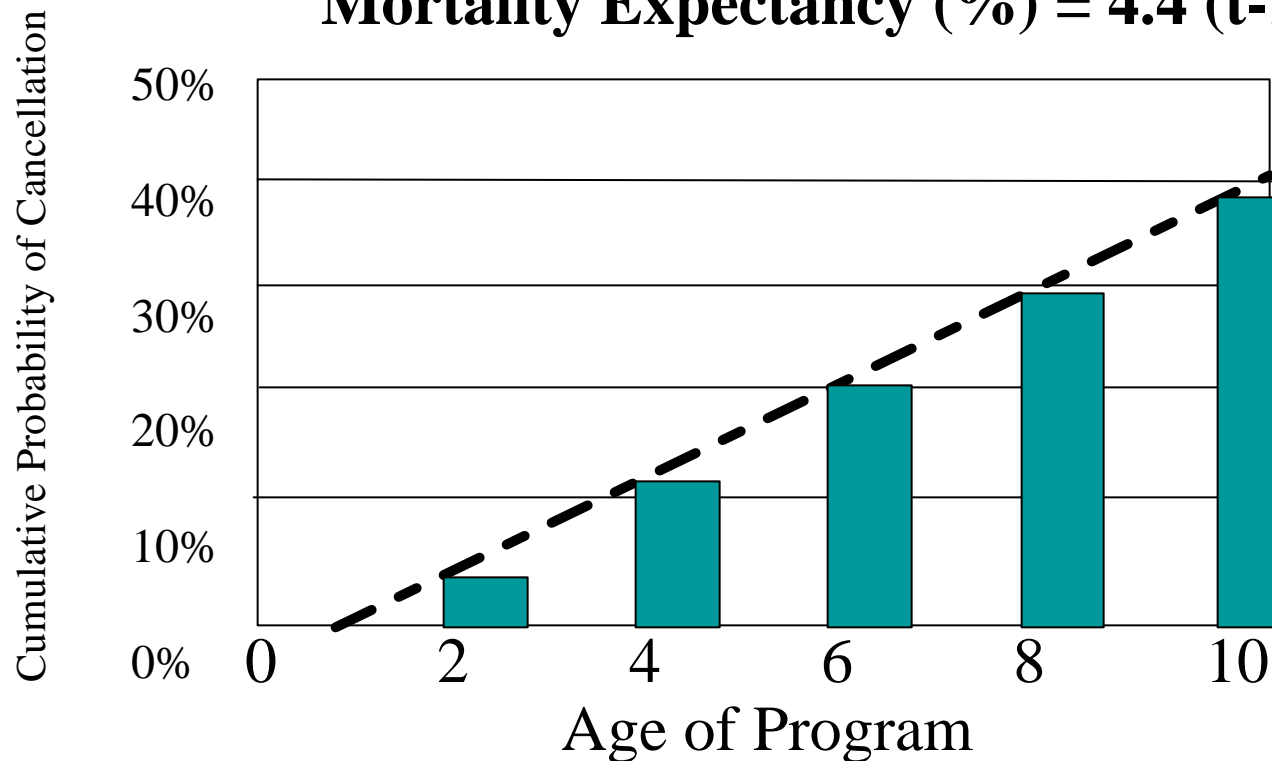
*Reminder: Golden Rule (Budget = Force Structure + Readiness + Modernization)*

\*\*\* MDAP Programs Only - Data from Selected Acquisition Reports (SARs) dated December 31, 1997 \*\*\*



# Increased Program Cancellations

Mortality Expectancy (%) = 4.4 (t-1)



114  
Cancellations

**Examples:**  
 Canceled Army Air Defense Systems  
 1. Mauler  
 2. Roland  
 3. Sgt York  
 4. ADATS  
**Cost \$6.7 Billion**

“The funds expended could have purchased 1,000 Abrams tanks, 100 F-16 Fighters, 1,000 AMRAAM Missiles, 10 Titan IV Rockets, 20 JSTARS, 10,000 Javelin Missiles, 70,000 MLRS Rockets, and One Nuclear Attack Submarine”

Norm Augustine *Augustine's Laws 1986 and Acquisition Reform Dream or Mirage .. Army RD&A Sept- Oct 1996*



*Impacts of Long Development Times*  
**Changing Leadership  
Changing Priorities?**

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**Number of: (132 Months Avg ACAT I)\***

<b>Program Director</b>	<b>4</b>
<b>Program Executive Officer</b>	<b>5</b>
<b>Service Acquisition Executive</b>	<b>8</b>
<b>Air Force Chief of Staff</b>	<b>6</b>
<b>Secretary of the Air Force</b>	<b>8</b>
<b>Defense Acquisition Executive</b>	<b>8</b>
<b>Chairman of the Joint Chiefs of Staff</b>	<b>5</b>
<b>Secretary of Defense</b>	<b>7</b>
<b>Presidents</b>	<b>3</b>
<b>Budget Cycles</b>	<b>11</b>

\* Includes those in acting capacity





## *Impacts of Long Development Times* **Impact of Long Cycle Times on Sustainment**

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### Longer to Replace High-maintenance Systems and Components

- O&S Costs Example: F-15 - \$106M/year/sq → F-22 - \$56M/year/sq\*
- O&S Costs Example: DD21 - 70% target reduction from DDG-51\*\*

### Obsolete Technology Costly to Maintain and Replicate

- F-15 Radar Upgrade: Current - 12 hours MTBF → Upgrade-120 Hours MTBF\*\*\*

### Diminishing Manufacturing Base Arise Earlier in Life Cycle

- F-22 - 593 Parts Out of Production Projected Cost \$279M\*\*\*\*

### New Systems in Development Freeze Upgrades to Current Systems

- Large Performance Differences Needed to Justify New System
- Upgrades and Mods Compete for Scarce Resources
  - Milstar program delayed other upgrades to MILSATCOM during 1980s.

\* F-22 O&S Costs Projected Dec 1996 SAR Report. DD-21 O&S Cost Source DD-21 Program Office \*\*\* Source: F-15 Program Office Projected for APG-63 V.1

\*\*\*\* Source: F-22 Program Office



*Commercial Development Experience*  
**Commercial Product  
Development Efforts**

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- **Reducing Product Development Cycle Time is the Organizing Focus For Improvements in Commercial Product Development Processes**
- **Highly rated management tool by industry**
  - #1 for achieving financial results, long-term performance capabilities
  - #2 for overall satisfaction, achieving multiple strategic priorities
- **‘Key to Making Changes in the System’**
- **Obvious Commercial/Competitive Advantages**
- **Real World Results (Across Many Industries)**
  - Dramatic Decreases in Cycle Time Achieved
  - Increased Quality
  - Decreased Development Costs
  - Dramatic Increases in Number of Products

**Product Development Cycle Time is The Leading  
Metric of Product Development Effectiveness**



Commercial Development Experience

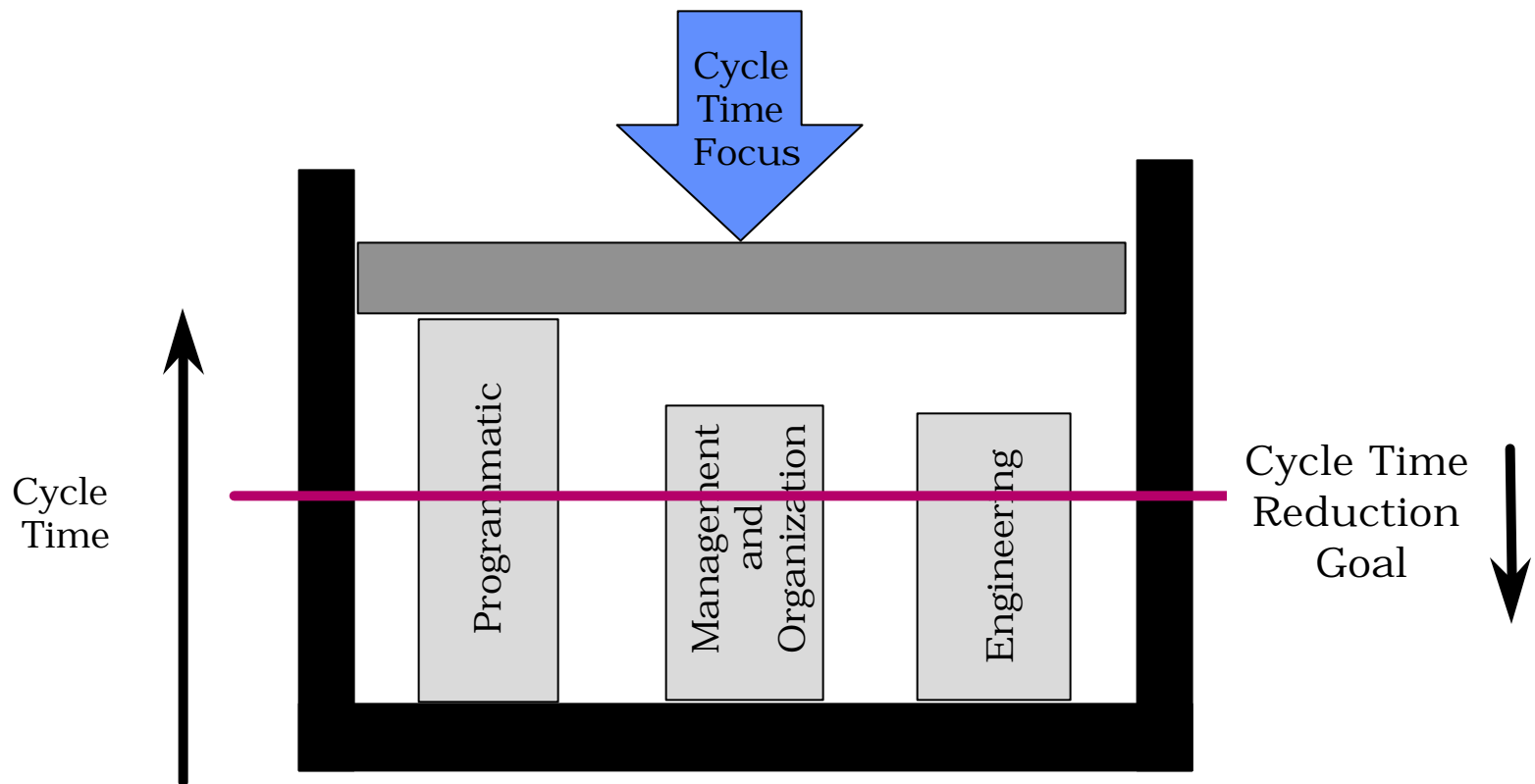
# ***Commercial Success at Shortening Cycle Times***

<b>Industry</b>	<b>Old Time</b>	<b>Current</b>	<b>Goal</b>
<b>Automobile</b>	<b>84 months</b>	<b>24 months</b>	<b>&lt;18 months</b>
<b>Commercial Aircraft</b>	<b>8-10 years</b>	<b>5 years</b>	<b>2 1/2 years</b>
<b>Commercial Spacecraft</b>	<b>8 years</b>	<b>18 months</b>	<b>12 months</b>
<b>Consumer Electronics</b>	<b>2 years</b>	<b>6 months</b>	

**50%-70% Reduction In Development Times Are Typical**



## Commercial Development Experience *Shortening the Longest Pole*



Most companies development times are limited by the programmatic aspects of a project due to poor portfolio management practices. However, efforts to reduce development time must focus on all aspects of a project



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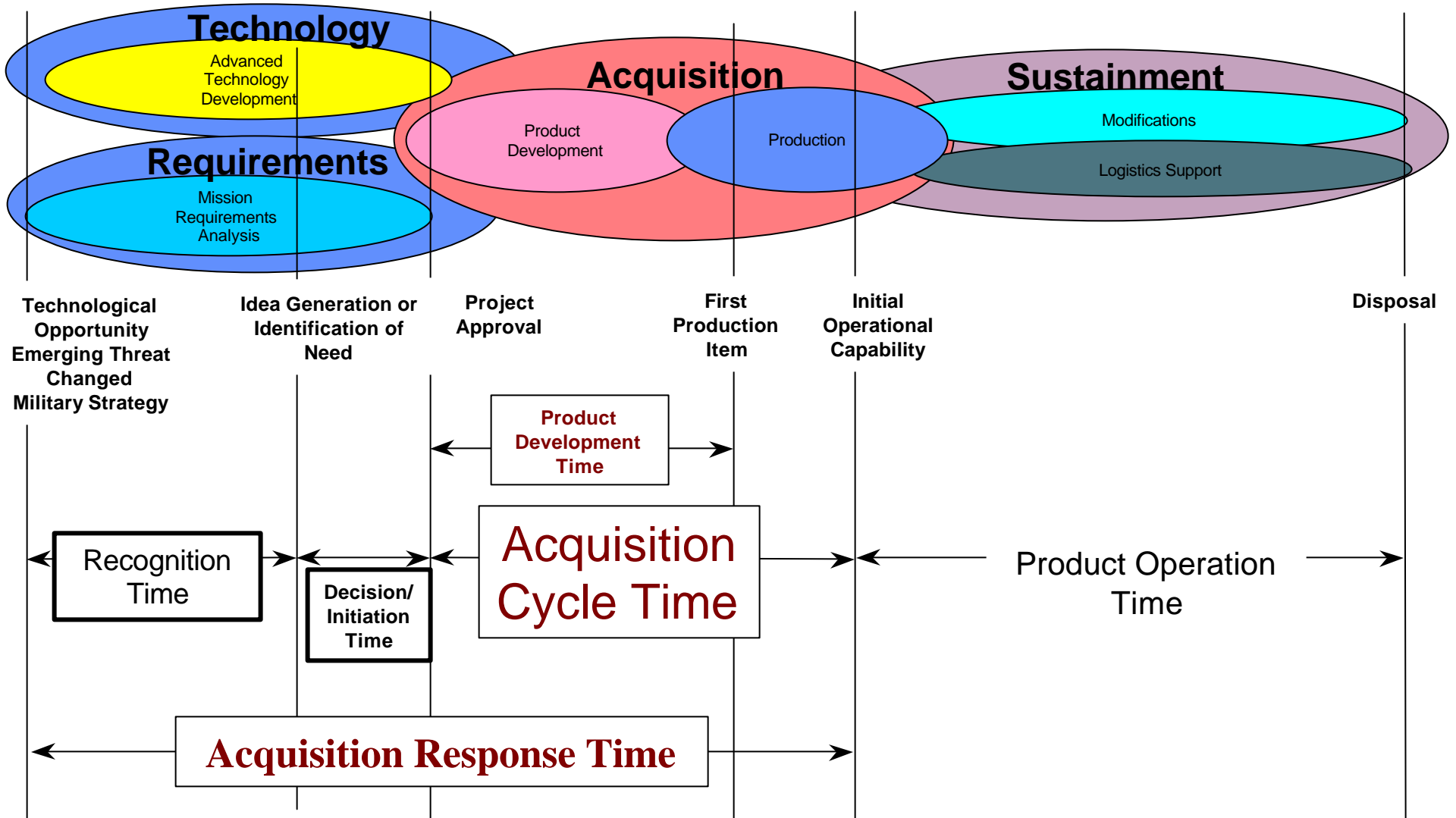
# ***AF Cycle Time Reduction Action Plan and Actions to Date***

***What we have done and plan to do***



# Acquisition Response Time

## Acquisition Cycle Time





*Cycle Time Reduction Actions and Plans*

# ***Cycle Time Reduction Action Plan***

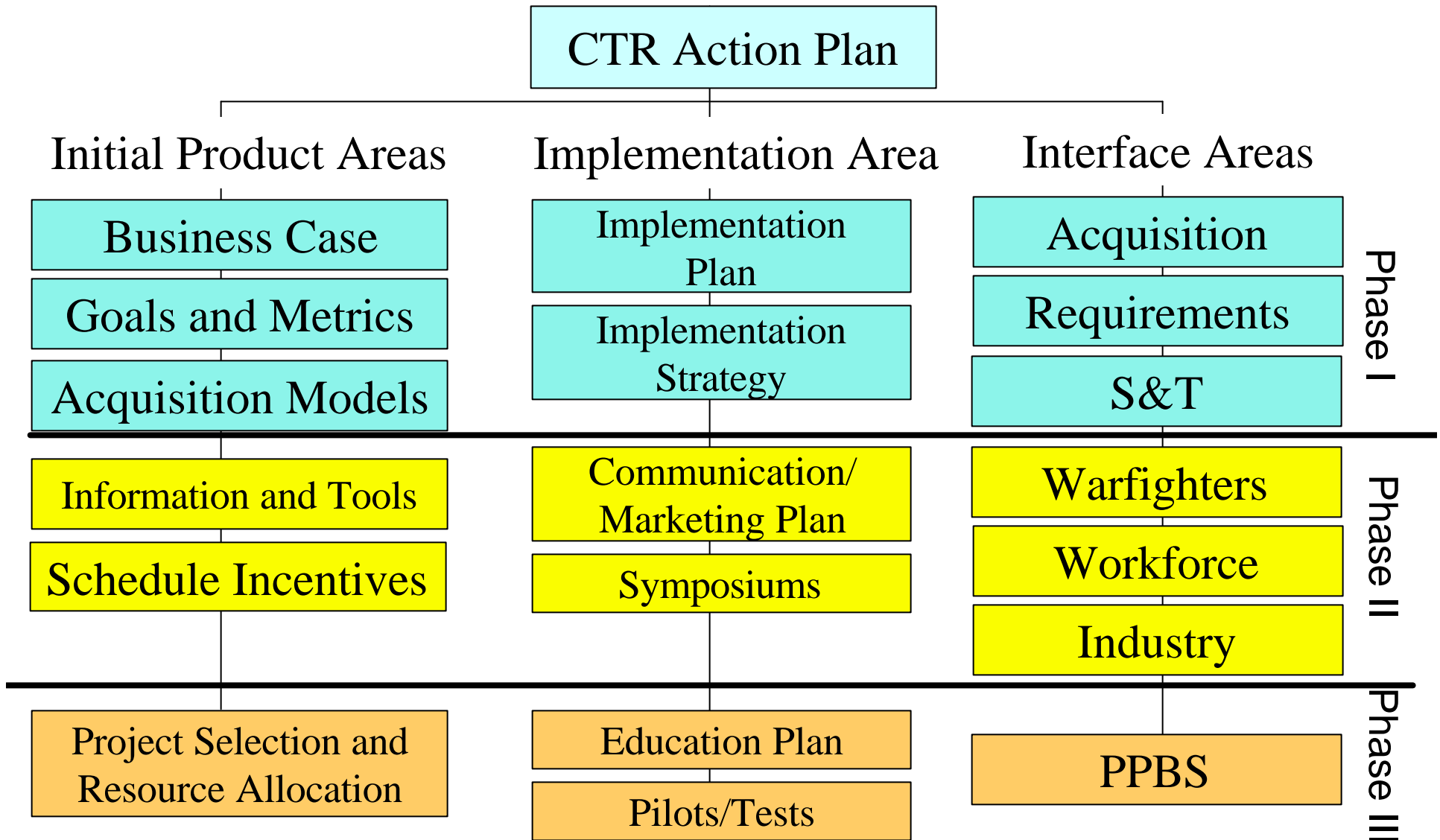
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- **Layout necessary actions to achieve significant reduction in the development time for Air Force and DoD products**
  - Identify necessary steps based on research
  - Identify impacted organizations and processes and the likely changes required within each area - Identify groups to address
- **Develop time phased approach to accomplish the necessary steps**
  - Identify preferred order of steps and actions
- **Develop implementation strategy to accomplish the necessary steps**
  - Identify targets of opportunity and resources to accomplish tasks

Have Comprehensive Plan to Reduce Development Time  
Implementing as opportunities and resources are identified



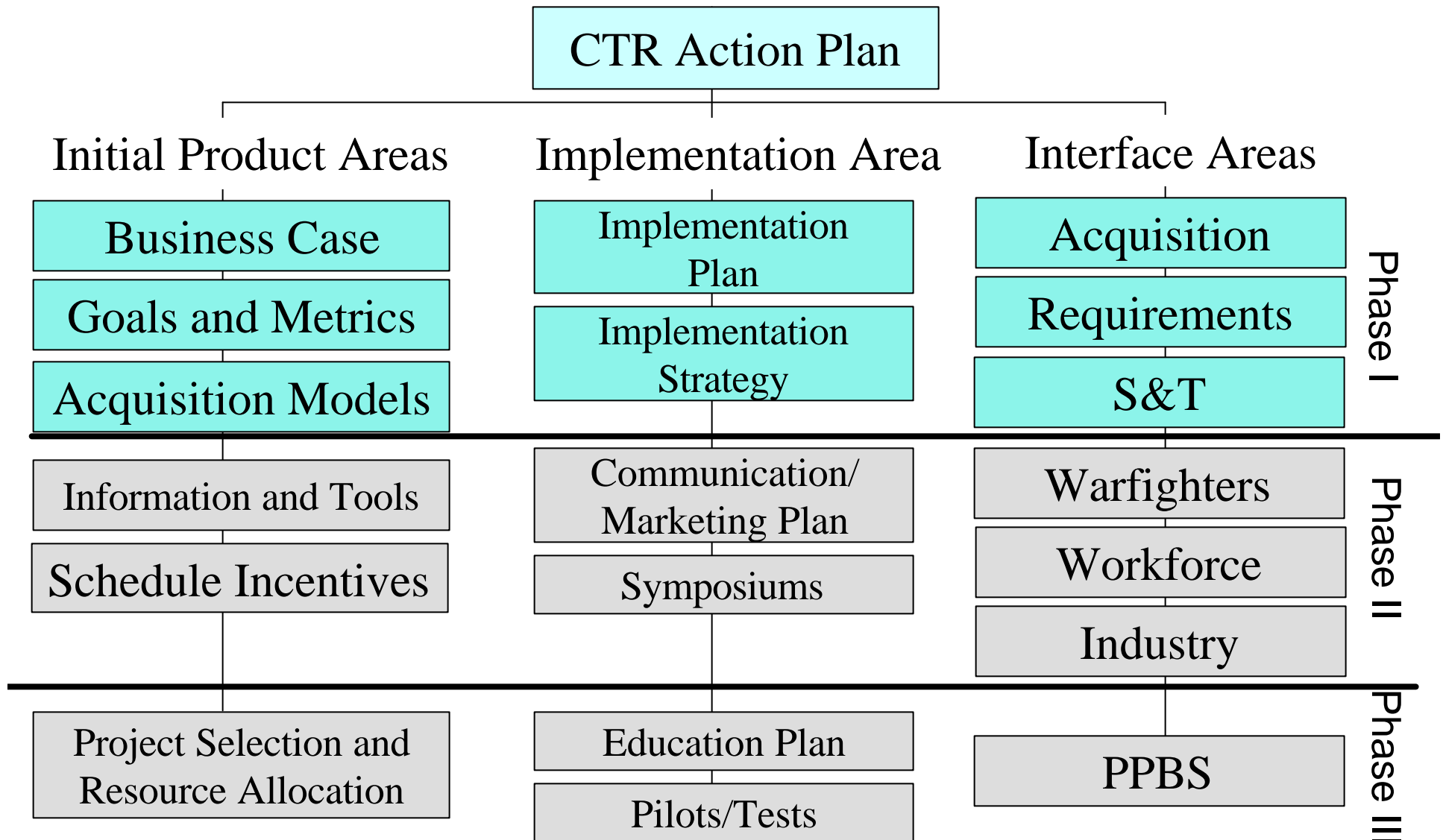
# Acquisition Time Reduction







# Cycle Time Reduction Action Plan (Phase I)





*Cycle Time Reduction Actions and Plans (Phase I)*

# ***Business Case for Cycle Time Reduction***

- **Built Macro-Business Case for Cycle Time Reduction**
  - Shows impact of long development time on warfighter, budget, acquisition community, and sustainment community
  - Uses specific supported examples to illustrate impact
  - Developed by SAF/AQXA with financial support from OSD(A&T)
- **Widely Presented and Accepted Within Acq Comm**
  - Presented to DoD acq leadership, service acq leadership, PEO/SYSCOM conference, congressional staffs, many others
  - Made cycle time a front burner issue for OSD acq community
- **Not Widely Presented Outside Acq Community**
  - Need to involve Warfighters, Finance, Services, Sustainment, Service and DoD Leadership,

(Highlights of business case are on slide 4-24 of this briefing)

Business case has had significant impact convincing people of the necessity to address long development times where presented



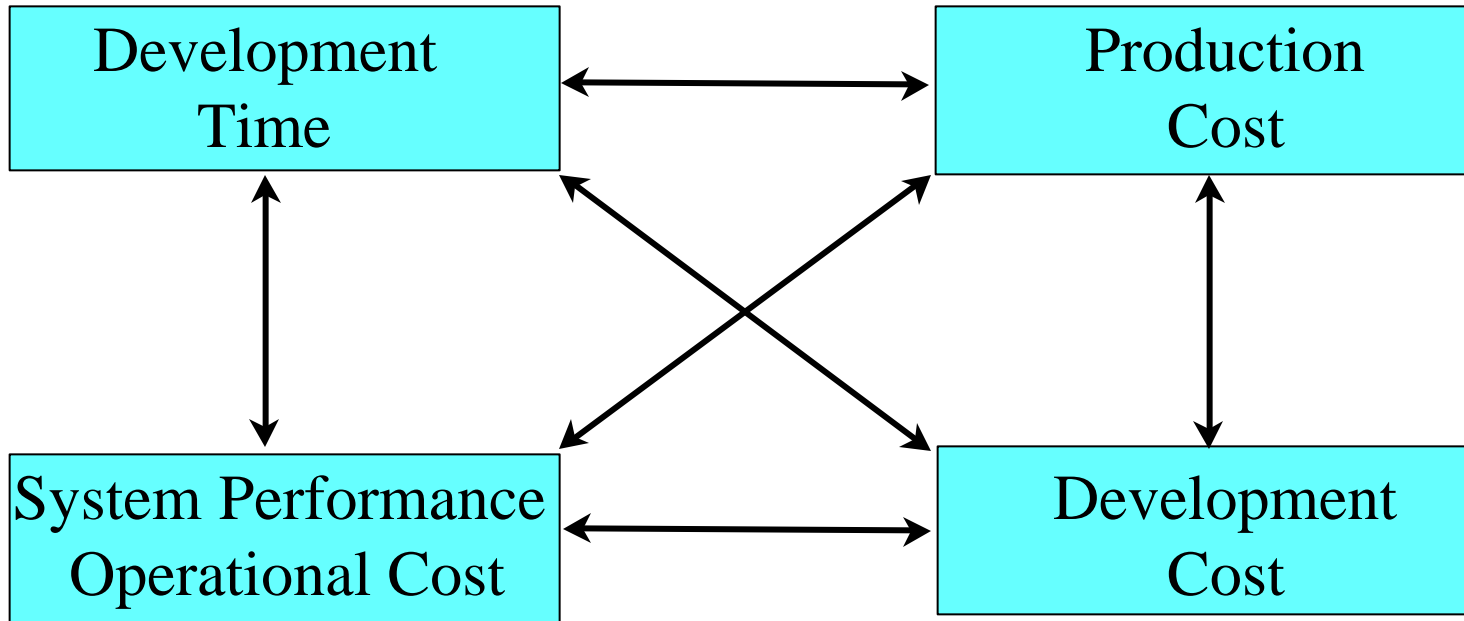
# ***Cost of Delay Analysis***

- **Business Case for Cycle Time - Project-by-Project**
- **Method determines the value of time versus cost and performance on the value of a project**
  - **Method developed by Don Reinertsen Producing Products in Half The Time**
  - **Widely used in commercial industry**
  - **Adapted to military by SAF/AQXA with support from OSD(A&T) AT**
- **AF Reserve Officers Tested with 12 current programs**
  - **Results indicate that the method works for wide array of projects**
  - **Indicate in many cases we underestimate value of time**
- **AF developed briefings, training package, and exercises**
- **Presented at PEO/SYSCOM, ESC, ASC, SMC, ASTs, DSMC, JSF, and Presented during Acq and Log Ref Wk**

**Being Deploy Now**



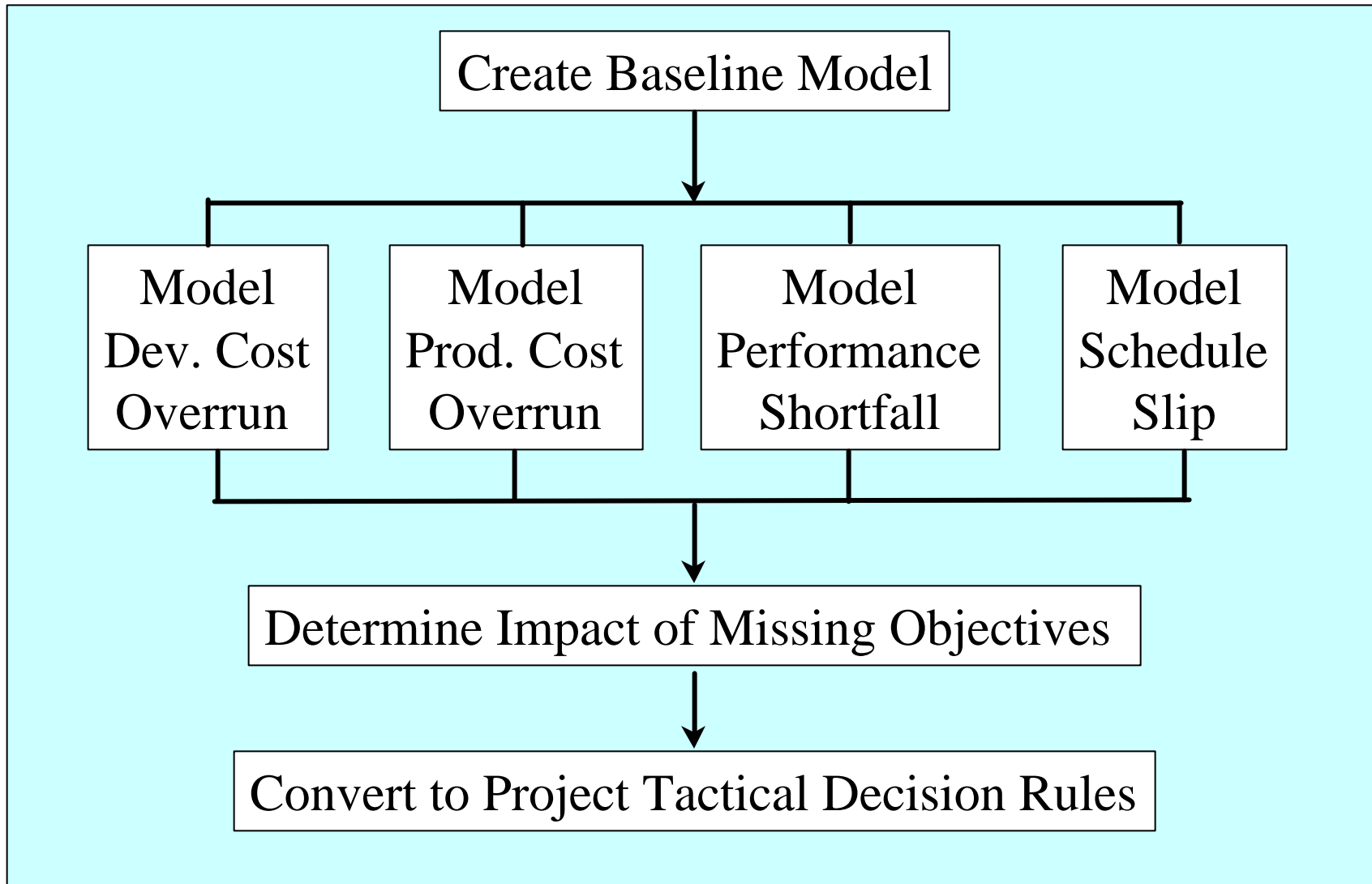
# The Four Forces on Projects



**Method provides the necessary information to make appropriate tradeoffs to maximize value**



# Cost of Delay Analysis





# Baseline Economic Model Template

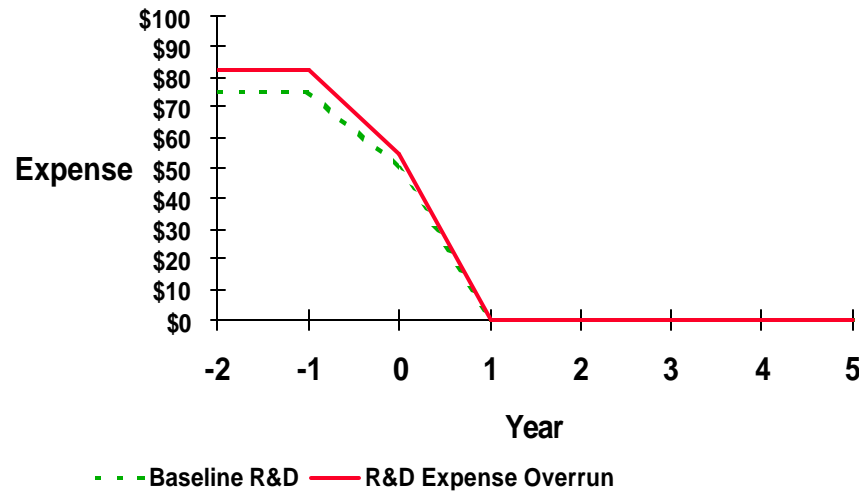
		Title of Project						
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
<b>Costs</b>	Old System							
	Operating Costs							
	Disposal Costs							
	<b>Total Costs</b>							
	New System							
	Development Costs							
	Production Costs							
	Installation Costs							
	Operating Costs							
	Disposal Costs							
<b>Total Costs</b>								
	<b>Combined Total Costs</b>							
<b>Benefits</b>	Old System							
	<b>Total Benefits</b>							
	New System							
	<b>Total Benefits</b>							
	<b>Combined Benefits</b>							
<b>Value</b>	<b>Total Annual Value</b>							
	<b>Cumulative Value</b>							



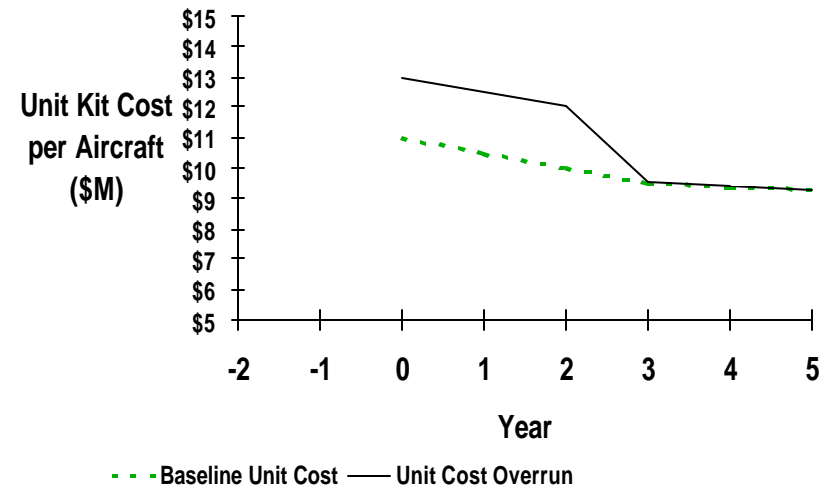
# Cost of Delay Analysis Overview

## Modified Value Models

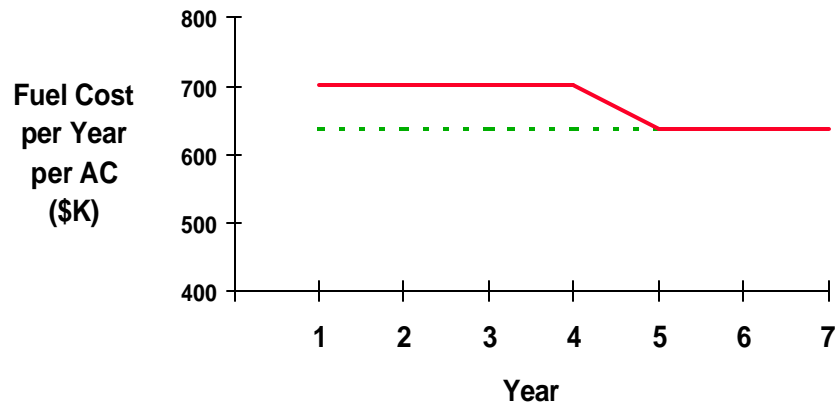
### R&D Cost Overrun



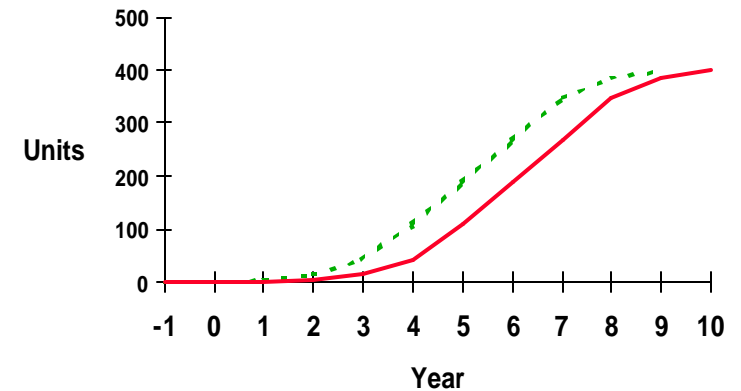
### Production Cost Overrun



### Performance Shortfall



### Schedule Delay



--- Baseline Fuel Costs    — Actual Fuel Costs

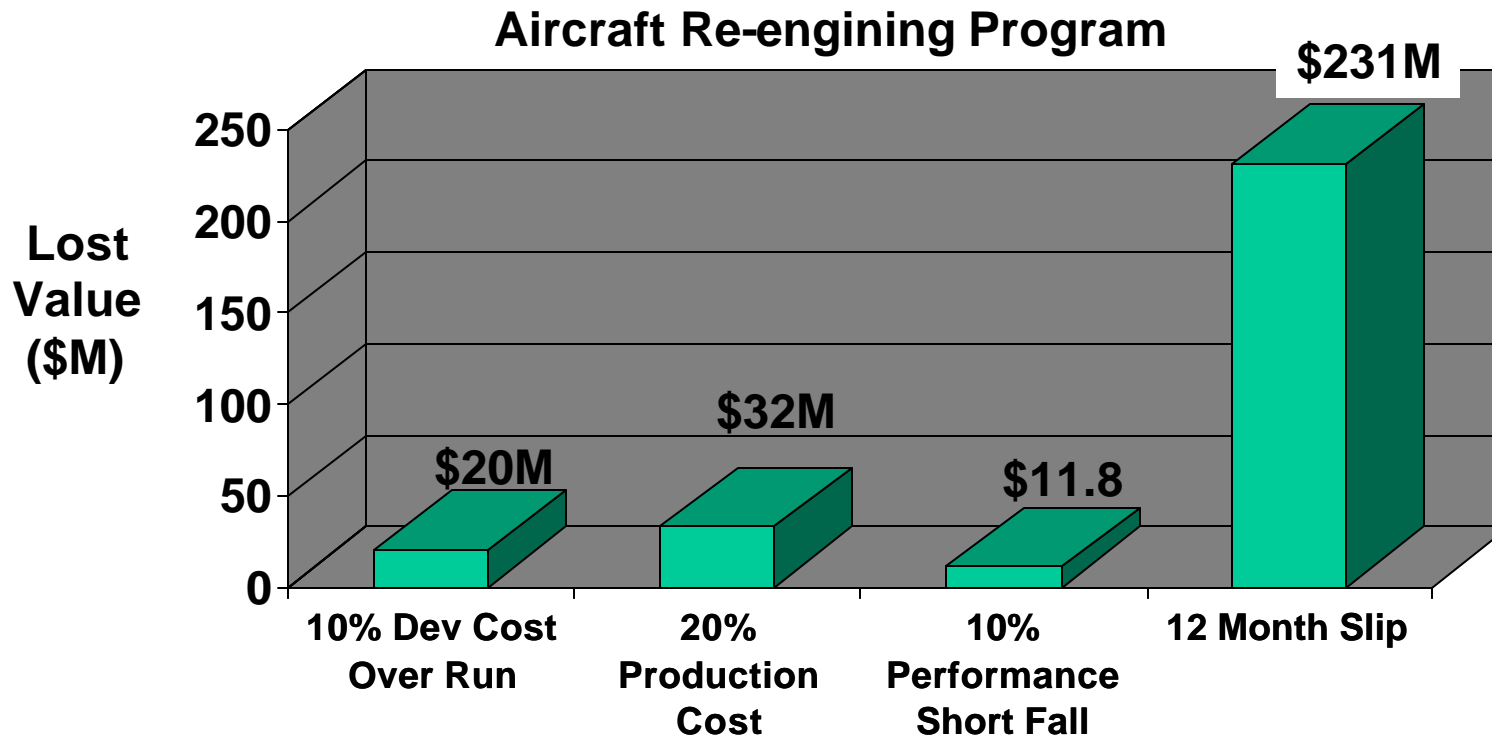
SAF/AQXA Major

--- Delivered Units  
— Delivered Units with Schedule Slip



## Step III - Calculate Total Impact

Compare the cumulated value of each modified value model with the baseline value model







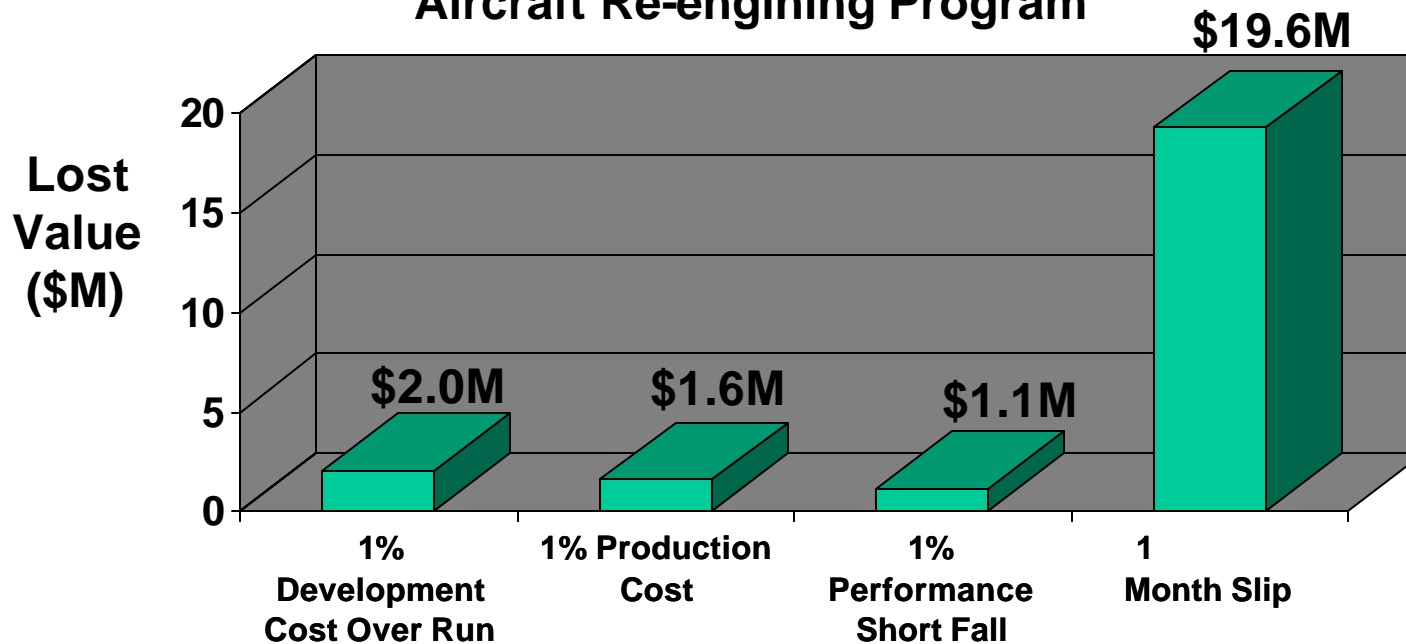
# Step IV - Convert to Decision Rules

## Convert to Tactical Decision Rules

### – Impacts of incremental changes

- i.e. 1% increase in development cost,
- 1% increase in production cost,
- 1% performance shortfall
- 1 month slip in schedule

Aircraft Re-engining Program





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# *Acquisition*

*Changing the Acquisition Approaches to  
Support Evolutionary Acquisition and  
Faster Acquisition Cycles*



*AF Cycle Time Reduction Plans and Actions (Phase I)*

# ***Acquisition Process Changes Support of Evol Acq Approaches***

- **Ensure acquisition processes and culture support evolutionary acquisition approaches**
- **Developed New Acquisition Model (OSD CT Task Force)**
  - Being used as basis for Major DoD 5000 Re-write
  - Evolutionary Acquisition approach based
- **Support Evolutionary Acquisition**
  - Evolutionary Acquisition Reinvention Team
  - Developed Evolutionary Acquisition Guide for AF Programs
- **Provide Support of Spiral Development**
  - AFI 63-123 EA for C2 Systems “Spiral Development”
  - In final coordination (AQI Lead)

**Major Changes Expected in DoD 5000 Acquisition Model**



*AF Cycle Time Reduction Plans and Actions (Phase I)*  
***Evolutionary Acquisition  
Reinvention Team***

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- **Researched and consolidated available information, direction, guidance, and best practices**
- **Developed guide to assist Program Managers in application of evolution acquisition to programs**
- **Developing EA training program**
  - **Overview**
  - **Seminar/Workshop**
  - **Training to be deployed to acq support teams, Acquisition Logistics Reform Week, and AFIT**

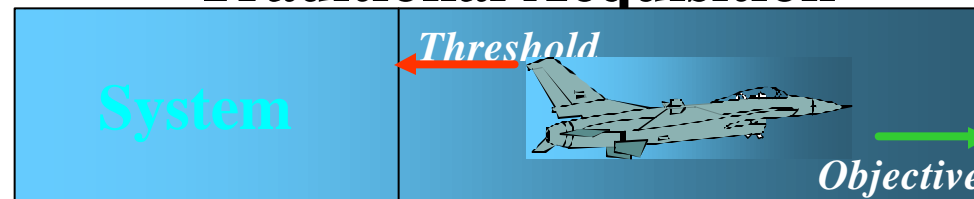
**Team Leader: Mr. Tom Graves ASC**

**Air Force Evolutionary Acquisition Guide In Coordination  
Very Favorable Comments from Centers and Programs**

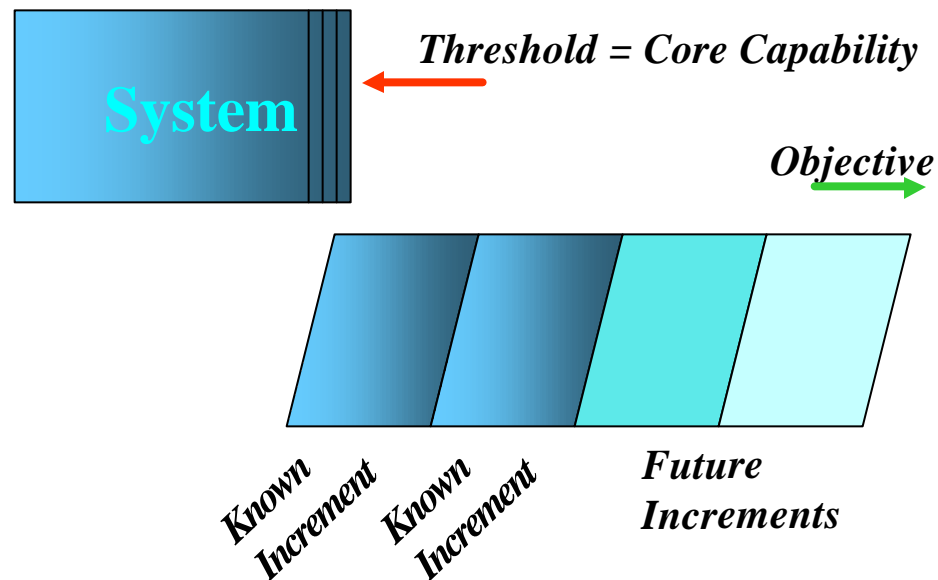


# EA Working Concept

## Traditional Acquisition



## Evolutionary Acquisition





## ***Spiral Development***

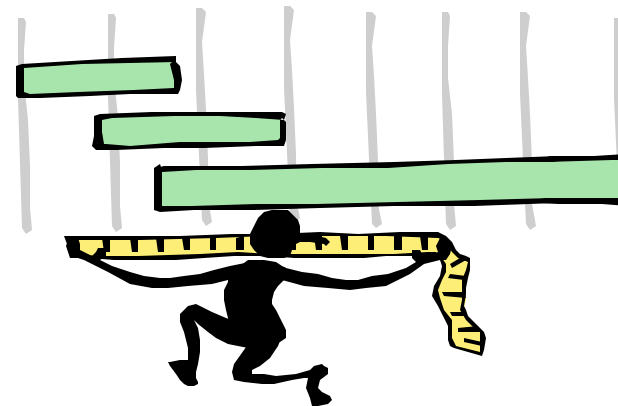
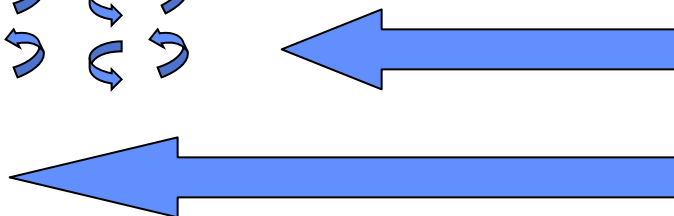
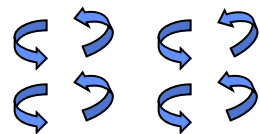
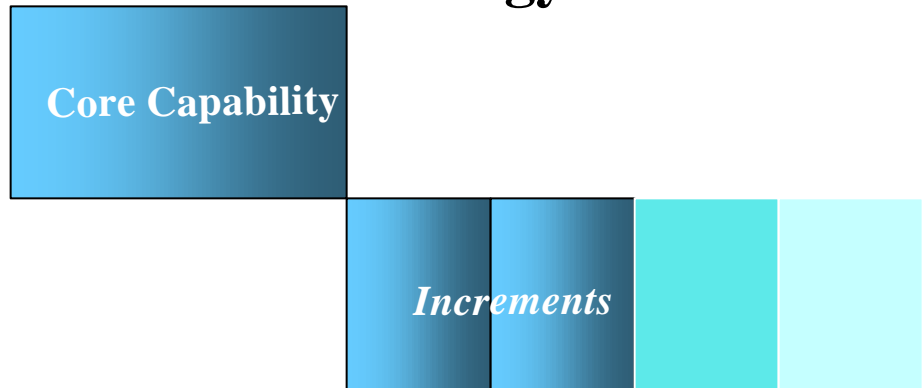
- **AF Spiral Development efforts are led by Electronic Systems Center, SAF/AQI, and AC2ISRC**
- **Adopting best practices developed for commercial software development**
- **Primarily being applied to AF electronic and software based systems**
  - **Command and Control**
  - **Intel, Surveillance, and Recon**
- **Goal is to get inside the rapid technology cycle (18 month goal for incremental deliveries)**
- **“Spiral Development Reg” in final coordination**

**Air Force is applying spiral development methods**



# Evolutionary Acquisition vs Spiral Development

## Evolutionary Acquisition is a Strategy



## Spiral Development is a Process

- Within Increment
- Certain Aspects of the Core
- Is not a “given” when using EA



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# *Requirements*

**Requirements must support of faster development times and evolutionary acquisition strategies**





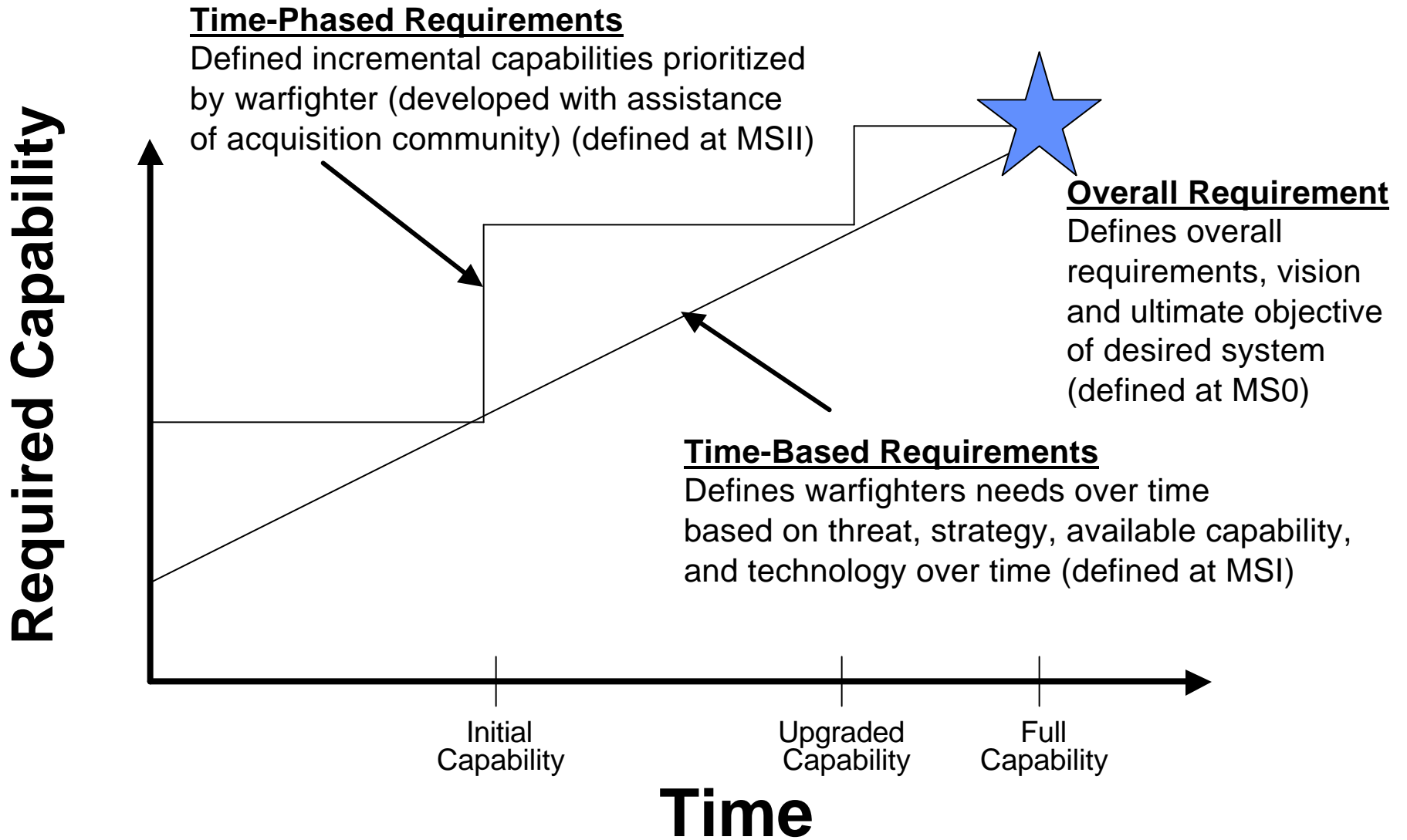
# ***Ensure Requirements Allow for Shorter Cycle Times***

- **AF 10-601 Requirements Generation Instruction Rewrite**
  - Explicit support evolutionary acquisition - June 98
- **Section 912c Requirements/Acquisition Study** - Nov 98- Jan99
  - Addressed cycle time issue, Time-based requirements
- **CJCSI 3170.01 Requirements Generation System Rewrite**
  - Changes incorporated into instructions - Jan-Jul 99
  - Evolutionary acquisition, Time-based requirements, Time-phased requirements, Prioritization of requirements
  - Updated Regulation signed by J-8 14 Aug 99
- **AF Requirements Reinvention Team** Jan 99 -
  - Taking clean sheet approach to AF requirements processes

**Changes Incorporated in JCS and AF Regulations**



# Time-Phased and Time-Based Requirements (In CJCSI 3170.01)





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# ***Science and Technology and Experimentation***

**Science and Technology efforts must support and supply the necessary technology to support rapid development efforts. Experimentation, Demonstrations and Preparations for Technology Transition**



*Decision/Initiation Time*  
***Transition Planning***

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## ***Innovation Transition Planning***

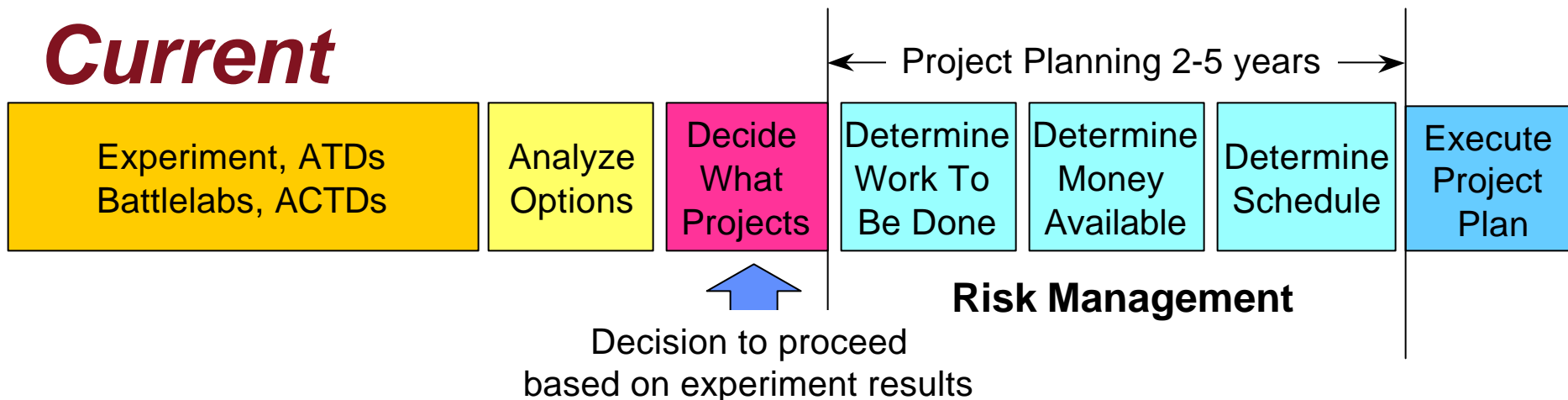
- Many current experimentation and innovation efforts lack sufficient transition planning
- Significant transition planning must occur to support transition decisions and initiation of an acquisition project
- AC2ISRC is “Lead User” in transition planning efforts
  - Warfighter experiments
  - ATDs
  - ACTDs
  - Battlelab initiatives
  - Spiral development efforts
  - POM Building
- Currently developing AC2ISRC and Air Force Guides for Transition Planning

**Necessary to make informed decisions on potential projects - speeds Decision/Initiation Time**

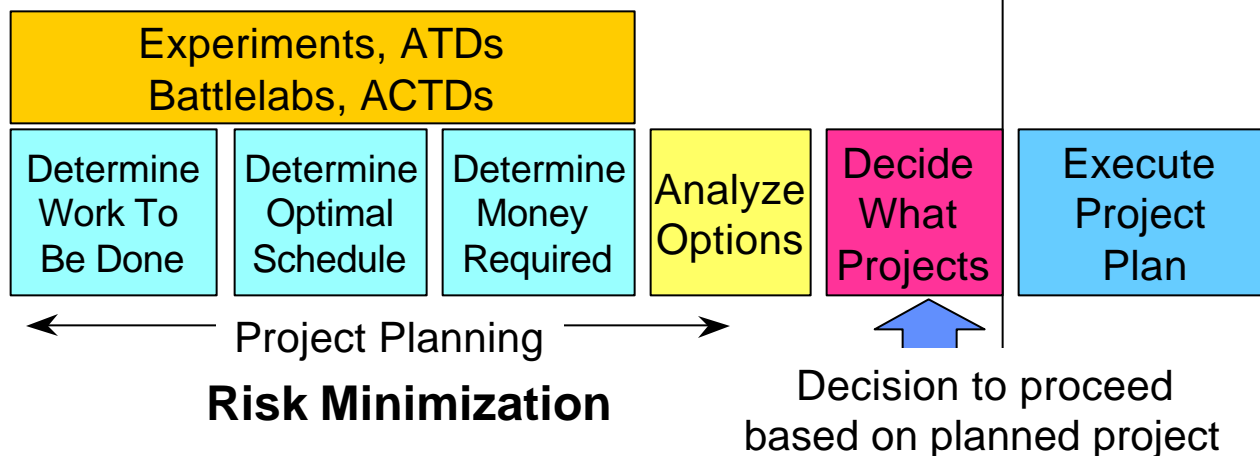


# Transition Planning Fundamental Difference between “Current” and “Proposed” Models

## Current

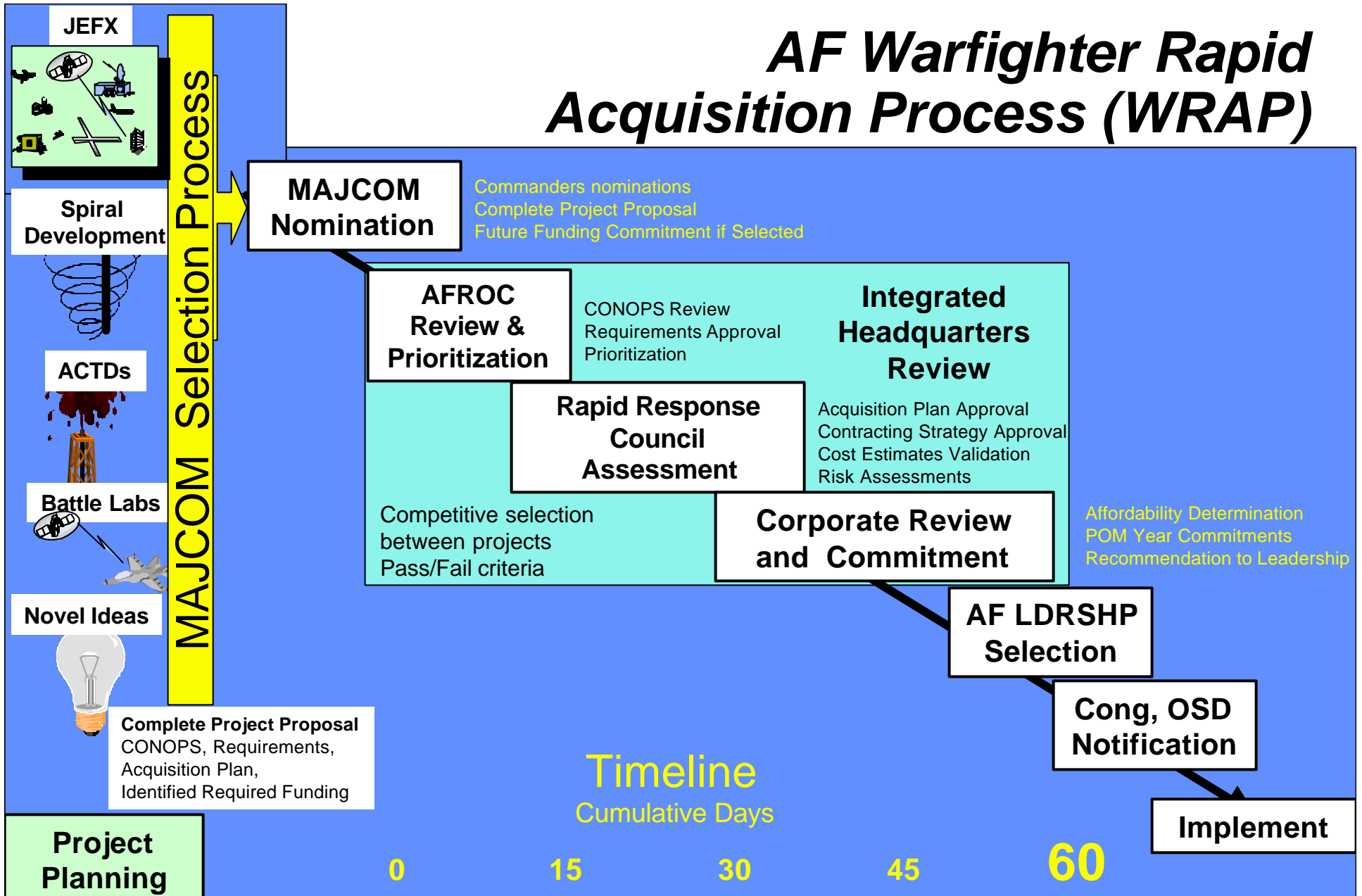


## Proposed



**Projects must be fully planned prior to decision**

# AF Warfighter Rapid Acquisition Process (WRAP)



Competitive Selection Between Competing Projects  
Involved the Critical Organizations in Their Areas of Responsibility

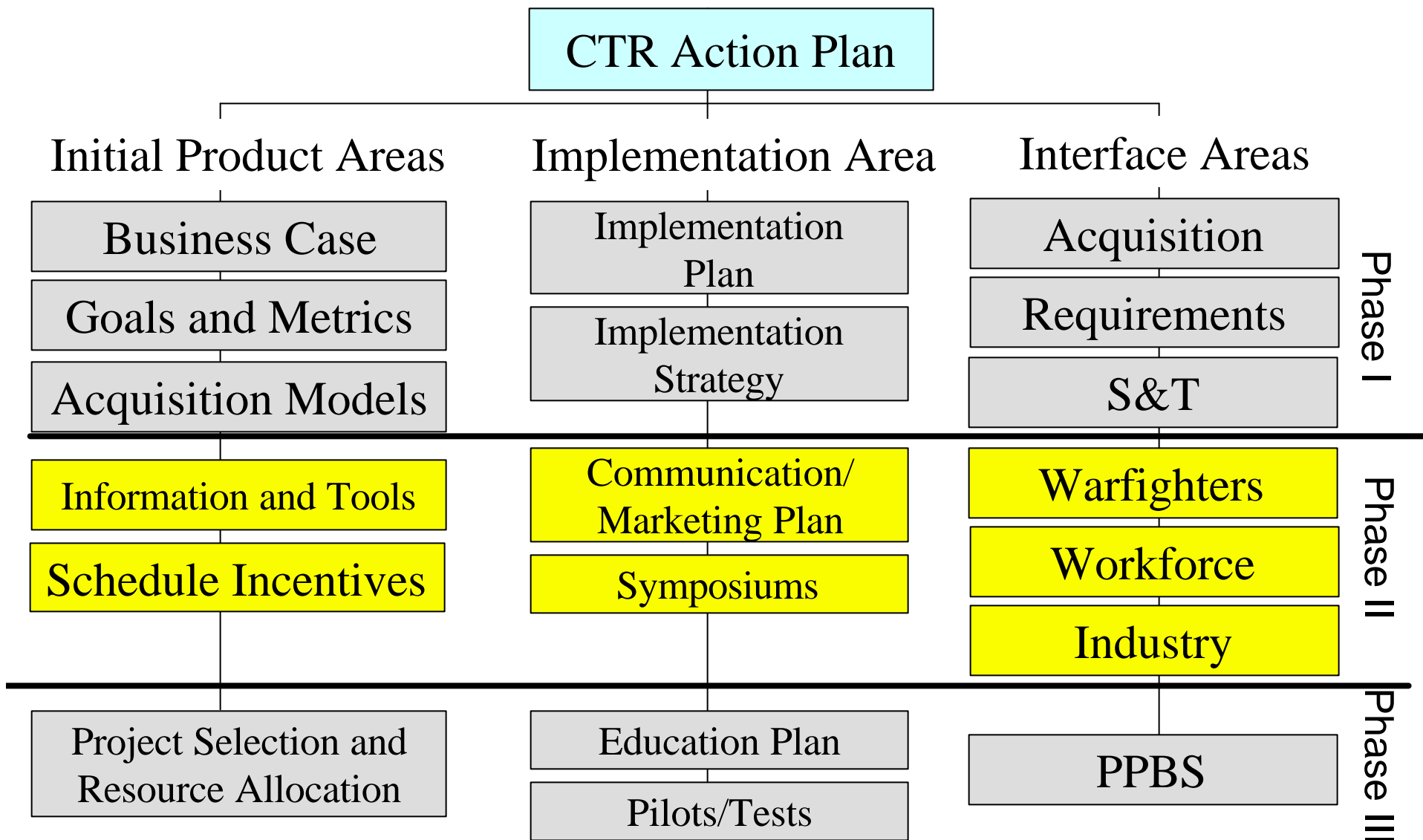


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# ***AF Cycle Time Reduction Action Plan Phase II***



# Cycle Time Reduction Action Plan (Phase II)







# ***Schedule Incentives***

## ***Develop Methods to Provide Incentives That Encourage Cycle Time Reduction***

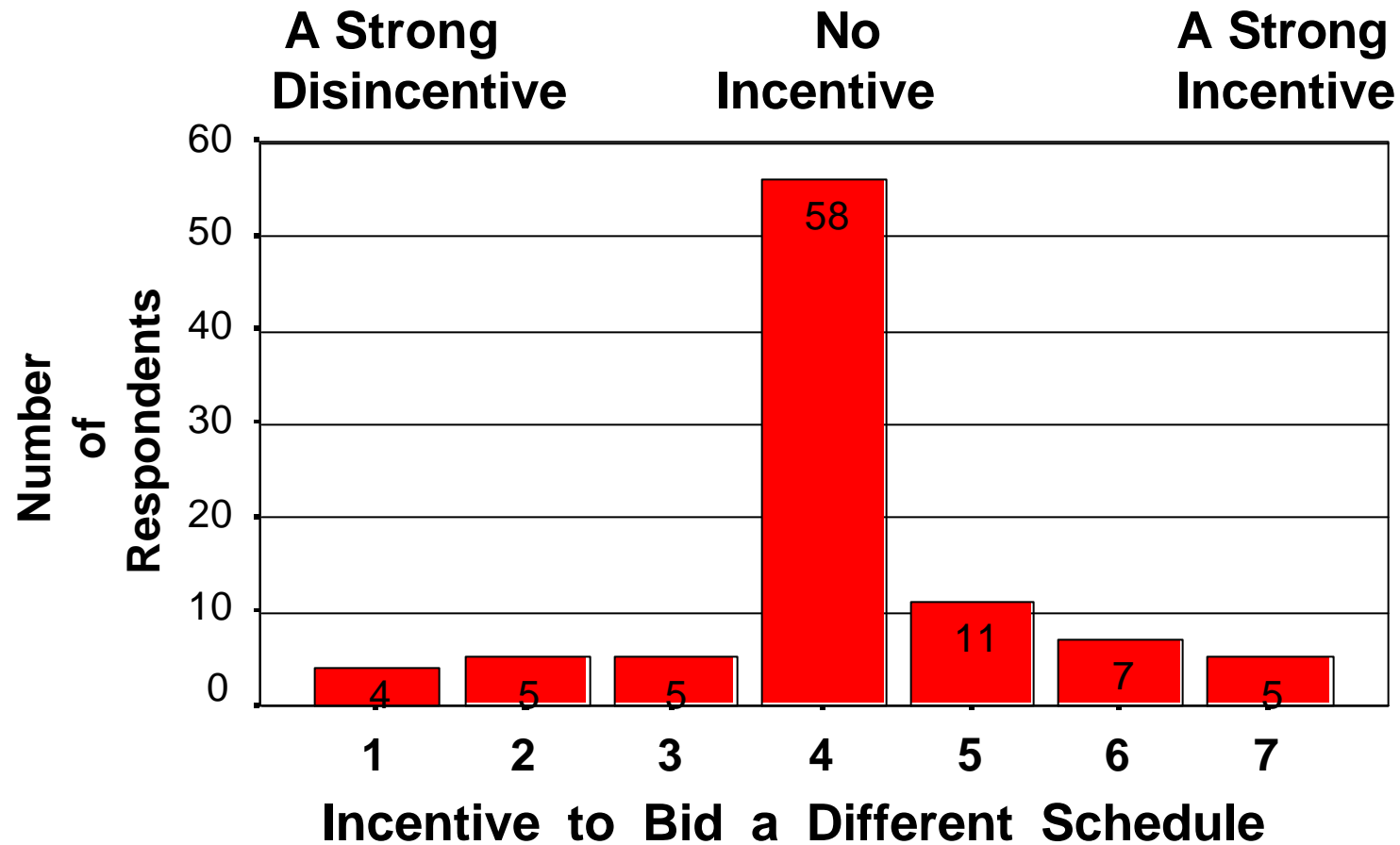
It is essential align personal and organizational incentives with cycle time reduction

### **Potential Tasks:**

- 5.1 Develop Incentives for Cycle Time Reduction within the Government (Service, Program Office, Test, Oversight Agencies)**
- 5.2 Develop Incentives for Cycle Time Reduction for Contractors**
  - 5.2.1 Make the length of the development schedule and the associated risk a significant source selection criteria**
  - 5.2.2 Provide significant schedule-based contract incentives to meet and reduce the schedule**
- 5.3 Develop plan to provide increased awareness and training on best product development practices**



## Schedule Development Process: Contracting **Contractor Incentive to Bid a Different Schedule**

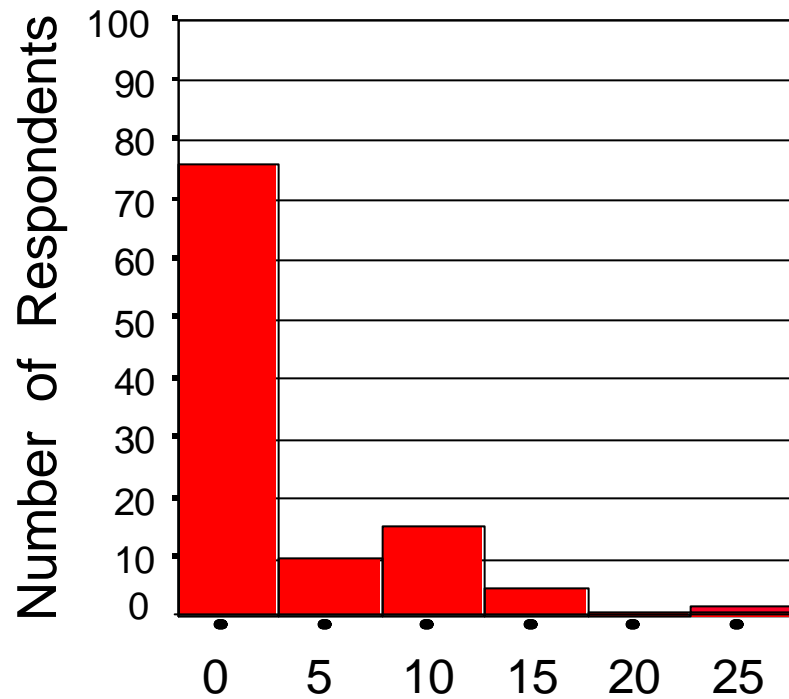


Contractor Survey N=97



# Schedule Development Process: Development Available Schedule-Related Incentive Fees

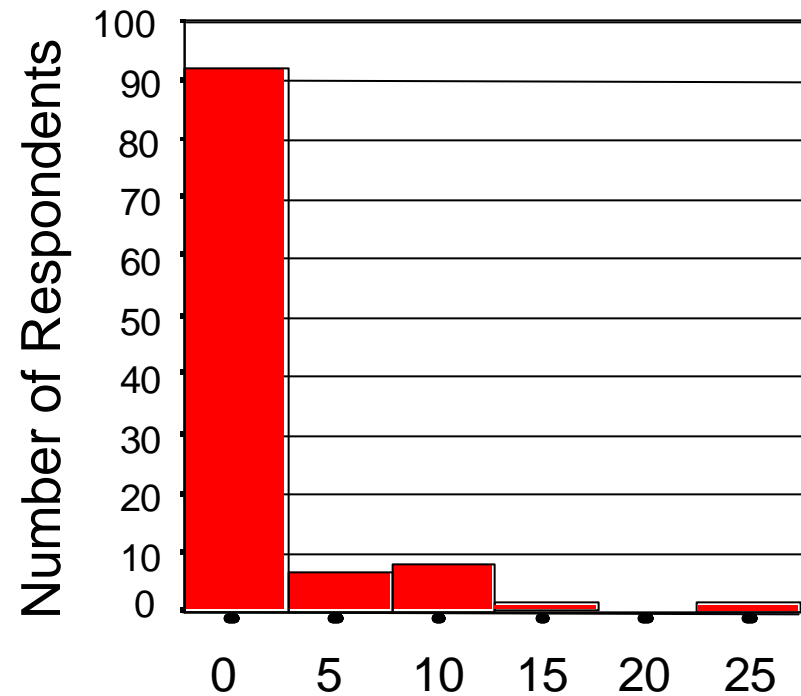
## On Time Completion



Mean = 3.0

**Percent of Contract**

## Early Completion



Mean = 1.5

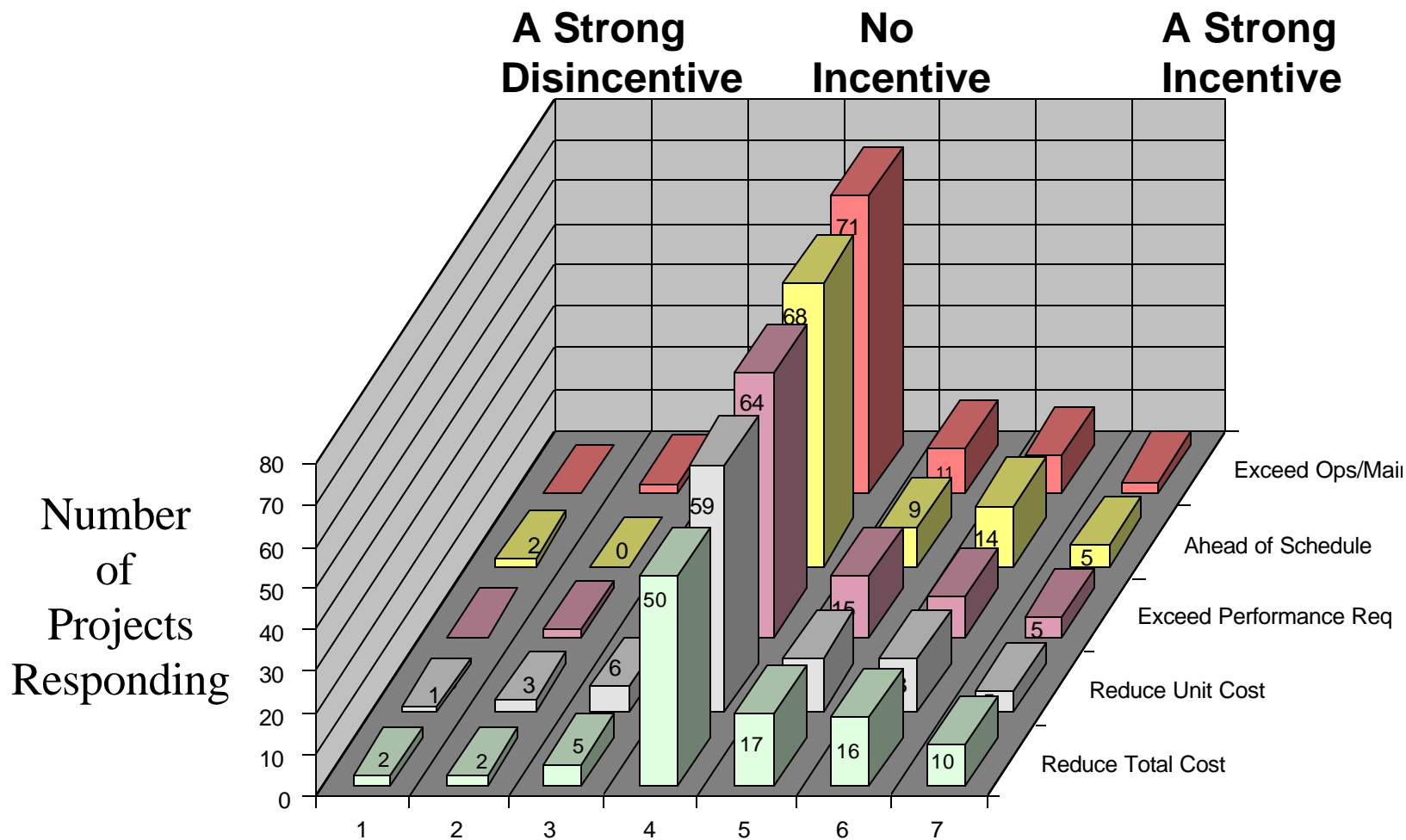
**Percent of Contract**

Government Program Manager Survey N=108



# Schedule Development Process: Development Phase

## Contractor Reported Incentives to Exceed Project Objectives



Contractor Survey N = 102



*AF Cycle Time Reduction Plans and Actions (Phase II)*  
***AF Schedule Incentives  
Reinvention Team***

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- **Approved by AF Acq Ref Leadership Council (Jan 99)**
- **Looking at Program Office and Contractor Incentives to Shorten Project Schedules**
  - **During Pre-Award Phase**
  - **During Execution Phase**
  - **Develop range of options from which SPOs and contractors can propose based on project specifics**
- **Led by Space and Missile Center**  
(Mr Bill Floyd SMC/AXC - Team Leader, Mr Maikisch SMC/CD- Champion)
- **DSMC Alumni Association Symposium Session**
- **NDIA-Offsite in October 99**

**Team Underway - Making Progress**

Looking for participation, ideas, and recommendations



# ***Schedule Information And Tools***

## ***Develop and Use Rigorous Schedule Based Information and Tools***

Accurate and available information and analysis is required to make schedule based decisions

### **Potential Tasks:**

- 4.1 Develop “Should/Could Take” method and procedures to analyze and estimate the appropriate length of a development project**
  - used to determine “Right Sizing” of a program based on its economics and development related requirements
- 4.2 Develop effective project schedule estimation and evaluation tools**
  - Used for Initial Schedule Development
  - Used for Source Selection Determination
- 4.3 Develop method to collect detailed schedule information on contractor proposed schedules for evaluation during the source selection process**



*AF Cycle Time Reduction Plans and Actions (Phase II)*

# ***Schedule Development and Evaluation Tools Reinvention Team***

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- **Approved by AF Acq Ref Leadership Council (June 99)**
- **Team will investigate and determine how we:**
  - **Evaluate value, risk, and costs of various potential project schedules**
  - **Develop best value initial project schedules**
  - **Effectively evaluate the value and associated risk of various contractor proposed schedule**
  - **Manage and execute projects schedules**
- **Led by Aeronautical System Center**  
(Mr. Michael Welch ASC/SYI - Team Leader, Ms Margaret LeClaire ASC/SY- Champion)

**Team Underway - Making Progress**

**Looking for participation, ideas, and recommendations**



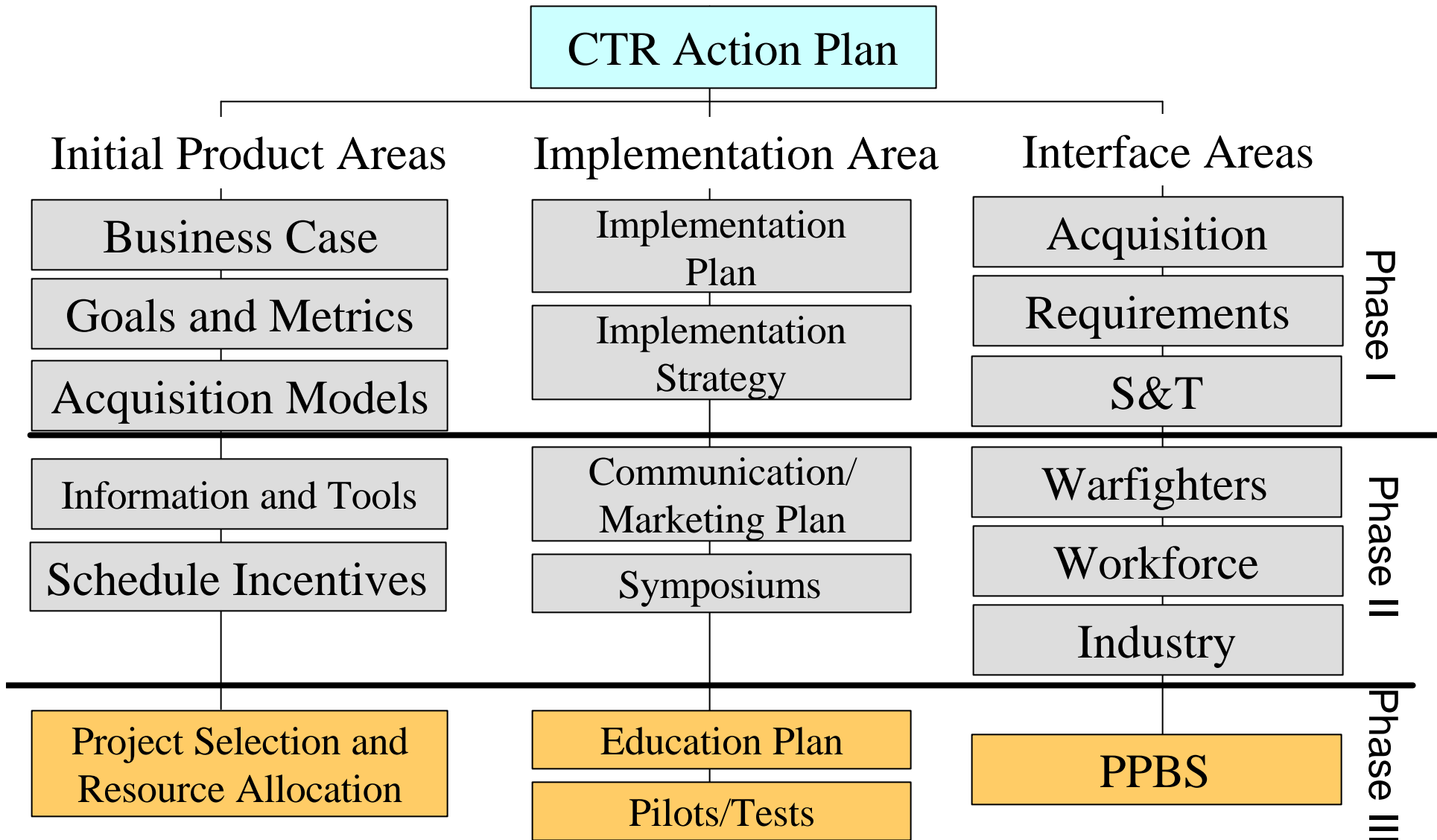
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# ***AF Cycle Time Reduction Action Plan Phase III***





AF Cycle Time Reduction Plans and Actions (Phase III)  
**Cycle Time Reduction Action Plan**  
**(Phase III)**





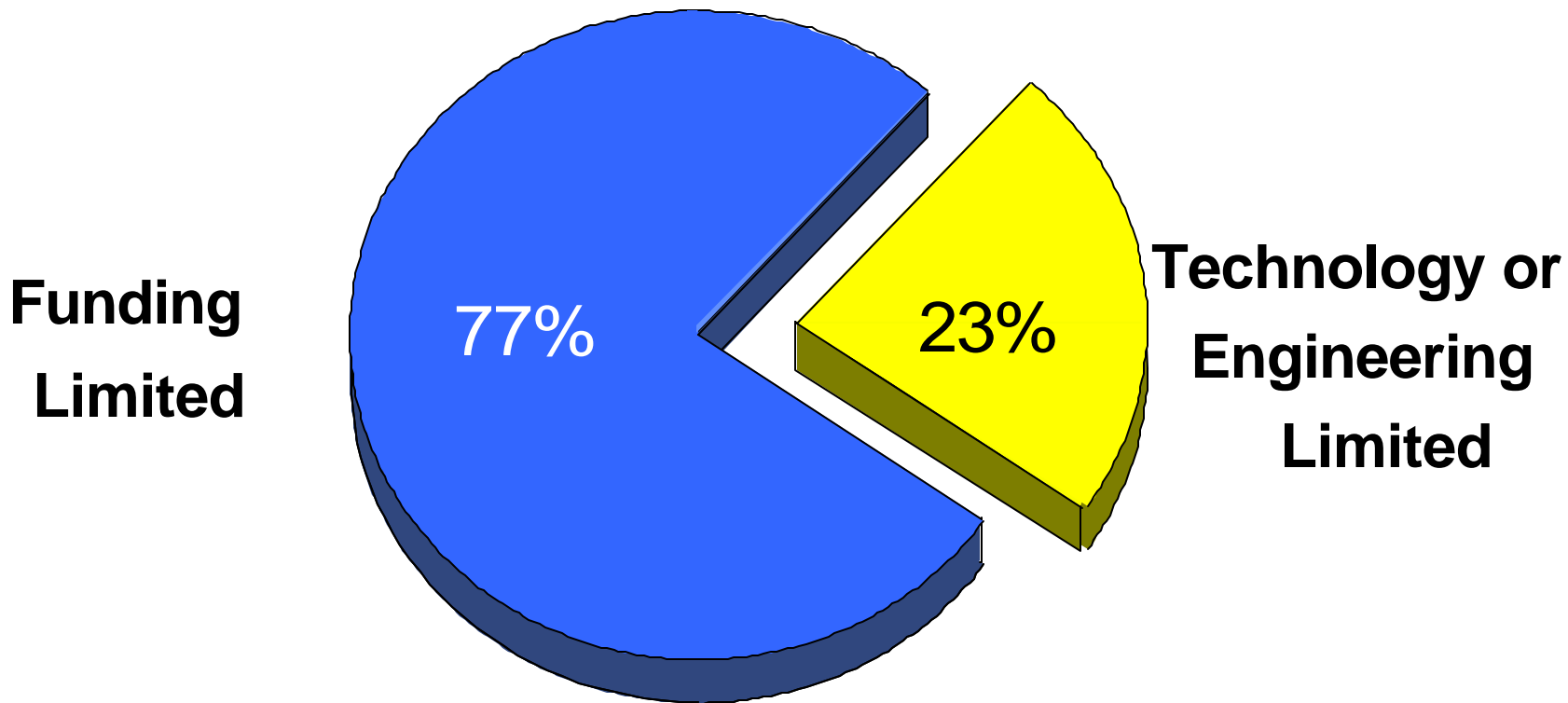
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# ***Project Selection and Resource Allocation (Portfolio Management)***

## **Mitigating Funding Based Constraints**



## ***Schedule Limitations: Funding Limited Vs Technology and Engineering Limited***



**Percent of Respondents Reporting the Limiting Factor for Their Project's Schedule as Funding or Technology and Engineering (Pentagon Survey; Number of Projects = 61)**



*Cycle Time Reduction Policy Recommendations*  
**Recommendation 4**

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## ***Mitigate Funding-Based Schedule Constraints***

**The allocation of resources across the DoD portfolio of projects should allow for potential cost savings through cycle time reduction in product development**

### **Recommended Steps:**

- 4.1 Require All Projects That are Initiated Be Fully Funded Based on Development Related Requirements**
- 4.2 Establish an Effective Project Screening Process**
- 4.3 Limit the Number of Projects in Each Phase of Development**
- 4.4 Clear the Log Jam of Current Projects**
- 4.5 Ensure Necessary Funds are Available to Accelerate Projects as Opportunities Arise**



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# *Summary*



## *Summary*

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- **Significant impacts of long acquisition response times**
  - Impacts Warfighter, Acquisition, Budget, and Sustainment
- **Significant research on causes and recommendations exist**
- **Must address in Recognition, Decision Initiation and Acquisition Phases**
- **Action plan being Implemented**
  - Phase I - Building awareness and quantifying impacts
  - Phase II - Building the necessary infrastructure and tools
  - Phase III - Mitigating funding based constraints
- **Actions cross all organizations**

All the actions are necessary to make our  
acquisition process - **Fast and Smart**



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***“and miles to go before I sleep.”***

***Robert Frost***



# Contact Us

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## Open Communications Channels

- [www.safaq.hq.af.mil/acq\\_ref](http://www.safaq.hq.af.mil/acq_ref)
- [ARIdeas@pentagon.af.mil](mailto:ARIdeas@pentagon.af.mil)
- Fax (DSN 425-1068, Comm 703-588-1068)
- Mail (Attn: SAF/AQXA, 1060 Air Force Pentagon, Washington, DC 20330-1060)

## Cycle Time Reduction Web Site:

[www.safaq.hq.af.mil/acq\\_ref/cycletime](http://www.safaq.hq.af.mil/acq_ref/cycletime)