Resolving the conflict between acquisition affordability, total cost ownership cost, and maximum military performance.

Dr. Craig Arndt
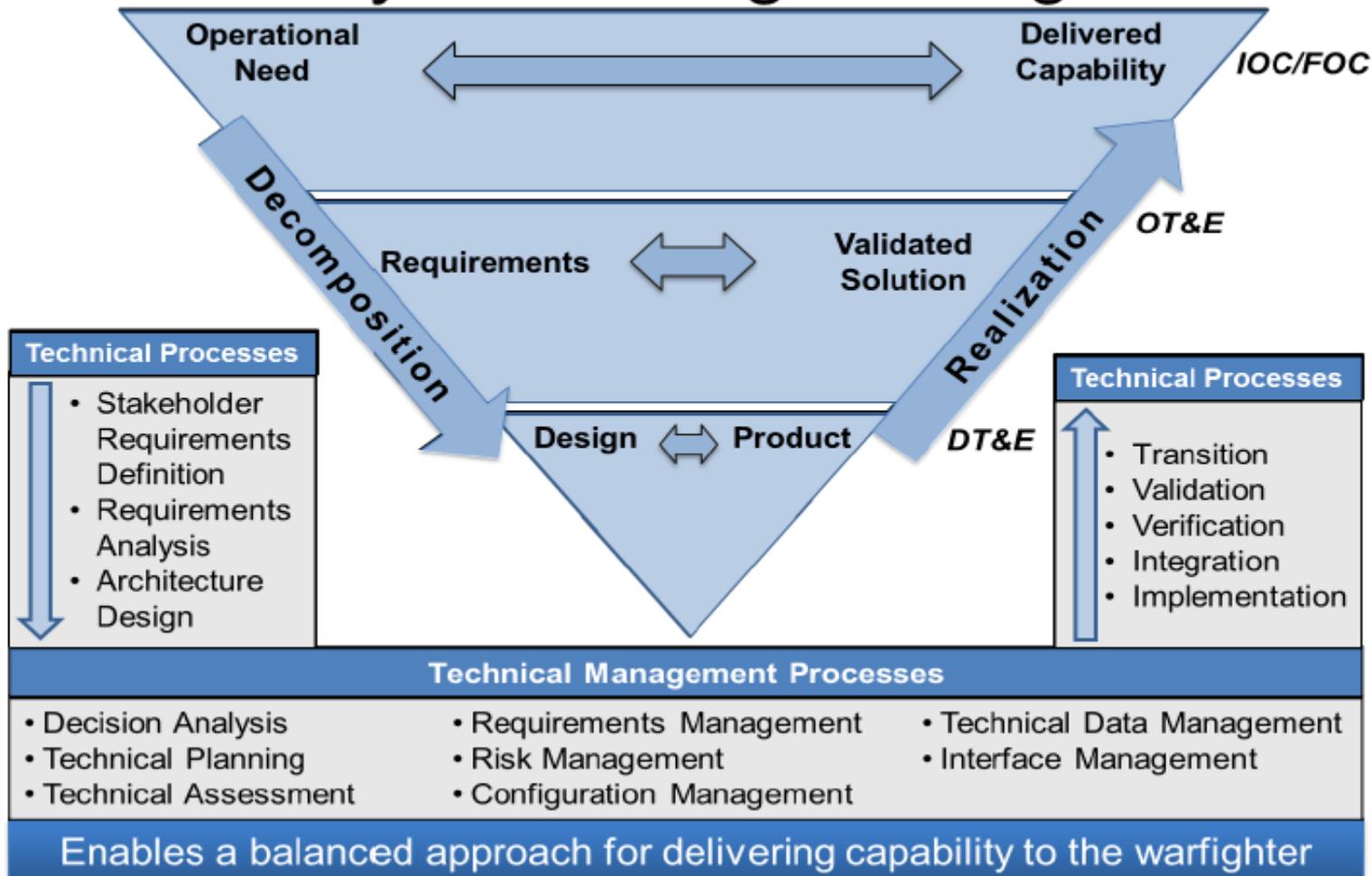
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Abstract

Affordability is and should be one of the most important aspects of future defense acquisition. However the issue of affordability is much more complex that just getting the best value for the development money we spend. In order to address long term affordability we also need to address the issues of life cycle cost, the ever shortening technology development cycle, the cost of not having technology when it is needed and the need for high levels of system performance in military applications. This paper examines different traditional and non-traditional approaches to reducing the cost of defense acquisition and the consequences of each approach in terms of a) addressing the problems (High cost of Acquisition, Development time, Rapidly changing technology, Rapidly changing threat environment, Rapidly changing industrial capability, and the need to rapidly field a highly capable force), b) the proposed solutions, c) the real cost, and cost saving of the different approaches and d) the unintended consequences in terms of risk, force structure, economic and political impact, and relationships with our allies.

Note: The opinions express here are those of the author and should not be construed as those of the Defense Acquisition University or the Department of Defense.

Outline

- **What is affordability?**
- **What are the requirements for developing and delivering future capabilities?**
- **What is the current state of DoD Acquisition.**
- **Relevant Issues in technology development.**
- **Contracts and requirements created by our enemies/missions.**
- **Requirements from the stand point of being capable and affordable.**
- **Models from commercial practices.**
- **Architectures and processes to achieve capability, agility and affordability.**
- **Other impacts and unintended consequences.**
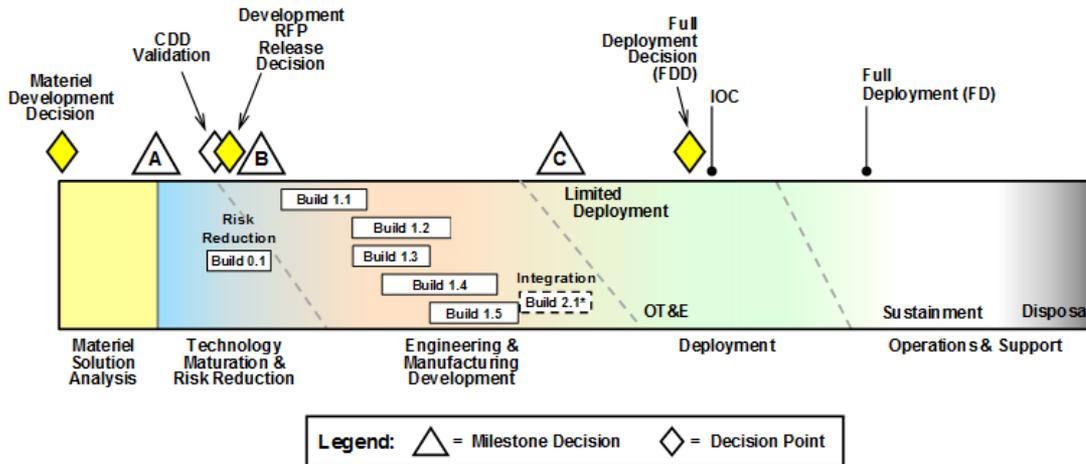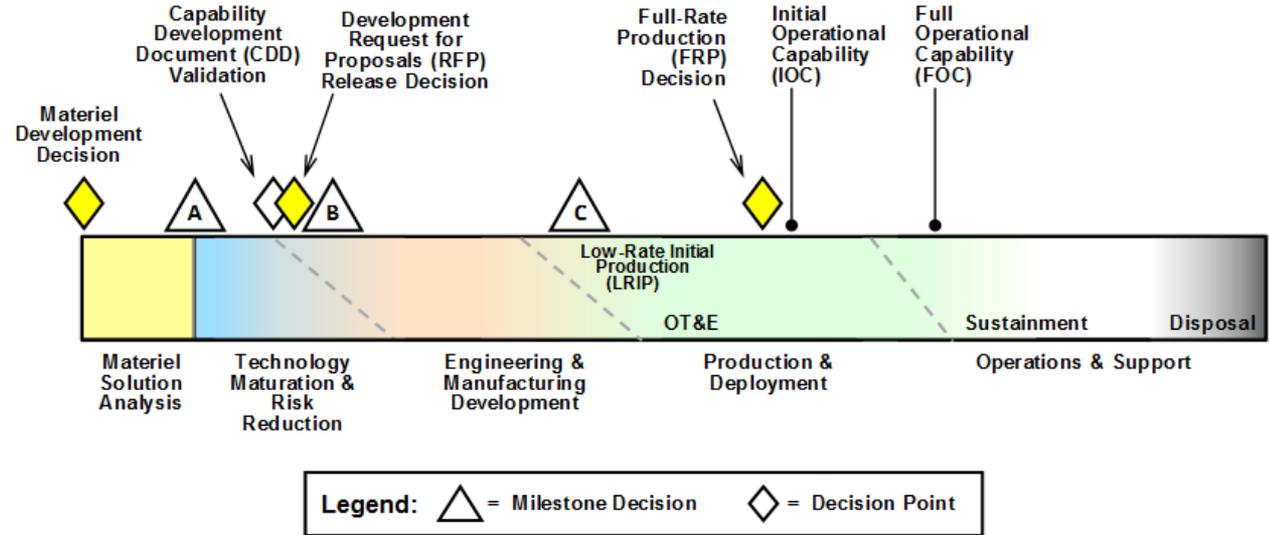- **Conclusions.**
- **Recommendations.**

DoD SE Process Model

Systems Engineering

Operational Need ⟷ Delivered Capability   IOC/FOC

Decomposition — Realization

Requirements ⟷ Validated Solution   OT&E

Design ⟷ Product   DT&E

Technical Processes
- Stakeholder Requirements Definition
- Requirements Analysis
- Architecture Design

Technical Processes
- Transition
- Validation
- Verification
- Integration
- Implementation

Technical Management Processes
- Decision Analysis
- Technical Planning
- Technical Assessment
- Requirements Management
- Risk Management
- Configuration Management
- Technical Data Management
- Interface Management

Enables a balanced approach for delivering capability to the warfighter

Hardware Intensive development program such as major weapons platform

- Starting point for most weapon systems; however, almost always contain s/w development resulting in some form of Hybrid Model A
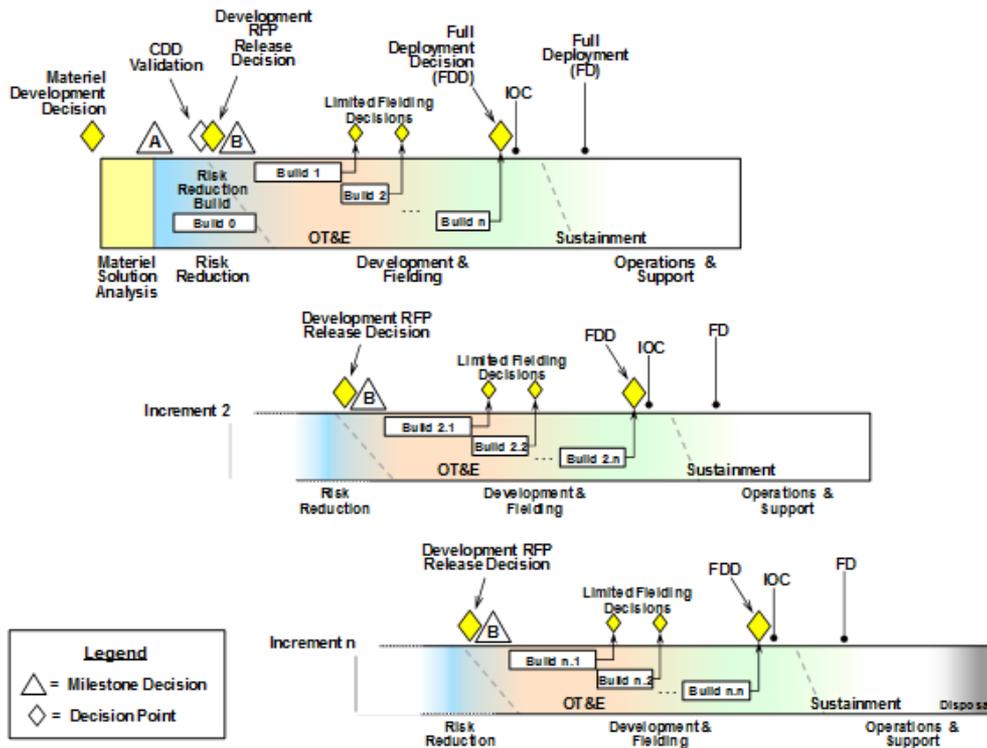

Capability Development Document (CDD) Validation
Development Request for Proposals (RFP) Release Decision
Full-Rate Production (FRP) Decision
Initial Operational Capability (IOC)
Full Operational Capability (FOC)
Materiel Development Decision

A B C

Low-Rate Initial Production (LRIP)
OT&E
Sustainment
Disposal

Materiel Solution Analysis | Technology Maturation & Risk Reduction | Engineering & Manufacturing Development | Production & Deployment | Operations & Support

Legend: △ = Milestone Decision ◇ = Decision Point

Materiel Development Decision
CDD Validation
Development RFP Release Decision
Full Deployment Decision (FDD)
IOC
Full Deployment (FD)

A B C

Risk Reduction
Build 0.1
Build 1.1
Build 1.2
Build 1.3
Build 1.4
Build 1.5
Integration
Build 2.1*
Limited Deployment
OT&E
Sustainment
Disposal

Materiel Solution Analysis | Technology Maturation & Risk Reduction | Engineering & Manufacturing Development | Deployment | Operations & Support

Legend: △ = Milestone Decision ◇ = Decision Point

*The actual number and type of builds during the program will depend on system type.

Defense Unique Software Intensive development is characterized by need to develop complex, usually defense unique, software program that will not be deployed until several software builds are completed

- Key feature is planned s/w builds
- Examples: military-unique command and control systems and upgrades to combat systems on weapons systems such as surface combatants and tactical aircraft
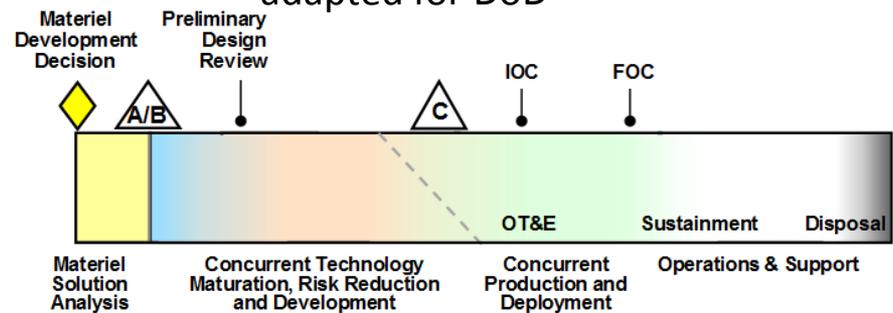
Incrementally Fielded Software Intensive development is characterized by need for rapid delivery of capability through several limited fieldings in lieu of single Milestones B and C and single full deployment

- Several builds/fieldings typically necessary to satisfy approved req'ts for increment
- Applicable for COTS software, such as commercial business systems with multiple modular capabilities, are adapted for DoD

Accelerated Acquisition Program applies when schedule dominates over cost and technical risk considerations. Compresses or eliminates phases accepting potential for inefficiencies in order to achieve deployed capability quickly

- Model shows one example of tailoring with many others possible
- Usually motivated by potential adversary achieving technological surprise, and featuring greater acceptance of program risk

What is affordability?

- **Is affordability design to cost?**

- **Is affordability best value?**

- **Is affordability staying within existing program budgets?**

- **Affordability in defense spending is minimizing national spending to meet our defense requirements while maximizing our return on Research and Development that benefits all aspects of national security, power, influence, and prosperity.**

Requirements for Future Capabilities

- A force structure that allows for basic defense of the homeland and vital US interests.

- The ability to rapidly augment force structure and defense systems in reaction to and anticipate of new threats as and before they emerge.

- World leading research and development base across a spectrum of areas that will support both rapid development and fielding of military systems and development of new civilian industries.

What is the current state of DoD Acquisition

- The Department of Defenses (DoD) has more demands on it now that ever before.

- The DoD continues to struggle with developing and supporting state of the art weapon systems in a cost and schedule effective manner.

- The current defense industrial base is invested and structured to support the current acquisition processes.
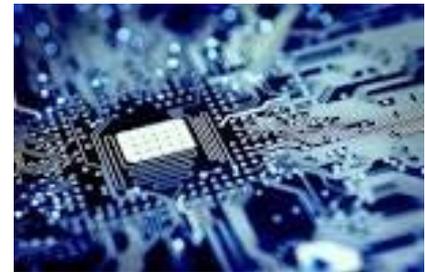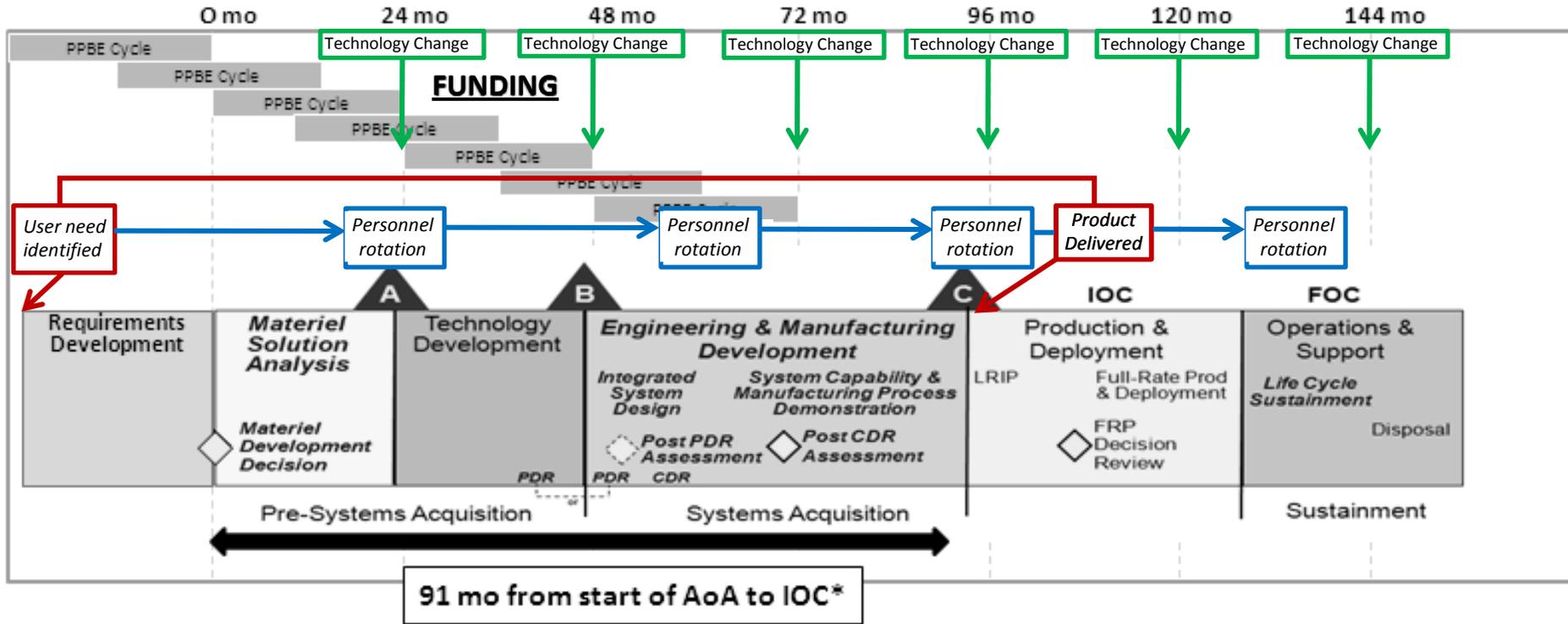
- Current DoD practice is not compatible with commercial business practices. DoD should work to make necessary changes to acquisition regulations. (Jun 94)

- Conventional DoD acquisition process is too long and too cumbersome to fit the needs of the many Information Technology (IT) systems that require continuous changes and updates.

- There is a need for a unique acquisition system for IT. (Mar 09)

Relevant Issues in Technology Development

- Technology development has and continues to out strip the pace of DoD acquisition processes.

- Particularly in the case of electronics and software the DoD life cycle is significantly shorter than the current DoD acquisition process can support.

- Many technology driven system are best suited for throw away and replace. This is not a process that the DoD is good at.

- **Program-based**
- **Personnel Rotation – about every 3 years**
- **Technology Changes about every 2 years**

*Reference: Mar 2009 DSB Report - ASD NII Study of 32 MAIS

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Requirements created by our enemies/missions

- Unlike in past years, DoD now has many different mission.

- We must still defend against traditional adversaries.

- Non-traditional, non-state adversaries continue to develop.

- Rise in asymmetric attacks.

- Additional non-military missions.
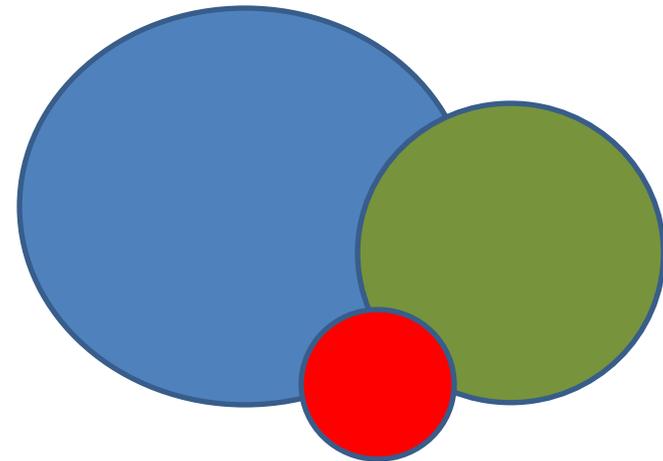
Models from Commercial Practices

- In industry, it is common to separate different business units and different operations.

- These different operations are then optimized based on total value analysis.

- In many cases, businesses contract out work that they are not optimized to do.
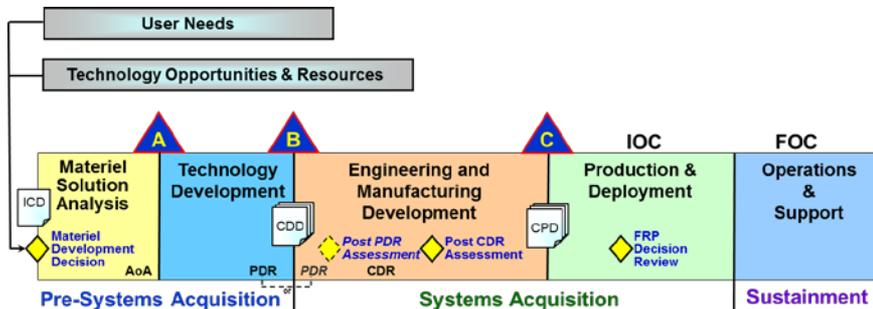
Architectures and Processes

- The has been a recognition that there is a need for a different acquisition process to help resolve the issues and changes with the current system.

- In order to increase the capabilities and agility of Defense Acquisition, in a budget constrained environment, even more significant changes should be investigated.

Different Approaches for Different Problems

- Business practice Friendly Acquisition

- Platform Military Acquisition

- High Risk / High Impact Advanced Technology Acquisition

Major Platform Programs

- **Platform systems provide the back bone of traditional force structure.**

- **They need to be design for long term and flexible operations.**

- **The current Acquisition system services this need well.**

- **The system can be optimized by maximizing**
  - **Open design**
  - **Scalability**
  - **Modularity**
  - **Interoperability**

Business Practice Friendly

- Acquisition of Services
- Military support services
- Medical services
- Parts and supplies
- Consumables
  - Food
  - Fuel
  - Power
  - Clothing

High Risk / High Impact Advanced Technology Acquisition

- There is a history of revolutionary development in DoD labs and development programs.

- If the research is mature, then high end technical teams can rapidly accelerate technology development.

- Specific capabilities that are developed for specific threats may not be needed for future conflicts.

Research

Contingency Workforce

Standing cadre

Requirements

Advanced Capabilities
Rapid Development Programs

- SOCOM Model
  - Pull requirements and specialized resources from all services
  - Max two year programs
  - Direct connection to the battle field
  - Direct connection to the vender and S&T communities
- Technology Acceleration based on
  - Need
  - Maturity
  - Positive risk management

Benefits to Capabilities

- One of the cost drivers of military systems is pushing the technical envelope.

- This new approach look to reduce this cost pressure in several ways
  - Only developing high risk systems when they are needed and technical ready (rapid advancement from TRL 2 to TRL6).
  - Increase the availability of new technologies by increased investment in research and early development with the best ROI.
  - Design and field platform systems with high degrees of modularity, and flexibility to accept future technology insertion.

Reduced Overall Costs (Affordability)

- The majority of DoD acquisition spending does not require the government acquisition processes.

- A workforce with significant experience in commercial business practices.

- Small highly capable teams (skunk works) can rapidly develop advanced systems without the costs of big development programs.

Other Impacts
Unintended Consequences

- Increasing specialization accountability increases risk.

- Reducing existing force structure.

- Economic and political impact

- Relationships with our allies

Conclusions

- The current Defense Acquisition system changes are moving in the right direction but are not keeping pace with changes in technology and the needs of the nation in a increasingly competitive and dangerous world
- The DoD cannot change its current defense acquisition system without significant enabling actions.
  - Changes to Law and Policy
  - Changes to the structure and development within Industry
  - Restructure of the Defense Acquisition Workforce

Recommendations

- Continue to improve current Acquisition process.
- Separate the common business practices and made them more affordably though commercial practices and competition.
- Significantly increases research and development investment.
- Incentivize the defense industry to diversify.
- Build a small cadre of the very best engineers, scientists, and other acquisition professionals to rapidly develop advance systems on an as needed bases.

Recommendations (continued)

- Separate the easy things and made them affordable (commercial and commodity).

- Separate what we do well now (platform systems) and do them better.

- Separate hard things and have them done by different people under different rules.