# *Headquarters U.S. Air Force*

*Integrity - Service - Excellence*

# How Can Systems Engineering Support Program Execution?

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**12th Annual NDIA**
**Systems Engineering Conference**
**26-29 Oct 2009**

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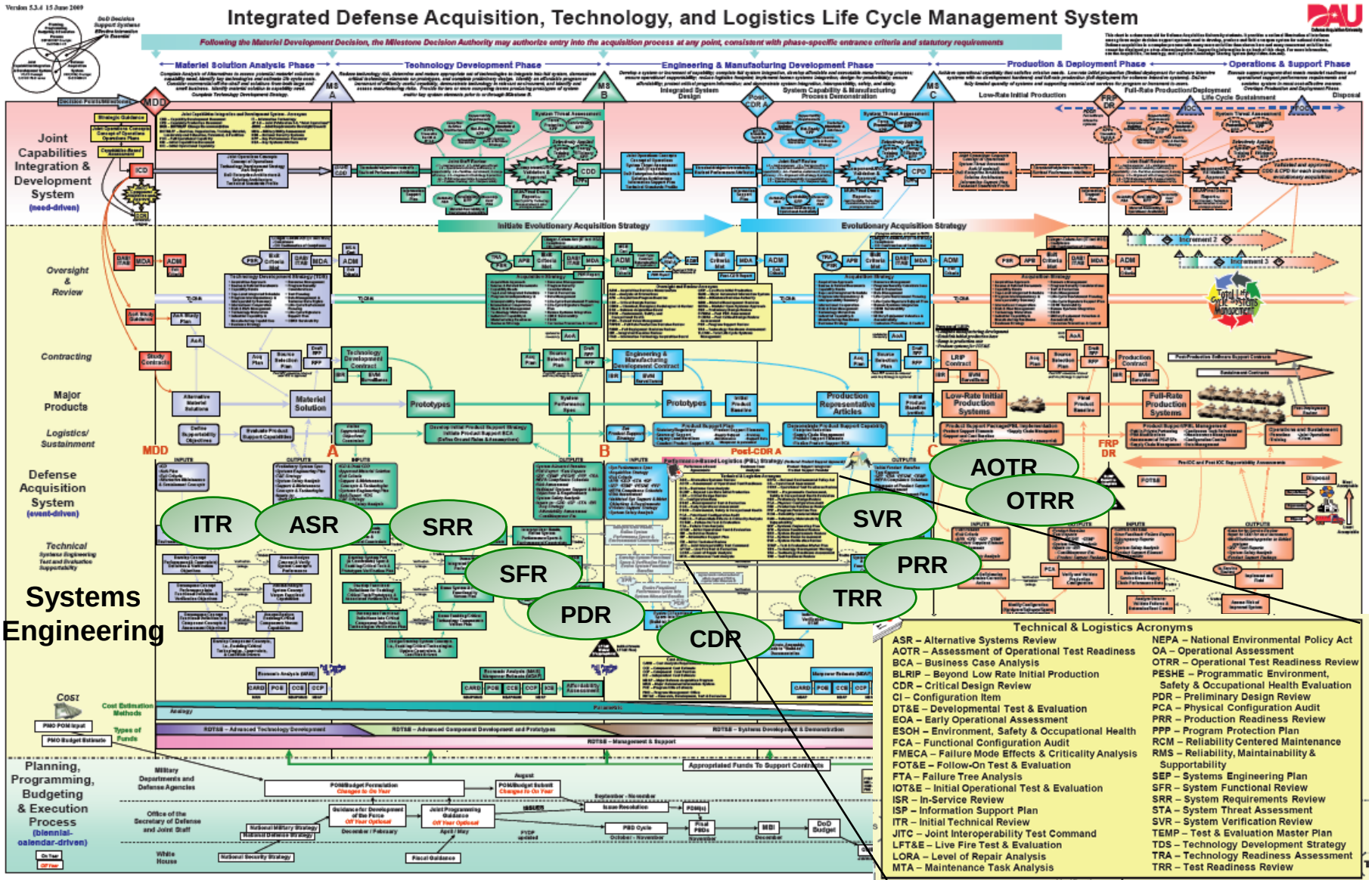
# Defense Acquisition System
## Sys Eng Throughout Life Cycle



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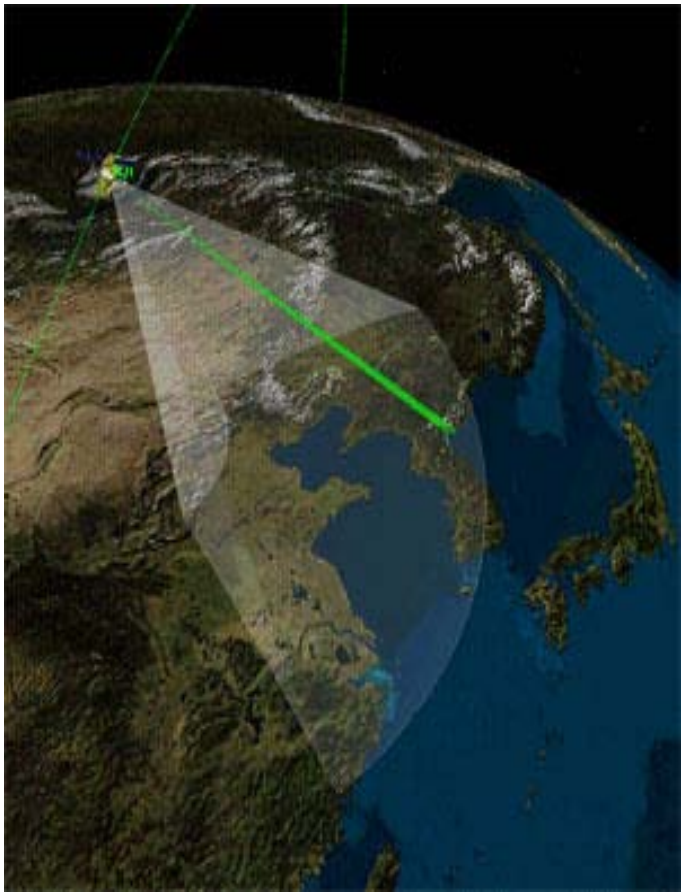
# DoD Acquisition Challenges



- Requirements Instability
- Technology Maturity
- Systems Engineering

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# Ample Direction for Early SE

**Weapon Systems Acquisition Reform Act (WSARA) 2009**

**"Support each MDAP prior to Milestone A approval through a rigorous systems analysis and systems engineering process"**

**NRC Report "Pre-Milestone A and Early-Phase SE" (Jan 08)**

**"Attention to a few critical SE processes particularly during preparation for MS A and B is essential to ensuring programs deliver on time and on budget."**

**GAO Report – 09-326SP "Defense Acquisitions"**

**"ensure new programs follow a knowledge-based approach and must begin with strong systems engineering analysis"**

**Air Force Acquisition Improvement Plan**

**"There will be acquisition involvement earlier in requirements development process and SE techniques will be applied"**

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# Air Force Acquisition Improvement Plan

**SECAF & CSAF approved plan to recapture acquisition excellence**

**Five Major Goals**

1. **Revitalize the Air Force Acquisition Workforce**
2. **Improve Requirements Generation Process**
3. **Instill Budget and Financial Discipline**
4. **Improve Air Force Major Systems Source Selections**
5. **Establish Clear Lines of Authority and Accountability**

**Acquisition Improvements Heavily Dependent Upon SE**

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# Focus on Air Force SE Processes

- Streamline Acquisition Processes
  - Move Faster, Smartly
- Instill Systems Engineering Discipline
  - Technical reviews and processes
- Active SE Early in Program Life Cycle
  - Shape scope, requirements definition, identify viable concepts
  - Extensive user/provider collaboration

# Early Systems Engineering Was Lost

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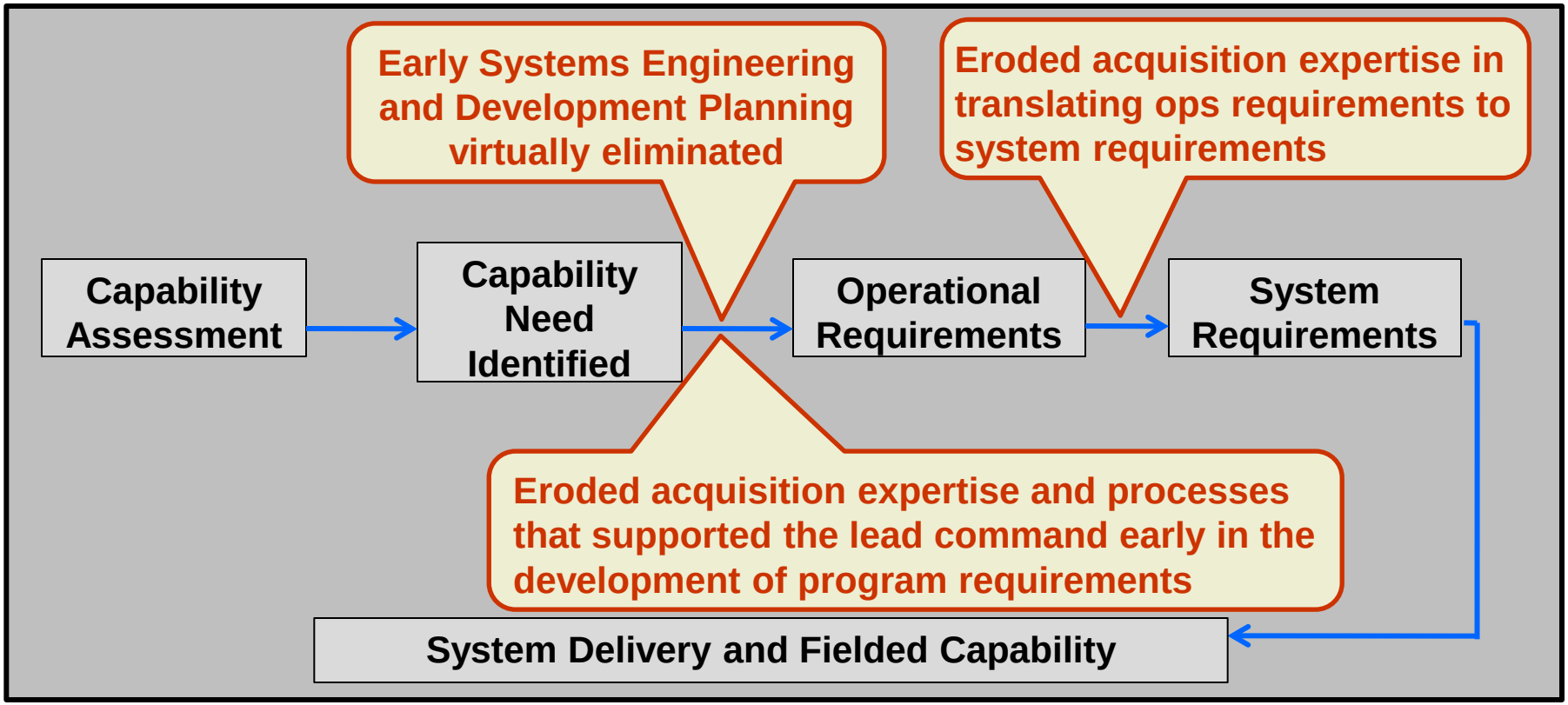
## Problem Statement

**"Overstated, unstable requirements that are difficult to evaluate during source selections"**




## Solution

**"Ensure acquisition involvement and leadership in support of the lead command early in the development of program requirements"**

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# Disciplined SE Reduces Risk

- Up to 75% of life cycle cost is determined during concept refinement and requirements generation
- Identify the key decision points
  - What are the significant cost drivers – budgetary risk
  - New technologies – engineering risk
  - What does the 80% solution look like
  - What is commercially available
  - What do we prototype
- Identify risk
  - Cost, technical, integration, manufacturing, and sustainment

**Upfront Effort And Resources Will Pay Significant Life-Cycle Benefits**

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# Air Force Vision

- **Attack problem early with Disciplined, Repeatable Processes from JCIDS CBA (pre-ICD) to AoA, Pre-MDD**
  - **Inform decision makers on technical feasibility of prospective concepts for materiel solutions**
  - **Initial integrated risk assessment addressing both operational and programmatic issues**
- **Support realistic program formulation through application of early Systems Engineering**
  - **Robust and disciplined up-front technical planning**
  - **Solid technical foundation for the future program**
  - **Reduce the chances of poorly planned concepts emerging from AoA with relatively high rankings**
  - **Use Concept Characterization & Technical Description approach**

**Clear and Actionable Policy and Process**

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# Improving Program Execution

- Development Planning
  - Early and often discussions with users to debate what is feasible
  - Ensure ICD/CDD are comprehensive, complete, and unambiguous
- Analysis of Alternatives
  - Examine new applications of existing technologies
  - Analyze technical feasibility and risk of alternatives
- Cost and Schedule Estimates/Execution
  - SE is responsible for WBS development – Basis for sound estimates
  - Independent assessment of contractor schedule & technical progress
- Contracting
  - Translating JROC validated requirements into technical basis of RFP
  - SE analysis key to negotiations with contractors on their proposals


**Early Sys Engineering Is Critical To Long-Term Program Success**

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# SE/STEM Workforce Initiatives

- AF is establishing a Science, Technology, Engineering and Mathematics (STEM) Emerging Issues Panel to address tech workforce requirements—to include SE
- STEM resources will be affordable, scalable, agile, and seamlessly aligned with the AF mission and strategies
  - Growing acquisition workforce – SE in high demand
  - Additional hires for Product Centers, ALCs, labs and other facilities
  - Recruiting additional Systems Engineers using expedited hiring
- Building on and establishing aggressive outreach efforts Air Force-wide with our high schools, colleges, universities, sister services and others existing efforts
- Aggressively using the education and training capabilities to keep AF STEM professionals current in their fields and on the cutting edge of technology – we must grow our technical expertise in-house
- 'Bright Horizons' strategic plan in development to properly size, train, and equip our SEs/STEM community with the technical depth and breadth needed for acquisition excellence

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# How Can Systems Engineering Support Program Execution?

- Disciplined Engineering is critical to program execution
- Early SE and Development Planning are up-front investments to reduce risk in later phases of the acquisition life cycle
- Systems Thinking & Tech Planning MUST start in the early stages of concept development, BEFORE formal program initiation
- SE Experience is critical – Invest and grow workforce

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# Air Force Acquisitions