Annual SERC Research Review
AF Sponsored SERC Study
Expedited Systems Engineering

5 Oct 2011

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**AF Sponsored SERC Study Expedited Systems Engineering**

3rd Annual SERC Research Review (ASRR 2011), 5-6 Oct, Hyattsville, MD.
"Increasingly urgent demands of the warfighter are requiring effective capabilities to be fielded more rapidly than the conventional acquisition processes and development methodologies allow”

--NDIA Systems Engineering Division, Task Group Report

- Framing today’s acquisition environment
- Increase/Rewrite in guidance and policy
- AF Systems Engineering Strategic Plan provides roadmap
- Explore and develop a scalable Expedited SE framework
  - Rapid acquisition + Sustainable + Reliable + Adaptable
- 2nd order affect - Expedited SE could streamline traditional SE
The Problem – Framing Today’s Environment

“…programs continue to take longer to develop, cost more, and deliver fewer quantities and capabilities than originally planned.”

“costs … increased 26 percent and development costs increased by 40 percent from first estimates” and “… experienced, on average a 24 month delay delivering initial capabilities to warfighter”

“programs … failed to deliver capabilities when promised—often forcing warfighters to spend additional funds on maintaining legacy systems”

Numerous studies and reports document program performance issues and the role of effective systems engineering

ETC…

In the 5+ years from 2003-2008 *:
- Only 1 non-ship pre-MDAP has gone to a MS A
- 20 MDAPs have gone through a MS B
- 14 MDAPs had had Nunn-McCurdy breaches

*Data from OSD Program Support Reviews
The Result –
DoD/Air Force Guidance, Policy, and Plans

- Air Force Acquisition Improvement Plan (AIP), 4 May 2009
- Weapon Systems Acquisition Reform Act (WSARA), 22 May 2009
- CSAF’s Vector, 4 July 2010
- OUSD(AT&L) "Better Buying Power" Memorandum, 14 Sep 2010, and implementation directive 3 Nov 2010
AF SE Strategic Plan

Informing the AF SE Strategy and Goals

OSD Policy, Directives and Memorandums

QDR, Strategies and AF Vectors

AF S&T Workforce Roadmap

Reports and Studies

Integrity - Service - Excellence
## AF SE Strategic Plan

**Goal 5 – Expedited SE**

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<th>AF SE Strategic Plan Goals</th>
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Stakeholders and research point to “Urgent” the new “Normal”

- More than 20 rapid-reaction programs and organizations addressing DOD urgent warfighter needs, with over $50 billion spent on urgent needs between 2005-2009

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<tr>
<th>Research/Report</th>
<th>GAO, March 2011</th>
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<td>DOD’s Urgent Needs Processes Need a More Comprehensive Approach and Evaluation for Potential Consolidation</td>
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<td>Improvements to DOD’s Urgent Needs Processes Would Enhance Oversight and Expedite Efforts to Meet Critical Warfighter Needs</td>
<td>GAO, April 2010</td>
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<td>Rapid Capability Fielding Toolbox Study: Standard acquisition process not designed to respond to dynamic environments</td>
<td>DDR&amp;E, March 2010</td>
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<td>Fulfillment of Urgent Operational Needs</td>
<td>Defense Science Board Task Force, July 2009</td>
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- Explore/develop scalable expedited SE framework for hybrid pgms
  - i.e., utilize rapid acquisition procurement but w/intent of more traditional lifecycle for deployment, maintainability, reliability, adaptability and sustainment.
- Framework will examine scaling of SE activities in response to different development constraints...e.g., reduced development time.
2nd Order Effects of Expedited SE

- Streamline traditional SE practices / processes
  - Expedited SE supports lean/agile processes + life cycle concepts

- Cyber Battlefield must rapidly invent, develop and field new technologies
  - AF Cyber Safari – recognizes speed-to-need (timelines more rapid – < 2 yrs)

- Assist small / mediums-scale businesses- increase competition / innovation

Integrity - Service - Excellence
Scalable Decision Making

Rapid

Comprehensive

Hybrid

Disposable SCALABLE SE Full Life Cycle

Days TIME

Decades

Integrity - Service - Excellence
Collaboration - SERC Universities, SERC Research Council, Air Force Center for Systems Engineering, and SAF/AQRE

- Principal Investigator (PI)= Stevens, Co-PI = Air Force Institute of Technology

- Leverage previous SERC research and models, processes and tools

- Leverage AFIT research in SE – master level research projects

- Synergism with Systems 2020/Engineered Resilient Systems and Rapid Capabilities Toolbox

- Initial AF investment can lead to further DoD collaboration in SE

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<th>Phase 1</th>
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| Phase 2 |        |        |        |        |        |        |        |        |        |
| Phase 3 |        |        |        |        |        |        |        |        |        |
Research Phases
SERC Research Topic #34

- **Phase 1: (Short Planning Phase)**
  - Identify organizations practicing expedited systems engineering
  - Visit selected organizations
  - Incorporate input from the SERC Research Council

- **Phase 2: (Analyze and Develop)**
  - Analyze current state of the art in Expedited SE w/in DoD + commercial sector
  - Develop framework for scaling SE activities in response to different development constraints...such as reduced development time.

- **Phase 3: (Pathfinder Plan Development)**
  - Prepare a plan for validating framework on a DOD acquisition program.

- **Phase 4 (Future, Separate Funding):**
  - Execute Phase 3 Plan
  - Conduct research to analyze the framework in action...iterate the framework based on observations and results as applied to a real program.

*Integrity - Service - Excellence*
Resourced constrained environment + recapitalization of platforms may require developing new acquisition paradigms

Acquisition processes need to become more agile to stay abreast of threat and leverage innovation

As “urgent” becomes more “normal,” move from risk-adverse to managed-risk….purview of Systems Engineering

Many studies point to the acquisition process…but few focus on role of SE …what is done in an urgent needs environment and how those practices can be applied to longer lifecycle programs
Rethinking How We Do SE?

Expedited SE SERC Study

Can we increase the speed of our rigorous processes?

Can we increase the rigor of our rapid process?

Shorten the time to deliver war-winning technologies – without compromising product integrity

I n t e g r i t y  -  S e r v i c e  -  E x c e l l e n c e
Acquisition Excellence Through Systems Engineering