Lessons Learned in Applying Architecture to Acquisition

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Overview

- Conducted an in-depth look at three USAF Electronic Systems Center (ESC) programs and their use of architecture in acquisition
  - Various approaches to use of architecture
- Primary areas of interest
  - Representing requirements
  - Driving system design
  - Supporting Enterprise Integration

Architecture's Role in Acquisition

Stakeholders
(buyers, users, maintainers , testers, developers, …)

Vision
objectives

e.g.,
Reliability
Performance
Security
…

documents

describes
prescribes

Architect

Architecture Documentation

"System" Or "Enterprise"

Architecture Users*

Effect the transition

As-Is **time** To-Be

* Includes most if not all of the stakeholders

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Program A Characteristics

- Program Scope
  - Migration of legacy systems to network-centric, enterprise-based system
  - Sustainment of legacy systems until decommissioned
- Architecture Development
  - Government developed Operational Views (OVs) and Technical Views (TVs)
  - Contractor developed System Views (SVs)
- Program Status
  - Initial increment operational

Program B Characteristics

- Program Scope
  - Migration of legacy system to common infrastructure to provide distributed, network-centric capability
- Architecture Development
  - Contractor and Government developed OVs/SVs
- Program Status
  - Initial increment in test

Program C Characteristics

- Program Scope
  - Development of new capability
  - Multiple contractors led by Integration contractor
- Architecture Development
  - Focus on common architecture data
    - Aligned to multiple "driving" architectures
    - Contractor/Government architecture products developed to support systems engineering analyses
- Program Status
  - In requirement clarification phase

Architecture as a Means to Represent Requirements

- What worked
  - Useful as communication vehicle between user, acquirer and developer
  - Used in source selection process
  - Supports business process reengineering
- Issues
  - Maintaining architecture-requirements traceability
    - Size of requirements databases has led to difficulties in mapping requirements to architecture

Architecture as a Means to Drive System Design

- What worked
  - Used as basis of discussion at major program reviews
  - Identification of common Use Cases
- Issues
  - Architecture usage not incorporated into existing contractor processes
  - Have not yet achieved automated architecture to design traceability

Architecture as a Means to Support Enterprise Integration

- What worked
  - Identifying common technical principles
- Issues
  - Evolving Enterprise Architectures concurrently with Enterprise Integration processes
    - Role of architecture not well understood
    - Need to determine right level of data abstraction
  - Enterprise Architectures evolving concurrently with Program Architectures
    - Enterprise guidance/direction may result in potential cost/schedule impacts to programs

General Observations

- Shift in culture/process still evolving
  - Architecture not incorporated into existing processes
  - Configuration management of multiple, related architectures is needed
- Methodology standardization is not imminent
  - Both Object Oriented and Structured Analysis methodologies have their advantages and proponents
- Tool standardization is not a panacea
  - Same tool doesn't ensure traceability
  - Required tool may not fit contractor's development processes
- Focus on architecture data is more important than a particular methodology or tool
  - More data is not necessarily better
  - Some level of abstraction is needed to conduct meaningful analyses
- DoD Architecture Framework (DoDAF) does not yet adequately address:
  - Net-centric representations
  - Performance representation