An NRO Vision for Ground Systems Architecture

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Agenda

• What We all Want
• Lessons From the Past
• Lessons From Today
• A Vision to Consider
What We all Want

- Empowerment to Excel
- Freedom to do our Mission
- Wisdom to Learn from Past Mistakes
- Solutions for the Future
Lessons from the Past
Etruscans: ~1000BC - 505BC

Stovepipes don’t work!
Lessons from the Past
A Common, Rigid Solution Doesn’t Work Either
Lessons from Today

**Experience:** Large core implementation is bad because when it breaks, the system breaks, and regression testing becomes expensive.

General DeKok, GSAW 1997

**Lesson 1:** True because the system implemented was not structured to support change.

**Lesson 2:** We need to design large systems in a new way. We need to support change and new technology.
Lessons from Today

**Experience:** COTS integration is non-trivial.

**Lesson 3:** Architectural mismatches between COTS products can be a problem for reuse and interoperability.

**Lesson 4:** Standards are important, but are not enough for interoperability.

**Lesson 5:** Need to leverage commercial success with component-based systems using a common underlying architecture.
Lessons from Today

Experience: Reuse does not have the promised payoff.

Lesson 6: Reuse is the means, not the end.
Lesson 7: Successful reuse requires a strategy.
Lesson 8: Reuse needs to be applied to leverage big-ticket assets.
Lessons from Today

Experience: Systems have become increasingly complex. They are consequently harder, slower, and more expensive to deploy.

Lesson 9: The organizational and acquisition processes we employ are not geared to meet that complexity and to reduce cycle time and cost.

Lesson 10: We build what we are organized to build.
What does this all mean?

A common reference architecture is not AutoShave!
A Vision to Consider
A Compromise Solution

Buildable Reference Architecture

Specific Target Architectures to meet particular Mission Needs
Challenges We Face

• The Right Domains
• Legacy Architectures
• Stakeholders
• Architectural Evolution
• Ownership of Domain and Product Line Architectures
We Have Partners to mount the challenges

- FFRDCs (e.g., SEI, Aerospace, Mitre)
- Universities (e.g., USC, CMU)
- Commercial Developers (e.g., Raytheon, Lockheed Martin, HP)
Summary

- We need an approach that falls evenly between the Etruscan and Autoshave extremes
- We live in a constrained world with many relationships
- We need to build systems that support change and complexity
- We must cooperate to achieve interoperability and exploit COTS
- An underlying architecture is key

Use of a common reference architecture that will support ground system product lines is a promising vision for the NRO
Thank you!