Working Group Session Summary

ACE4: Architecture-Centric Evolution of Software-Intensive Systems

Session 10e

Chairs
Dr. Sergio Alvarado
Dr. Phillip Schmidt
The Aerospace Corporation

10th Anniversary
GSAW 06
Ground System Architectures Workshop
Session Goals

- Promote the central role of software architectures during the acquisition and development of software-intensive systems
- Elucidate high-level recommendations for improving software architecture representations, development, and design
- Focus on evolution, evaluation & elaboration of descriptive/prescriptive architectures within the system acquisition & development lifecycle
Presenters/Panelists

- **Acquisition Perspective**
  - Col. Michael Coolidge, Air Force Space and Missile Center
  - Lt. Col. William Page, Air Force Space and Missile Center
  - 1Lt. DeWitt Latimer IV, Air Force Space and Missile Center

- **Oversight Perspective**
  - Frank Sisti, The Aerospace Corporation
  - Dr. Peter Hantos, The Aerospace Corporation
  - Dr. Phillip Schmidt, The Aerospace Corporation

- **Development Perspective**
  - Richard Anthony, General Dynamics
  - Leeha Herrera, John Hopkins University Applied Physics Laboratory

- **Research Perspective**
  - Eric M. Dashofy, University of California, Irvine

- **Moderator**
  - Dr. Sergio Alvarado, The Aerospace Corporation
Key Points

- **Acquisition**
  - Challenge: Integration of systems that were never meant to be integrated
    - Follows from focus on net-centric systems
  - There is a “sweet spot” for standards/architecture development between overly-generic and stovepipe systems
  - Beginning to define architectures early in the acquisition process improves outcomes—acquirers should do their homework
  - Adopt a step-based approach to development with later blocks taking on less mature technology
  - Having dedicated software people/advocates inside the acquisition house promotes early guidance to the contractor
Key Points

**Oversight**
- Leveraging software & architecture people from across the oversight organization increases horizontal engineering
- Lifecycle models are key in ensuring the synergy across architecture evolution, elaboration, and evaluation
- Architecture evolution should be evident in the evolution of architectural views
- Evaluating the product is just as important as evaluating the process to create the product
- Use UML profiles to manage evolutionary change of complex architectural models
- Reference architectures are key platform-independent models to characterize goals, requirements, feasibility, and system variability
Key Points

Development

- Lessons moving from stovepipe to reuse to reference architecture
  - Increased reusability, shared cost
  - More validation by more programs
  - Platform for more future development
  - Higher initial costs
  - More communication issues
  - Configuration management issues
- Develop high-level architectures early to use as drivers for the remainder of development

Research

- All stakeholders should agree early on the goals, benefits and limitations of a reference architecture
- Architecture-centric tools, used properly, can provide improved architecture communication, representation, and analysis
Conclusions

- **Acquisition and Oversight Perspective**
  - Increased recognition of the need for early definition of software requirements being reflected in ongoing organizational changes

- **Development and Research Perspective**
  - Case studies indicate that early inception and definition of architecture results in successful outcomes

- **Stakeholder-centric views of architectures should serve as the basis for stakeholder negotiation**