

The logo for GSAW2003, featuring the text "GSAW2003" in a stylized font. "GSAW" is in green and "2003" is in purple, all on a black background.

Ground System Architectures Workshop

Breakout Session 8A

Architecture-Centric Evolution (ACE) of Software-Intensive Systems

Session Chairs

S. Alvarado, M. Hogan, and P. Schmidt, The Aerospace Corporation
J. Georgas, UC Irvine Institute for Software Research

Session Goal

Develop recommendations on appropriate level of granularity of software architecture needed to support evolution (changing requirements, evaluation, development, implementation, integration, test, verification, and maintenance) of software-intensive spacecraft ground systems

ACE Session Baseline:

Overview of Discussion Statements Given to Presenters

- 1. Architecture as Evolution Blueprint**
Integral part of software system evolution rather than a documentation afterthought
- 2. Multi-View Architectures**
Software system evolution dependent on architecture models with concurrent multiple views: logical organization, dynamic behavior, software organization, process decomposition, and physical realization
- 3. Architecture as Decision-Making Tool**
System evolution decisions made by addressing front-end conceptual issues versus back-end implementation issues
- 4. Architecture Representation**
Electronically represented/shared using UML (Unified Modeling Language) or an ADL (Architectural Description Language)
- 5. Component-Based Architecture**
Organized in terms of software components with well-defined interfaces that encapsulate and provide access to component functionalities
- 6. Architecture as Basis for Requirement Verification**
System requirements traceable to detailed component representation
- 7. Architecture as Basis for System Testing**
Test plans and system failures traceable to detailed component representation
- 8. Architecture as Basis for System Implementation**
Mapping detailed component representation into COTS products, developed code, or both
- 9. Architecture as Tool for Managing COTS-Product Change**
Component-to-COTS mapping and access to COTS-products' internal structure provide basis for product upgrade or replacement
- 10. COTS-Product Independent Architecture**
Independence from specific COTS products selected for implementation ensures generic framework for COTS-product integration

ACE Session First Half: Wednesday March 5 (13:00–15:15)

Introduction: ACE Discussion Statements

13:00 S. Alvarado, The Aerospace Corporation

Segment 1: Architecture Requirements for Evolution and Evaluation

13:10 New Roles for Architecture

Maj. C. Beres, Air Force Space and Missile Systems Center

13:20 Architecture: Acquisition's Holistic Medicine

Capt. M. Raphael, Air Force Space and Missile Systems Center

13:30 Architecture-Centric Representation for Design Diversity and Program Evolution

P. Schmidt, S. Alvarado, J. Rivera, and J. Milstein, The Aerospace Corporation

13:40 Question Answering Period

14:00 Break (five minutes)

Segment 2: Architecture Methodology and Software System Lifecycle

14:05 From Cradle to Grave: An Architecture Substrate for Software Lifecycles

N. Rouquette, Jet Propulsion Laboratory

14:15 Usability Constraints on Architecture Development and Use

J. Reeves, Northrop Grumman Mission Systems

14:25 A Focused Approach to Software Architectural Recovery

N. Medvidovic and V. Jakobac, USC Center for Software Engineering

14:35 Recommendations for Architecture-Centric Software Supporting Self-Adaptive Behavior

J. Georgas, UC Irvine Institute for Software Research

14:45 Question Answering Period

15:05 Break (ten minutes)

ACE Session Second Half: Wednesday March 5 (15:15–17:10)

Segment 3: Architecture Methodology and COTS-Based Systems

- 15:15 An Adaptable and Market-Driven COTS Command and Control Architecture
S. Norcross, L3 Communications Corporation
- 15:25 Deploying a Common Software Architecture for Real Time Launch, Test and Satellite
Ground Systems
R. Andzik, Real Time Logic Inc
- 15:35 Balancing Generic Software Component Design with Tailored COTS Solutions
M. Gilmore, Raytheon (Aurora Campus)
- 15:45 Architecture Granularity – A COTS Vendor’s Perspective
B. Grasso, Integral Systems Inc
- 15:55 Question Answering Period
- 16:15 Break (five minutes)

Synthesis: Formulation of ACE Session’s Recommendations

- 16:20 Open Discussion
Facilitators: S. Alvarado and M. Hogan, The Aerospace Corporation
 - 17:10 Session Conclusion
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