GSAW 2008
Achieving Operationally Responsive
Ground Systems
Plenary Sessions Summary

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Space Is Integral to Our Daily Lives

- World continues to become more dependent on space
  - Direct uses such as communications and GPS, plus advances in basic science from NASA and others
  - Military and civilian, with the line between the two becoming increasingly blurred
  - However, dependence on space can become a vulnerability
- Changes should be transparent to the system users
  - Last year’s GPS ground station upgrade took place without users even being aware of it
- At the same time, we often undervalue and ignore the end users—they are the real customers, not the satellite operators
The Importance of the Ground

- The heart of every space system is on the ground
  - Benefit from space systems comes from what the ground can do with them
  - Need an integrated satellite operations capability
- Ground systems are the enabler of operationally responsive space
  - Over the life of a program, ground becomes more expensive than space
    - But it also provides more opportunity for near-term responsiveness
  - Ground systems need to be “forward compatible”
The Need for Responsiveness

- Ground systems must work to increase responsiveness to support a number of goals:
  - Adapting to rapidly changing mission requirements
  - Shorter development and deployment times
  - Reducing cost of ownership
  - Improved customer satisfaction—for all types of “customers”

- We must be able to quickly integrate new technologies and legacy systems
  - Some of which will be stovepipes
The Demands of Responsiveness

- Responsiveness requires efficiently and effectively adapting existing resources to accommodate unanticipated changes in:
  - Mission requirements and objectives
  - Users
  - Architectures
  - Software packages
  - Hardware platforms
  - Interfaces
  - Vendors
The Challenges of Responsiveness

• Quit competing infrastructure and emphasize mission
• Must come to grips with excessive risk averseness
  – Encourage innovation
• Never forget that better is the enemy of good enough!
The Role of Standards

• “What few things must be the same, so that everything else can be different?”
  – Eliot Christian

• Responsiveness implies change, and change is facilitated by the use of widely adopted, open standards and modularity

• Standards support the mixing and matching within:
  – Algorithms
  – Architectures
  – Platforms
  – Technologies
  – Scheduling of system enhancements and technology refresh
  – Vendors
The Importance of Testing

• Design and implementation isn’t everything—testing takes on additional importance as the need for seamless evolution increases

• Testing must go beyond testing to requirements (verification) and include “test as you fly” (validation)

• The use of test beds and simulators should span the life of the program
  – Early prototypes lead to development simulation tools which in turn lead to high fidelity system simulators

• Goal is to test using as much of the real system as possible
Many Past Themes Are Now Common Practice

• What used to be major GSAW topics can now be simply mentioned in passing
  – COTS/reuse/Java/XML/Web services/…
  – Architecture methodologies, UML, etc.
  – Reference architectures

• Focus is shifting to different issues and newer technologies
  – Pervasive dependence on space
  – Net-centricity and service oriented architectures
    • Security and privacy
  – Recurring architectural patterns
  – “Back to basics”
    • E.g., sound systems engineering practices