GSAW2006:
Applying Technology to Operational Goals
Plenary Sessions Summary

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Heard at GSAW2006

- Cheapest way to do things is to do them right the first time
- We build stovepipe systems really well
- Satellites are just expensive peripheral devices
  - Ground is the brains of space systems
  - Ground is the heart of space, determines capabilities for the user
- Or, in grid services approach, satellites are just the service

- Technology tree, opportunity tree, decision tree
- Service-oriented architectures, complexity
- Consensus (turtles)

- Interoperability - more of a coordination challenge than a technical challenge
- Interoperability isn’t everything
- Lights-out autonomous model-based operations, configured via XML
The Way It Was:
GSAW97 User/Acquirer Goals

User/Acquisition Community Goals

- Lower cost (development, operation, maintenance)
- Fewer operators
- “Normalized” operations
- Integrated operations
- Interoperability and commonality
- Vendor-independence
- Flexible, extensible systems
User/Acquisition Community Questions

- How do we standardize interfaces?
- How do we achieve open architectures?
- Is “modular” software the right thing to do? Does OO get us there?
- How do we realize the benefits of re-use and COTS?
- How do we achieve interoperability and integration? (and when is interoperability really needed?)
GSAW97 Supplier Responses

Supplier (Integrator, Vendor, Government) Community

- **We know how to do it.** Just use our
  - Open, scaleable, distributed, standards-compliant, (COTS-based), plug-and-play, componentized, object-oriented, workstation-based, table-driven, customizable, layered architecture

- **Don’t mandate**
  - architectures (how to do it)
  - rigid requirements (e.g. subsecond response time)
Technology Community - Solutions

- Software Architecture Attribute Analysis - Risk driven “just do it”
- Identifying architectural mismatches that arise from architectural styles
- Novel architectural styles (e.g. C2)
- Intelligent integration infrastructure (“wrappers”)
- Customizable, generic, and dynamically reconfigurable architectures
GSAW2006: Old Themes, New Semantics

- Using technologies: from concepts to prototypes to ops experience reports
- Mission success: delivering capabilities and services to end users
- Horizontal integration
- Product lines

- Mitigating macro-risks
- Software development standards are coming back

- Layered architecture for extensibility and evolvability
- Wrappers or adapters to incorporate COTS and legacy systems
- Common interfaces, standard communications and formats
- Consensus reference architecture

- Cultural challenges - using trust to overcome fears
- Change is hard - not bad, but hard
Some of This Year’s Acronyms

- Info systems evolution: RDBMS -> CORBA -> EAI -> SOA
- CCSDS, SLE, ITIL
- XML, WSDL, UDDI, SOAP, and also XTCE
- SOA, EDA, NCES, COI
- NCO, NCOW, NCOIC
- GHIPS, GSPML, GMSEC, GSMO
- CEV, CLV, ISRU
- ESA, DLR, CNES, …
- M&C, FDS, MPS
Increasing Complexity

- Integrated systems of systems, grids of grids
  - Even for smaller systems
- Net-centric systems, net-centric operations
- High situational awareness
- At least 2 orders of magnitude more code on the ground than in space, and likely more in the future

- Complex systems are more likely to fail than simple systems
- Complexity is the archenemy of security
- “Software allows us to build systems with a level of complexity and coupling that is beyond our ability to control”- Prof Nancy Leveson

- Incremental block acquisitions
- Simplicity paradigms - "Less is more" and "KISS"
KISS!
Just do it!
Small is beautiful!
Challenge for 2007

• How do we apply and evolve today’s technologies to control tomorrow's increasing complexities?

• Come back for GSAW2007 March 26-29, 2007
  • and tell us!
  • or - come find out!