

**GSAW 99**

**Breakout Session 4:  
Approaches to Achieving Common  
Architectures and Common Components**

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## Thanks to our Contributors

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- Lots of audience talent...

# Agenda

- **Session Themes**
- **Approaches and Insights**
- **Issues and Observations**



## Session Themes

- **What do we have to do to make common architectures and/or components really work and be understood?**
- **Look at technical/non-technical approaches to solve some challenging architectural issues**

# Use Standards to Achieve Commonality

- **They are not a panacea**
- **They may not meet your needs (e.g., DII COE)**
  - Grow stale
  - GOSIP example
  - Their implementations may be incomplete
- **They evolve (e.g., TCP, SQL)**
- **They may reduce your interface design complexity**
- **They need an architectural context to be effective**
- **Payoff to convert to them needs justification**

## Understand how the trends meet the needs

- **Architecture is defined once and tweaked forever => driver for flexibility**
- **Support for reuse less important than support for operational flexibility**
- **Evolution of new capabilities via new interfaces => driver for interface management**
- **Leveraging independent component development**
- **Interface definition without needing source code**
- **New business models will be necessary**



# Address the Challenges of Change

- **Designing for change requires more effort**
- **Interface Management Issues in Component-based Architectures**
  - Architecture representation to clearly manage interface and implementation separation
  - Implications of interfaces as contracts; limits of IDL
  - Policies and practices that manage interface growth
  - Need to map logical architectural representations to deployed components
  - Manage variation points throughout the artifacts
  - Solves Component Deployment Problem
- **Cannot force users into lock-step evolution**
  - Expect multiple versions will get deployed
  - Optional interfaces

# Address the Needs of Legacy Systems

- **Budget critical driver**
  - Massive budget cuts force creativity
  - Optimizations focused on out years won't get funded
- **Mission requirements/operation come first**
  - Need to keep the mission going
  - Can't afford to rebuild
- **We suffer from rigid designs of the past**
  - Blurs our focus on what's important and creates "tension" on how to fix it.
    - » Modernize vs Rearchitect
    - » Network-centric vs embedded
    - » One-size-fits all-solution is not necessarily the right solution
  - Move toward plug-and-use is heroic!!
  - Takes years to implement change (e.g. Commercial: 3 years, Govt: 11 years)
- **Will benefit from modernization be overcome by the benefit of commercialization?**
- **Commercialization as a faster, smarter evolution balanced against the influence to shape it**

## Collaborate on Reference Architecture for needed Domains

- **Idea of Domain Task Force for Space Ground Systems to shape a reference architecture**
- **It's starting**
  - NRO/NASA SOTG expanded
- **Technical: Correctly scoping domain and the components within**
- **Organizational: Concern for open participation**



# Create Business Incentives

- **What's the Product-line business case for an integrator?**
  - Will integrators be valued in this new model?
  - Always need someone to but pieces together in more complex ways than originally intended.
- **Vendor's have their "product line"**
  - COTS as an architectural driver
  - May not match the Govt definition the domain => architectural mismatches
  - They need to feel they can shape/contribute to the reference architecture
- **We suffer from our rigid business models of the past**
  - Blurs our focus on what's important and "tension" on how to fix it.
    - » Contractor use of derived
- **Preserve contractor's intellectual property rights**

# Leverage the Technology

- **Operating Missions as Nodes on the Internet**
  - Leverages IP as the Network layer to the Satellite
- **Leverage research of IETF community**
  - Debug
  - Deploy
  - Evolution IP4, IP6, etc
- **Web-based architecture directions for SGS**
  - Java, CORBA performance improvements
  - Configurability of JavaBeans
- **Cheap and Easy are attractive**
  - Some successes with DCOM
- **Watch Maturity**
  - Be prudent when moving toward bleeding edge



# Issues and Observations

- **Declaring a Center of Excellence for Space entails a responsibility to shape the domains in which we wish to excel**
  - Cannot be mandated
  - Cannot be closed
- **Perspective affects the way we perceive problems**
  - Are we riding the elephant or walking underneath it?
- **Support flexibility not perfection**
  - We're never done
  - Even reference architectures evolve
- **Scope/design issues**
  - Common solution <> one size fits all
  - Does common architecture => common mission?
  - Flexibility to support multiple CONOPS
- **Methodologies for evaluating architectures needed**
  - Interface semantics