GSAW 2007
Addressing Complexity Through Simplicity
Plenary Sessions Summary

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Summary Topics

- Keynote Themes
- Recurring Themes
- Quotable
Keynote Themes

• Complexity through simplicity seems like an oxymoron
  – But that’s what we ask our ground systems to do
  – Simple for the user, but complex to implement
  – Simplicity to enhance reliability

• Space is central to U.S. ability to defend itself
  – Chinese ASAT test shows our vulnerability
  – But ground stations are more vulnerable than satellites

• Space should be a utility (like the telephone)
  – If we do our job, the war fighter shouldn’t have to know about
    the satellites and ground systems that support them
    • Quote from a soldier to CNN: “I don’t need space; I just
      need my rifle and my GPS”
Keynote Themes (continued)

• A properly designed ground system is critical to mission success

• Can’t modify satellites quickly, must make changes on the ground to accomplish rapid transformation
  – Implementation will be filled with challenges
  – Make sure the little decisions along the way contribute to the end goals

• Ground systems: the center of the architecture
  – From integration to operations
Keynote Themes (concluded)

• Average NASA mission spends ~3.8 yrs in development but ~10.1 yrs in operation
  – Costs of ground system operations are critical to controlling total program costs
• The problem with “faster, better, cheaper” is that it turned into “cheaper, cheaper, cheaper, cheaper”
Recurring Themes

• The roles and goals of ground stations
  – It falls to the ground system to make it happen
  – Lights-out operations
  – Better utilization of ground station resources and more flexibility through automated planning and scheduling
  – Lower cost, more reliability, and faster developments through commonality, reuse, and standards

• Common ground stations and ground station designs
  – AFSCN and NASA have demonstrated ground station interoperability
Recurring Themes (continued)

• To reduce ground station complexity, we need:
  – Common systems (reuse)
  – Common standards
  – Vendor independence
  – Automation: simplify architecture by making components more automated and simpler to use

• Standards
  – Adopt-adapt-develop priority for using standards
  – Only essential specs and standards (dozens, not hundreds)
Recurring Themes (continued)

• **XML**
  – Flexibility if used properly
  – Does not do away with the need for ICDs
  – Can lead to high overhead in operations

• **SOA and net-centricity**
  – All DOD programs are going to implement a net-centric, SOA architecture
Recurring Themes (continued)

• **Reuse/COTS**
  - Reuse—we want it, but where does it come from?
    - “Reuse is not a requirement”
    - Where’s the budget and schedule to achieve it?
  - COTS—still a love/hate relationship
    - It’s obsolete before we can even deploy it
    - Vendor keeps changing its features and interfaces
    - How do you plan for long term maintenance?
      - DOD is not a major customer; where’s the motivation?
    - Licensing costs will bite you
Recurring Themes (concluded)

- **Controlling Cost and Schedule**
  - “We’ve got to do it within budget and on time”
    - This was one of the top 10 independent program assessment issues
  - How do we keep operations and sustainment costs under control?
  - Exclude “[I can] name that tune in three notes” contractors
  - We have to rebuild our Systems Engineering and Test knowledge/skills base
Cautionary Quotes

• “A key design issue is what should be common and what shouldn’t”
• Typical mission duration is 15 years: “Anybody ordering their operational hardware through eBay?”
  – “Not the supplier of choice”
• “The complexity of the protocol should not outweigh the complexity of the device”
• “A man has got to know his (COTS) limitations”
• “We’ve got to get it right the first time”
• “SOAP is a lie—it’s not simple, there are no objects, and it’s not a protocol”
Encouraging Quotes

• “It’s an exciting time to be in space”
• “Right data in the right place at the right time”
• “It’s time to make some bold moves”
• “It’s not easy, but it’s important”
• “We’re beginning to move from complexity to predictability”
• “Things should be made as simple as possible, but not any simpler.” Albert Einstein