Ground System
Architectures Workshop

GSAW 2003
Breakout Session 8E Summary
Business Cases

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Common Themes

- Ground Segment needs to become more important in space system architecture and acquisitions
- ***Infancy*** and ***Diversity*** of Cost Models demands more effort
- Systems need to be more flexible
- Communication/Involvement by all stakeholders
- Human Resource issues are important
  - Leadership
  - Personnel
  - Teamwork

Presenter Key Points

- Mary Rich, The Aerospace Corporation
  - *Space Acquisition Strategy – Just How Important is the Ground Segment?*
- Summarized a review of a program's ground system
  - Ground technical or programmatic risks were not delineated
  - Software differences demonstrate that ground is the highest risk
  - Options to mitigate risk: parallel or multiple contracts
  - Evolutionary Acquisition results in ambiguity for acquirers/budgeters

Presenter Key Points

- Larry B. Sidor, The Aerospace Corporation
  - *Mission Operations Comparison Study*
- Reviewed study to compare flight operations among several space missions
  - Mission Complexity Components and Risk-Mitigating Factors of the mission contribute to differences in staffing levels
  - Study assisted in explaining to customer the correlation of personnel to the complexity of mission

Presenter Key Points

- Roger Clason, NASA Goddard Space Flight Center
  - *NASA Ground Network Evolution – Designing for Best Value*
- Reviewed project to examine next generation of ground network for NASA missions
  - Challenges range from aging system with increasing cost and risk to service performance to non-standard interfaces that limit interoperability
  - Community may offer opportunities for coordination; active risk management is crucial
  - Ground network evolution implementation will be based on best value business cases

Presenter Key Points

- Peter In, Texas A&M University
  - *UML-Based Object-Oriented Metrics for Architecture Complexity Analysis*
- Development of UML-based OO Metrics Counter
  - Metrics Tree proposed to assist project manager early in development lifecycle – can we determine complexity earlier?
  - Collection of metrics automated
  - Model utilized in effort/cost estimation

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Presenter Key Points

- Ricardo Valerdi, University of Southern California Center for Software Engineering
  - *COSYSMO: Constructive Systems Engineering Cost Model*
- Provided update on COSYSMO Research - model to estimate system engineering costs
  - Satellite Ground System used as a reference system
  - Drivers developed: Size, Application and Team Factors – "Personnel capability and experience biggest surprise"
  - Delphi questionnaire will be used to validate drivers
  - Data collection from completed systems continues to statistically confirm

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Presenter Key Points

- Mike de Gyurky, Jet Propulsion Laboratory
  - *The Jason Satellite Telemetry, Command and Communications Subsystem (JTCCS)*
- Provided detail on command and control system for Jason-1 Satellite
  - "This is science, computer science, not just software"
  - Drivers for low cost LOC include:
    - Technical approach: judicial use of COTS, no re-use – "computer scientists like to work on new stuff"
    - Management approach: articulation of requirements, teamwork
  - Architectural Features include:
    - Design for follow-on satellites over next 20 years
    - Common software providing significant common functionality
    - "Ready to Run" on other O/S platforms
  - Demonstrated system

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CHALLENGE – HOW TO RAISE AWARENESS WITH ALL THE STAKEHOLDERS AS TO THE IMPORTANCE OF THE GROUND SYSTEM??