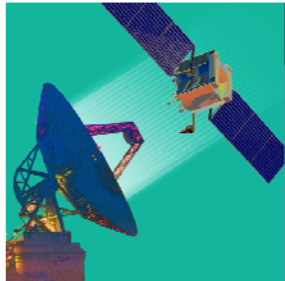


# Working Group Outbrief

## Ground System Architectures Workshop

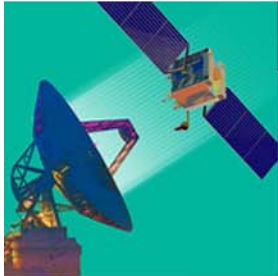


Session 11C

Evolving Model-Based Engineering to Keep Up With  
the Rapid Rate of Change

*Ryan Noguchi and Robert Pettit IV,  
The Aerospace Corporation*

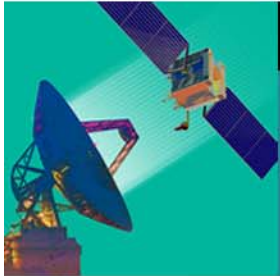
# Ground System Architectures Workshop



## Session Goals

- Open discussion of topics relating to Model Based Engineering (MBE) primarily (but not solely) in the context of satellite ground systems
  - How does MBE help programs to cope with and thrive in a highly unstable environment?
    - Changing requirements, technologies, missions, threats, etc.
  - How can MBE better respond to a highly unstable environment?
    - Evolving standards, tools, policies, interoperability needs, etc.
  - How can the GSAW community collaborate to improve the effectiveness of MBE in this emerging environment?
    - Interoperability standards? Joint acquirer-builder CONOPS?
  - Other topics

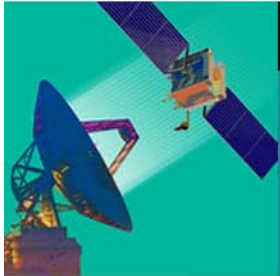
# Ground System Architectures Workshop



## Key Points

- MBE enables rapid iteration of architecture, requirements, design, analysis
  - Tight integration of functional and performance analysis
  - Rapid validation of CONOPS, test planning/execution, updates
- Key challenges
  - Getting organizational buy-in, adding value across entire life cycle
  - Perception of MBE as a cost, rather than as an investment
  - Making models understandable by stakeholders
  - Large NRE to model the as-is and incorporate flexibility for future (structure, metadata), but can pay big dividends over life cycle
  - Consistency in model semantics – both definitions and behavioral
- Acquiring new systems – require MBSE, make models deliverables

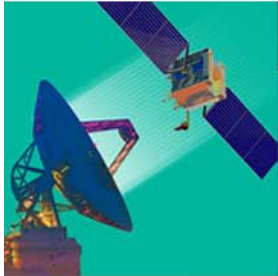
# Ground System Architectures Workshop



## Key Points

- Avenues for collaboration, e.g., as a CCSDS Working Group, INCOSE Challenge Team, OMG Working Group, DTIC user groups, etc.
  - Reference architecture, ontology
  - Sharing models, model libraries, tools
  - Define use cases for system behaviors in ground sys domain
  - Show how MBSE can be applied to address SE problems
    - Use cases for MBSE, with system use case as a focal point
    - Value proposition for the acquirer
  - Resource center, web portals, GSAW site
- Barriers to collaboration
  - Mechanics of participation – time, money, travel, virtual tools
  - Culture, ITAR, proprietary, classified, policy

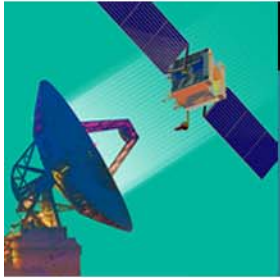
# Ground System Architectures Workshop



## Key Points

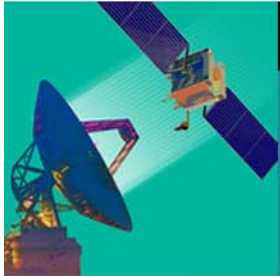
- Other Activities
  - Ideas for next GSAW
    - MBE success stories/case studies as a GSAW general track
    - Invite participation from other domains
    - Explore lessons learned and best practices from other industries
      - e.g., AUTOSAR, commercial electronics industry, Google
  - SMC/Aerospace sponsored MBSE Focus Day and Tool Fair in the late summer/early fall 2016
    - Provide a “challenge” problem (storyboard of operations or tasks) to the vendors to showcase

# Ground System Architectures Workshop



BACKUP

# Ground System Architectures Workshop



## Other Discussion Topics

- Rearchitecting existing systems / modeling the as-is
- Interoperability between tools, models
- Support to the acquisition process / impact to acquisition process
- Integration of systems / interoperability between systems / transactions
- Transition to CONOPS / whole-life cycle process integration
- Leverage more formal methods, integrate other disciplines
- Dynamic modeling, tighten the OODA loop
- Improve agility, integrated analysis, model execution, tradespace exploration
- Tools and approaches that are out there, usability of tools and methods
- Model repositories, templates, reusable library, reference architecture
- Enterprise architecture perspective, supporting high level decisions
- Collaboration with developers, communicating design intent