

GSAW Session 12D
Mission Assurance for Ground Systems
Year 2

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The Aerospace Corporation
2 March 2011

2011 Working Session 12D Agenda

1-1:30pm Frame the topic

- *Ground Systems (GS) Mission Assurance (MA) overview*
- *2010 Results*

1:30-3pm Panel Session and Discussion - Harmonization

- *What Works, What Doesn't in GS MA?*
- *Panel topics (10 min. ea) plus group discussion*

3-3:15pm Break

3:15-4:30pm GS MA Presentations

- *Software Development Std for Space Systems (Suellen Eslinger/The Aerospace Corporation)*
- *Ground System Test Standard (Brian Shaw/The Aerospace Corporation)*
- *Process Effectiveness (Rick Hefner/Northrop Grumman)*
- *ESA Software Standards for GS MA (Dr. Mario Merri/ESA)*

4:30-5pm Wrap Up

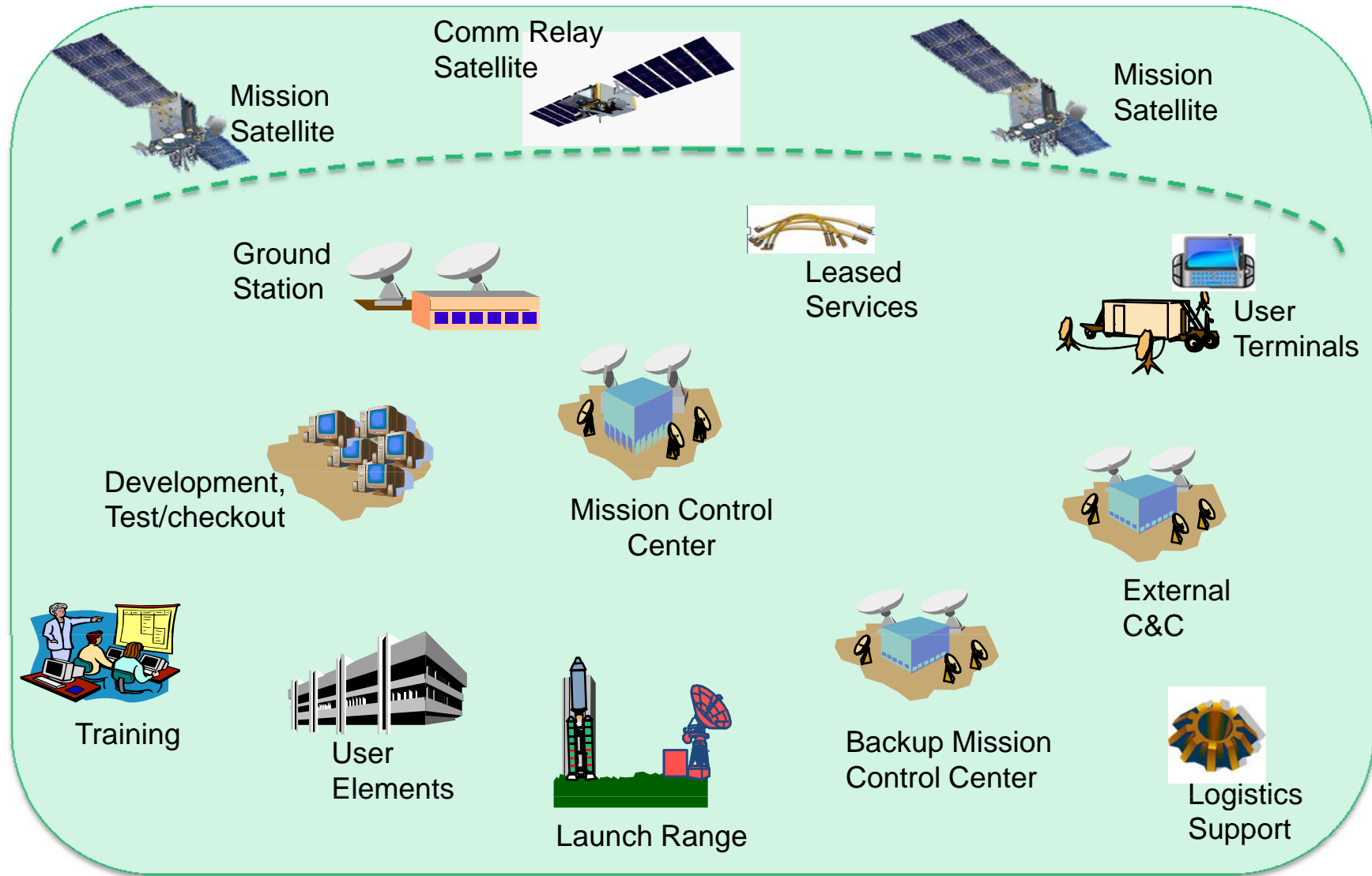
Workshop Abstract

Mission Assurance Workshop for Ground Systems

- **Background:** Mission assurance for space equipment and space systems has a relatively large body of work for guidance/compliance. These do not make clear which portions would be applicable to ground systems. Thus, ground system developers rarely use this body of work at all. We need to devise a strategy to adapt general purpose mission assurance techniques to apply specifically to ground systems.
- **Workshop:** This session will define Ground System Mission Assurance, recap the published results from last year's very successful working session "What Contributes to Ground Systems Mission Assurance," and then convene a panel to discuss Ground Systems Mission Assurance, "What Works, What Doesn't Work."

After the break, the session will provide presentations on emerging standards and their application.

2011 Session 12D, "Ground Systems Mission Assurance" Covers all Non-Space Systems



What Is Mission Assurance (MA) - Definitions

- MA is the disciplined application of general systems engineering, quality, and management principles towards the goal of achieving mission success, and, toward this goal, provides confidence in its achievement.
 - *MA focuses on the detailed engineering of the acquired system and, toward this objective, uses independent technical assessments as a cornerstone throughout the entire concept and requirements definition, design, development, production, test, deployment, and operations phases.*
- Ground Systems MA – as above, with “ground” replacing “acquired”
- To some extent, specific mission assurance techniques and principles are captured in specifications and standards

Why Do We Need Ground Systems MA?

- Somewhere along the line, the notion of “space systems” frequently gets shorthanded to “space vehicles”
- We have more specs & standards consistently applied to space vehicles than we do for ground systems
- There’s an underlying sentiment that ground systems for orbiting assets can be repaired after a space vehicle is launched, and thus do not need the level of scrutiny
- The reality is that
 - *Flaws in ground systems can be transmitted to space and launch vehicles*
 - *Flaws in ground systems can prevent timely initiation of a mission or cause serious mission interruptions*

What is the available body of knowledge in Ground Systems MA?

- There are some specifications and standards that can be applied to ground systems
- There are a few specifications and standards that are intended for ground systems
- There is a body of literature from professional societies, conferences, and government organizations

PROBLEMS:

- There is no single source compendium of the available body of knowledge in Ground Systems MA
- The available literature may not adequately cover all elements of ground systems
- There are likely to be gaps in lessons & guidance for ground systems

Concepts of Harmonization

- Harmonization is consistency among all relevant views
 - *For example, is the political view consistent with the GS MA program and tasks?*
 - *Does the GS MA “Business Case” close where the acquirer is willing to pay for the appropriate supplier MA?*
- Technical MA harmonization is largely (though not entirely) an engineering function
 - *Has to be done and done adequately*
- Harmonization still needs to be done among the other views
 - *Begs the question; “what are the relevant views to be harmonized for GS MA?”*

2010 Working Session Results



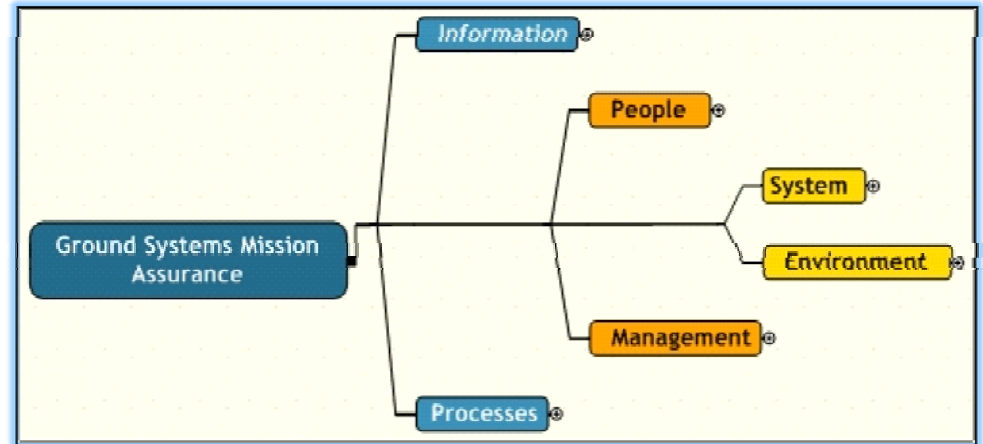
Presenters/Panelists

“What contributes to Ground Systems Mission Assurance?”

- *Organizers/Moderators/Facilitators*
 - *Julie White/Al Hoheb: The Aerospace Corporation*
- *Panelists and Facilitators*
 - *Rick Donnelly, Suellen Eslinger: The Aerospace Corporation*
 - *Judith Erickson, Loretta Rieth: Northrop Grumman Corporation*
 - *Stephen A. Capparelli: Raytheon*
 - *A. Ben Dove: Lockheed*
- *Participants*
 - *62 active and engaged participants*

We'll Build on the 2010 Session Results

- Featured a panel and a 62 person brainstorming session
- Produced and distributed a report: “Ground Systems (GS) Mission Assurance” April 13, 2010, TOR-2010(3907)-22



2010 Key Points

- GS Mission Assurance (MA) difficult to do until the baseline is defined so that it can adequately be priced
- MA-Quality and workforce accountability is critical
- It would be helpful to define “classes” of GS MA to allow trades
- GS MA needs and gov’t desires for open and interchangeable systems makes it difficult for contractors and the supply chain
- We need improved GS development and MA approaches and execution when development is not serial

Conclusions/Results

- Brainstorming results were provided to participants that signed-In
 - PDF diagram, docx file, and these summary slides
 - Subsequent Aerospace Technical Operating Report (TOR)
- Work can be carried further
 - Continue to refine inputs with other specialty teams
 - Prioritize which items merit further investigation
 - Develop a list of candidate actions and projects
 - Characterize and quantify as potential requirements for Command Media and metrics/heuristics
 - Bring back to the next GSAW?

GSAW 2010 Working Session 11c, “Ground Systems Mission Assurance” April 13, 2010 TOR-2010(3907)-22

- Forward: The purpose of this TOR is to document the work, participation, results and plans from the 2010 Ground Systems Architecture Workshop (GSAW) Working Group 11c on Ground Systems Mission Assurance. This effort was undertaken in concert with the Aerospace Chief Corporate Engineer’s Office (CCEO) work to define Ground Systems Mission Assurance state-of-the-practice and then move to guidance and application of command media.
- Index and Attachments listed on the following pages
- TOR was approved for public release

GSAW 2010 Working Session 11c, “Ground Systems Mission Assurance” April 13, 2010 TOR-2010(3907)-22

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- Ground Systems Mission Assurance State of the Practice
- Working Session Background
- Working Session Goal
- Working Session Method
- Working Session Agenda
- Working Session Organizers
- Working Session Panelists and Facilitators
- Working Session Background Material
- Working Session Observations
- Working Session Key Points
- Work to be Done

GSAW 2010 Working Session 11c, “Ground Systems Mission Assurance” April 13, 2010 TOR-2010(3907)-22

Attachments:

- Attachment A: Participant List
- Attachment B: GSAW Presentations
- Attachment B1: Working Group Session 11c Three-Minute Publicity to GSAW
- Attachment B2: Work Group Session 11c Charts to run the Four-hour session
- Attachment B3: Working Group Session 11c Five-Minute Outbrief to GSAW
- Attachment C: Results mailed to participants (included all of Attachment B and the following)
- Attachment C1: Visual Mindmap of brainstorming results
- Attachment C2: Editable Word document version of the Mindmap brainstorming results

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4:30-5pm Wrap Up

Panel: Ground Systems Mission Assurance, “Harmonization - What Works and What Hasn’t Worked”

- Panel Moderator: Chris Stevens/*The Aerospace Corporation*
- Dave Davis/SMC EN
- LtCol. Johnathan Grafelman/SBIRS Det1 CC
- LtCol. Brian Oelrich/GPS OCX
- Jody Gunn/JPL
- Rick Donnelly/*The Aerospace Corporation*

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Wrap Up

- Review the Candidate Brief for presentation on Thursday, 11am
- Define the elements of “What Worked, What Hasn’t”