Mission Assurance Workshop for Ground Systems

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The Aerospace Corporation
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Assuring Space Mission Success

Workshop "Housekeeping"

- Please complete the sign-in sheet
  - *Helps us e-mail you any results*

- Agenda
  - *1-1:15pm   Frame the topic – Storytelling and definitions*
  - *1:15-2:30pm   Panel Session and Discussion*
    - Panel topics (5 min. ea) plus group discussion
  - *2:30-3pm   Organizing the "Mindmap" Session*
  - *3-3:15pm   Break*
  - *3:15-4:30pm   Mindmap Session*
    - Reprise Framing and allocate newcomers to affinity groups
  - *4:30-5pm   Wrap Up*

- Thursday 11am Working Group Out Briefs
 - *Materials*

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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**: The workshop will first provide an overview of the mission assurance body of knowledge and then identify the range of work that applies to ground systems. The interactive part will be to work on identifying holes in the work and potential remedies as a set of sub-teams. Teams will report out as part of the workshop results.

Generic System

Highlights Aspects of the Mission
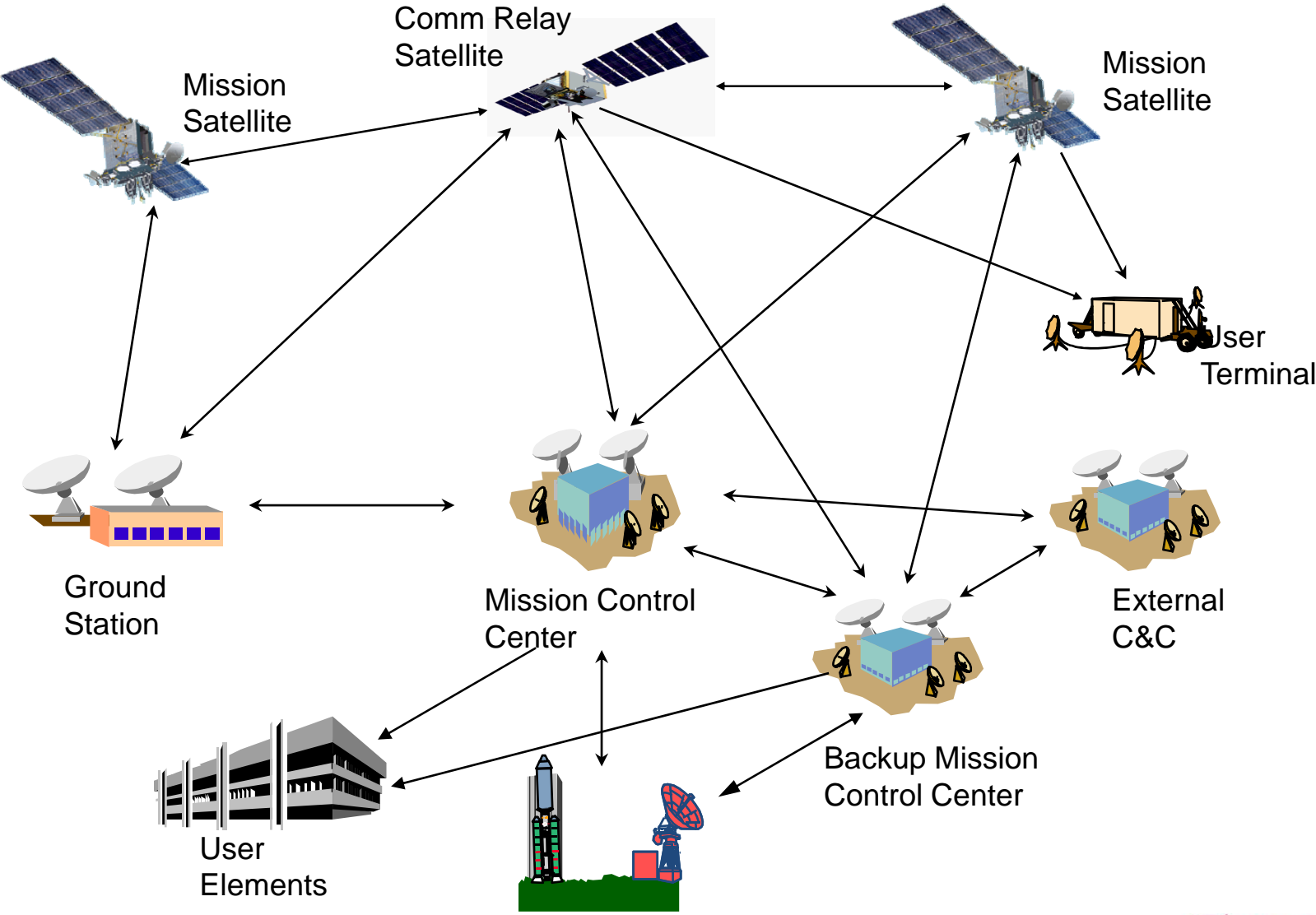
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What Is Mission Assurance (MA) - Definitions

- 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

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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*

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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

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The Mindmapping Session Timeline

- 2:30-3pm
  - *Review the purpose of a mindmapping session*
  - *Mindmapping Session Roles*
  - *Brainstorming Etiquette*
  - *Reveal our Top-Level Mindmap Diagram of Ground Systems Mission Assurance*
  - *Identify our leads*
  - *Rough show of hands to determine if we tackle some or all the topics and self-select groups*
- 3-3:15 Mandated Break
  - *Room set up*
- 3:15
  - *Poll for any new workshop participants and create short side session to get them up to speed*
  - *Affinity groups start working per group lead*
- 4:30
  - *5 minutes for each team outbrief*

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Purpose of a Mindmapping Session
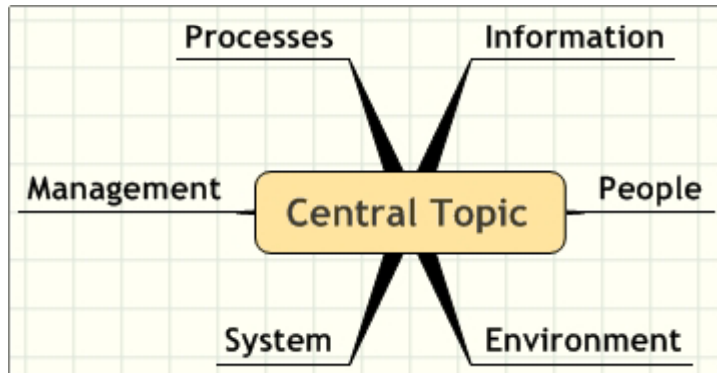
Mindmap

Fishbone
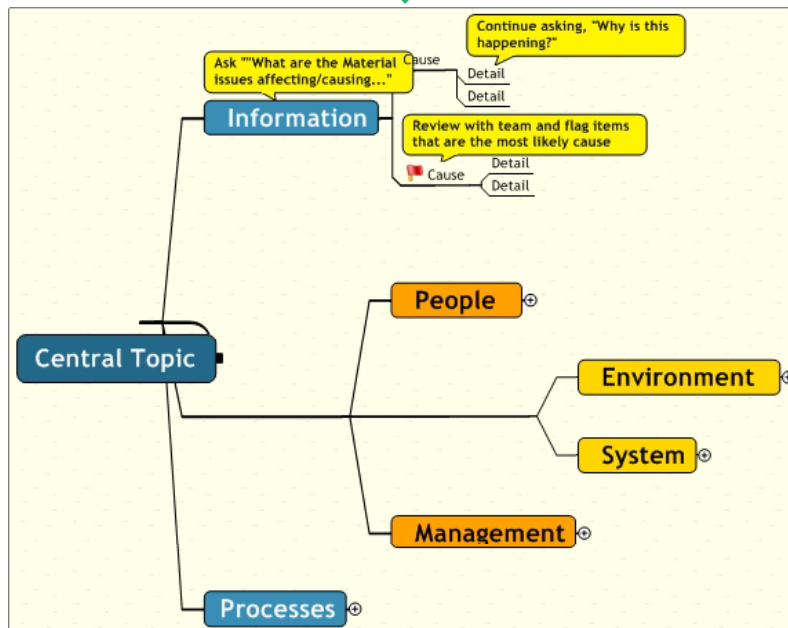
- Identifies potential inputs to address a central topic or specific question.

- A mindmap results from brainstorming.

- Mindmapping is a method used to generate ideas from groups.

- We'll split into groups to develop pieces of the diagram.

- Provides quick visible results leveraging group knowledge.

- Leads into follow on analysis to refine inputs, analyze results and act on the information.

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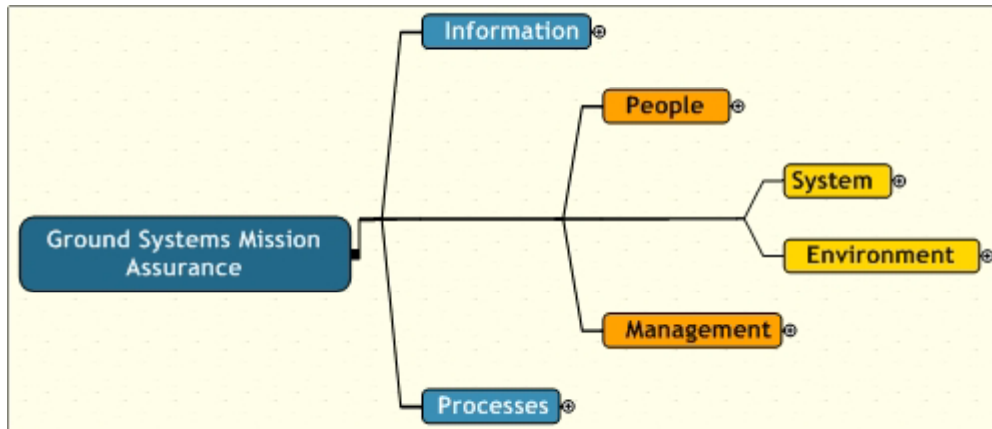Al Hoheb/TAI/ Albert.c.Hoheb@aero.org

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Mindmapping Session Roles

- Organizers
  - *Ensure proper instruction and resources*
  - *Roam to add assistance*
  - *After hours integration of results for Thursday Outbrief and e-mail results*
- Panel members and additional affinity group leads
  - *Elicit inputs, ensure all are heard, one voice at a time*
  - *Clarify inputs, help recorder pace inputs*
  - *Ensure we stay on time*
  - *Step in to allocate items to a "parking lot" if stuck*
- Designate a Recorder
  - *Record only what is said –or- help to restate it accurately for recording*
  - *Pace the inputs to ensure accurate recording*
  - *Mark pages with topic, page number, keys if used, and notes*
  - *Record "parking lot" items*
- Outbriefer (could be the same person as Recorder)
  - *5 minute outbrief for each affinity group*
  - *Provide a sense of topic coverage and if there were any surprises or items that are of high priority to study*

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Brainstorming Etiquette

- Group
    - *Decide on a recorder and outbriefer*
    - *Decide on Freewheeling vs. Round Robin Approach*
- Freewheeling vs. Round Robin
    - *Freewheeling: Group members call out their ideas spontaneously.*
    - *Round Robin: One at a time, in order, passing allowed*
- Contribution Guidelines:
    - *Strive for idea quantity*
    - *One idea at a time to allow proper recording*
        - *Don't talk while others are talking*
    - *Be specific and ensure ideas are accurately stated and written clearly*
    - *Encourage Ideas to create a rich picture*
    - *No evaluation of ideas (clarification questions only)*
    - *Hitchhike -- build on the ideas of others*

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Top-Level Mindmap Diagram of Ground Systems Mission Assurance

Workshop Output: What contributes to Ground Systems Mission Assurance?

Team Outputs: What are the <element> contributions to Ground Systems Mission Assurance?

Elements
- Information: all information and information infrastructure
- People: Organizations, People and their components and relationships
- System: H/W, S/W, Comm and Support Services, Development Environments, and Test Environments, O&M, Training, and external I/Fs
- Environment: Gov't Acq, Corporate, Budget, Economic, Political
- Management: Org Interfaces, Agreements, transition events, Interfacing system management
- Processes: All, competing and emerging process descriptions

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Team Assignments

Team number	Team Name	Team Leader
1	Information	Ms. Judy Erickson
2	People	Mr. Ben Dove
3	System	Mr. Steve Scaparelli
4	Environment	Mr. Karl Arunski
5	Management	Lt. Col. Jay Landis
6	Processes	Ms. Suellen Eslinger

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Recording and Wrapping Up the Session

- We'll integrate results for presentation at tomorrow's Workshop out briefs (11am)
- If you signed in, you'll get e-mailed results
  - *Mindmap PDF diagram*
  - *Mindmap PPTX charts*
  - *Mindmap docx file*

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  - *Room set up*
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  - *Poll for any new workshop participants and create short side session to get them up to speed*
  - *Affinity groups start working per group lead – select recorder, out briefer and which approach (freewheeling or round robin)*
- 4:30
  - *5 minutes for each team out brief*

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