NASA Requirements & Needs and their Relationship to Responsive Space

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Requirements - The Nation's new Vision on Space Exploration

- **Background** – "In preparation for future human exploration, we must advance our ability to live and work safely in space and, at the same time develop the technologies to extend humanity's reach to the Moon, Mars and beyond"
- **Policy Objective (Technology)** –"Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration…"
- **National Benefits (Technology)**–"Preparing for exploration and research accelerates the development of technologies that are important to the economy and national security…" – "NASA plans to work with other government agencies and the private sector to develop space systems that can address national and commercial needs."
- **Objectives**
  - Implement a sustained and affordable human and robotic program
  - Extend human presence across the solar system and beyond
  - Develop supporting innovative technologies, knowledge, and infrastructures
  - Promote international and commercial participation in exploration

Problem Statement

- For current space systems, how do we:
  - Reduce complexity
  - Reduce design, build, and test times
  - Reduce cost
  - Increase flexibility to satisfy multiple functions
  - Make them practical for widespread human and robotic exploration

What Do We Need

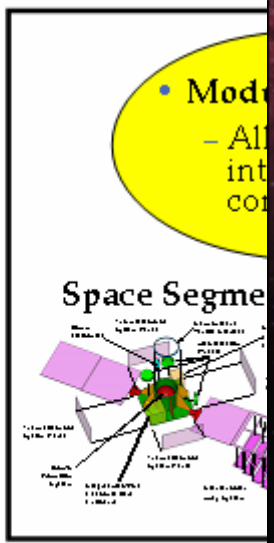
- Revolutionary transformational improvements in the design, architecture, and processes involved in the production of current flight systems (hardware and software)
- Improvements are critical across-the-board in any space-bound exploratory, scientific, or commercial endeavor.
- These improvements are essential to achieving the goals set forth in the President's new Vision for NASA.

Exploration Emphasis

What & How
will be addressed this afternoon

Modular, Reconfigurable, Rapid Space Systems

MR²: Addressing the need for revolutionary transformational improvements in the design, architecture, and processes involved in the production of current flig
Exploration



How Do We Implement: First Steps

- Adopt *commercial interface standards*
  - Modify only as needed for space applications
- Define *system architectures* that support the MR² paradigm
- Select *choice technologies* that support the system architecture

- **Standard Interfaces:**
  - Reduce Integration & Test times
  - Allows for maximum flexibility in component choices
  - Increase application breadth
  - Allows for individual component technology evolution
- **Choice Technologies:**
  - Increase mission implementation speed
  - Periodically revised list allows for technology evolution
- **System Architecture:**
  - The underlying infrastructure
  - Supports MR²

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NASA and DoD on Responsive Systems

- NASA and DoD's motivation for participation in responsive space is different, but the goal is akin: it and has to do with process improvements in the mission life cycle.

Life-Cycle Process Improvements

Flexible, cost-effective space systems for Exploration and Science

Fast-Response Tactical Satellites