Space Project Mission Operations Control Architecture (SuperMOCA)

Ground System Architectures Workshop

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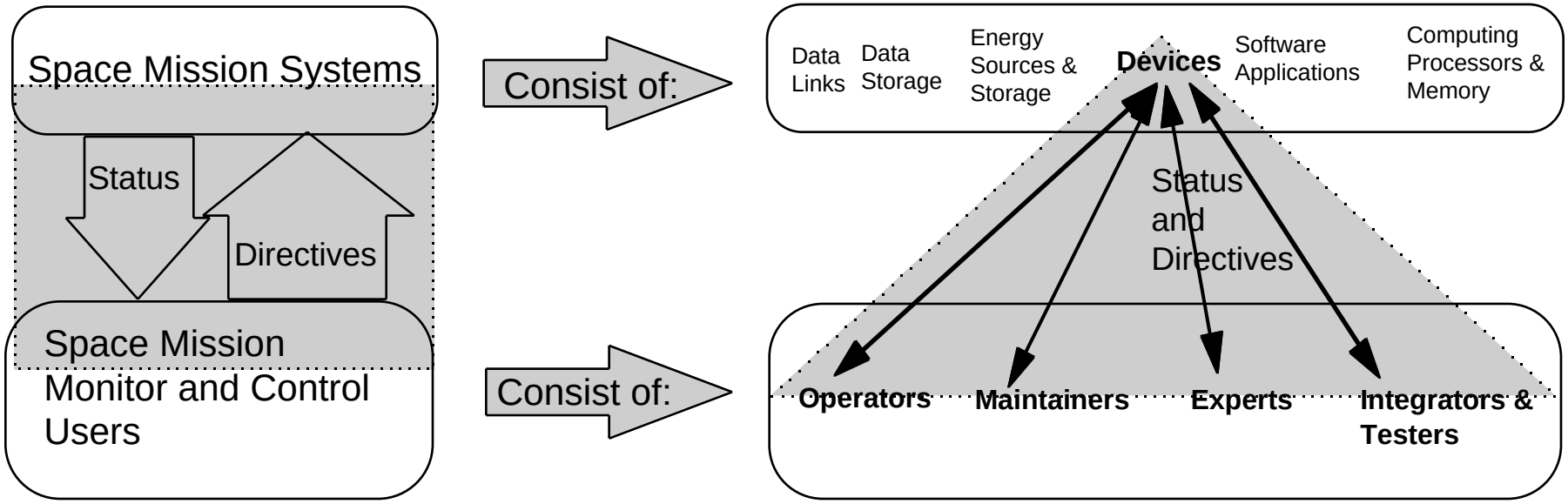
Outline

- What SuperMOCA Is
- Goals and Approach
- Some History
- Lessons, Advice, Opinions
- An Advertisement

What SuperMOCA Is

- An architecture for the monitor and control of mission resources used in space mission operations. These resources are:
  - ground terminals
  - launch complexes
  - launch vehicles
  - spacecraft
- A set of specifications that apply to the devices used in space mission operations and the products used to monitor and control those devices. These specifications:
  - are consistent with the above architecture
  - are open and supplier-independent

Scope of Architecture and Specifications

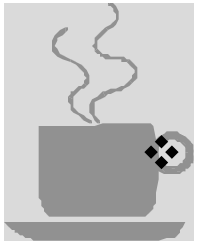


SuperMOCA Architecture addresses monitor and control dialogue between users and all components of Space Mission Systems

SuperMOCA Specifications only address monitor and control dialogue between users and devices of Space Mission Systems

Goals and Approach

- Decouple device design from controlling application design (e.g., plug and play)
- Describe device behavior in a manner that is easily accessible throughout the mission life-cycle
  - methods for description (e.g., object-oriented)
  - structures for containing descriptive information
- Use or adapt commercial standards wherever possible
- Testbed technologies, standards, system architectures, and operational concepts as early as possible

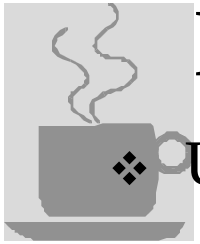


Past and Future

- Ideas for technologies, related standards and their applications in mission operations were developed in late 1980's as part of Space Station work
  - dropped after one of the station redesigns
- Ideas were kept alive and promulgated through an AIAA Spacecraft Control Working Group
- Goddard Space Flight Center developed an architecture and operations concept for their earth orbiting operations in the 1993 - 94 time frame
- Technologies, standards, architectures, and operations concepts were brought together by SuperMOCA in 1995 - 97
- Joint NASA/DOD program of standards development for 1998 - 2000 is being proposed this spring

Partnering Arrangements

- Contracts with experts in private industry
  - SRI International
  - Applied Information Sciences, Inc.
  - SAIC, Inc.
- Contracts with universities - U. of Colorado
- Cooperation with other NASA centers
  - KSC / Boeing
  - GSFC / CSC
  - GSFC / Allied Signal
- Spacecraft Control Working Group
  - Interested commercial suppliers
  - DOD interested parties



Lessons Learned (Free Advice!)

- Use reference models
  - to identify interfaces and layers
  - to compare designs
- Use ops concepts and scenarios
  - to configure testbeds
  - to see where the best bang for the buck is
  - to communicate with suppliers, analogous domain experts, other agencies, commerial space operators
- Find the experts (issue CBD announcements, host technical working groups, attend and speak at possibly related conferences)
- Find partners in and out of government

Going Commercial with Ground Systems for Space Missions

- Most current practices are limited to small markets
  - Privatizing government systems
  - Buying COTS tools where available and integrating
- Future steps should:
  - Investigate larger analogous markets and their technologies and standards
  - Develop and adopt standards that allow suppliers to develop products that fit into most private and government ground systems for space missions
  - Encourage the development of a commercial market for space mission operations products

SuperMOCA Homepage

- You can find it at: http://champwww.jpl.nasa.gov/supermoca

- You can access:
  - News & Announcements
  - Papers
  - Documents
  - Explanation of Demos
  - Points of Contact
  - Status Reports
  - Links to Related Home Pages