NASA Safety Directors Meeting

NASA Headquarters

Presented by

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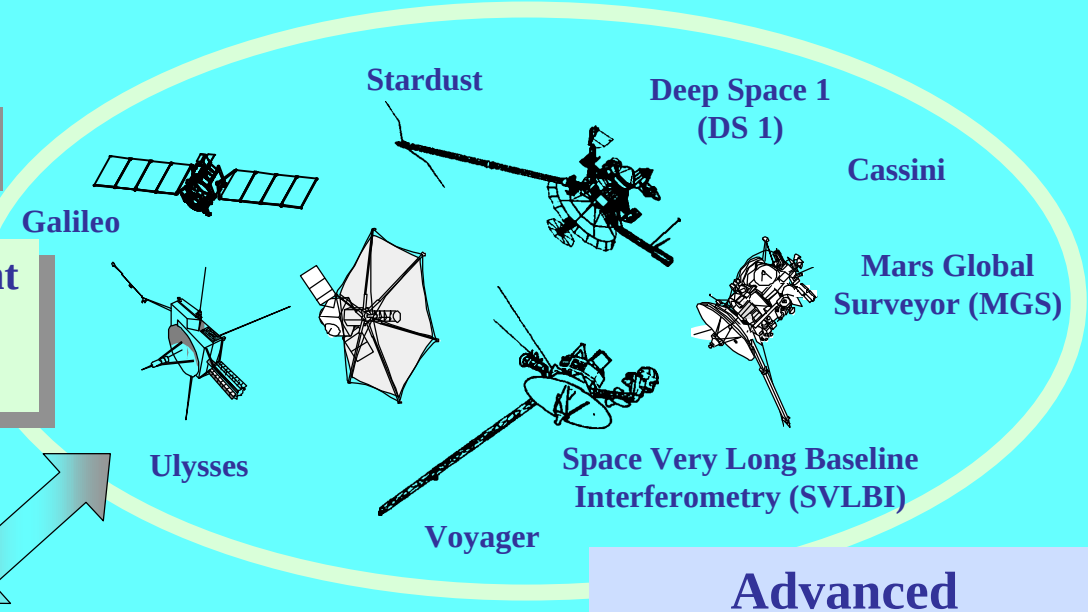
DSN Safety & Environmental Manager

March 20-23, 2001

What is TMOD?

Flight Projects

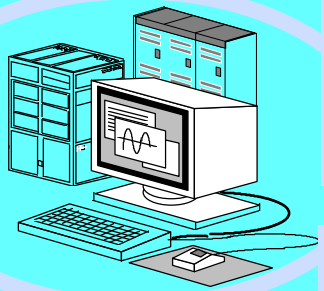
- Project Management
- Operations
- Science Analysis



The Deep Space Network (DSN)

- Telecommunications
- Radiometrics
- Timing
- Science Observations

Advanced Multimission Operations System (AMMOS)



- Data Extraction
- Data Distribution
- Navigation
- Mission Services

Our Mission:
Provide Space Communications and Mission Operations that measurably contribute to NASA and JPL mission success

TMOD Organization

Effective: December 18, 2000

900
Telecommunications and Mission Operations Directorate

G.F. Squibb, Director for
R.C. Coffin, Deputy Director for
P.E. Doms, DSMS Program Manager

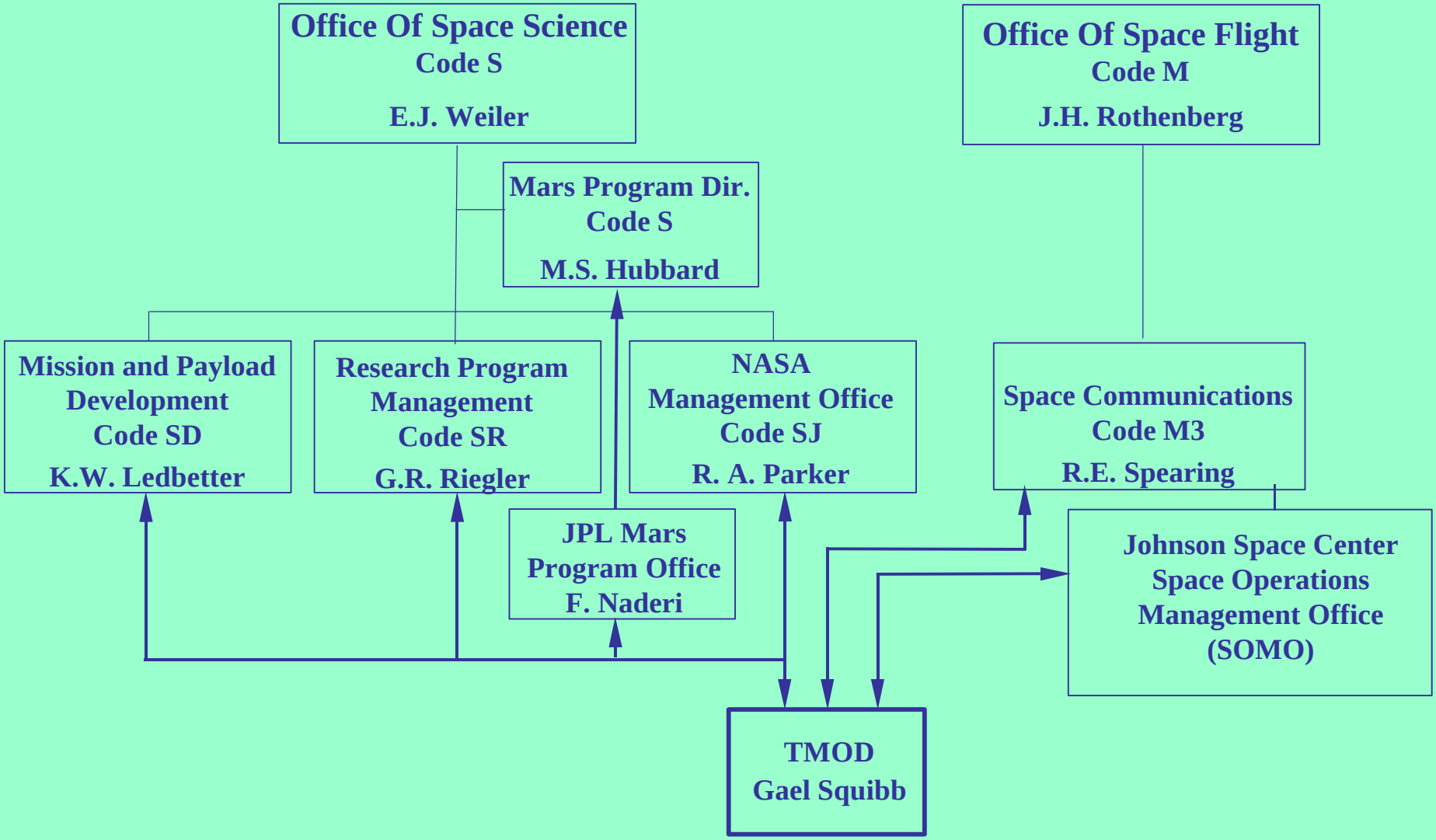
OTHER
- **Mission Data System**
- **Mars Network**

Mission Management Office

Deep Space Mission System (DSMS)

Flight Projects
- Mars Global Surveyor
- DS 1
- Cassini
- Stardust
- Galileo
- Ulysses
- Voyager
- Space VLBI

TMOD Sponsor Relationships



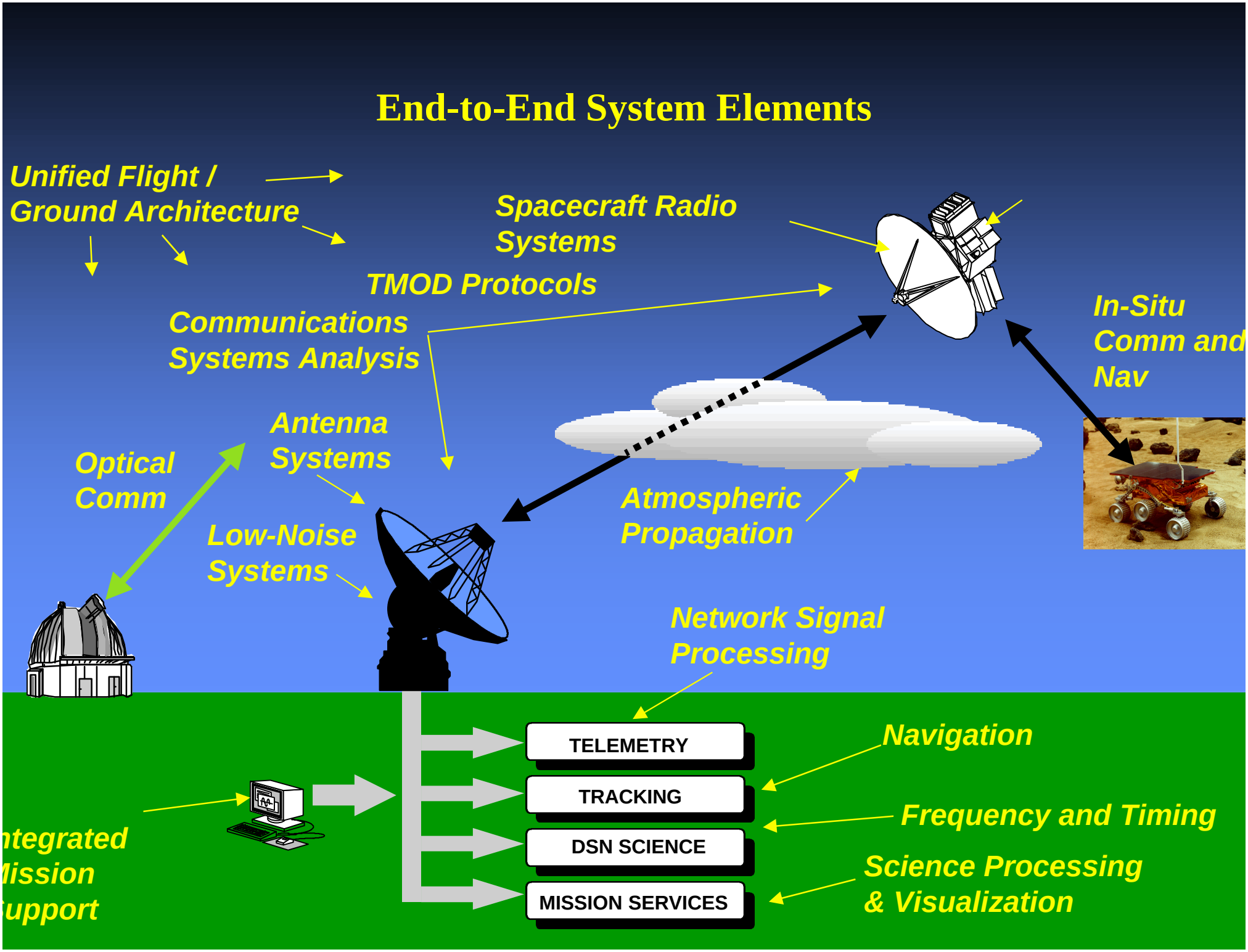
TMOD Programmatic Responsibilities

- Provide telecommunications for successful execution of a broad spectrum of space exploration missions.
- Provide mission operations that add significant value to the conduct of space exploration missions.
- Conduct ground-based radio astronomy, solar system radar, and radio science observations.
- Manage and operate flight projects assigned to the Directorate.

TMOD Major Programs

- Deep Space Network - provide communications and tracking services for a wide variety of interplanetary spacecraft.
- Advanced Multimission Operations System - provide a suite of mission operations services to customers that enable mission planning, sequence development, spacecraft monitoring, navigation, mission control, data archiving, and science product generation.
- Technology - develop flight and ground technologies to meet the needs of future missions, and reduce the cost of DSN and mission operations services.
- Science Observations - conduct ground-based radio astronomy, Solar System radar, and radio science observations.
- Flight Projects - Cassini, Galileo, Ulysses, Voyager, Deep Space 1, Mars Global Surveyor, Stardust
- Space Very Long Baseline Interferometry Project complete all implementations and provide operations support for the VLBI Space Observing Program (VSOP) and Radio Astronomy missions.
- Mars Network - a proposed constellation of satellites at Mars for providing communication and navigation services to other Mars exploration elements. When completed, Mars Network would essentially be an extension of the Deep Space Network at Mars, enabling substantially more data to be relayed to the Earth than if each Mars exploration element attempted to send back its own data directly.

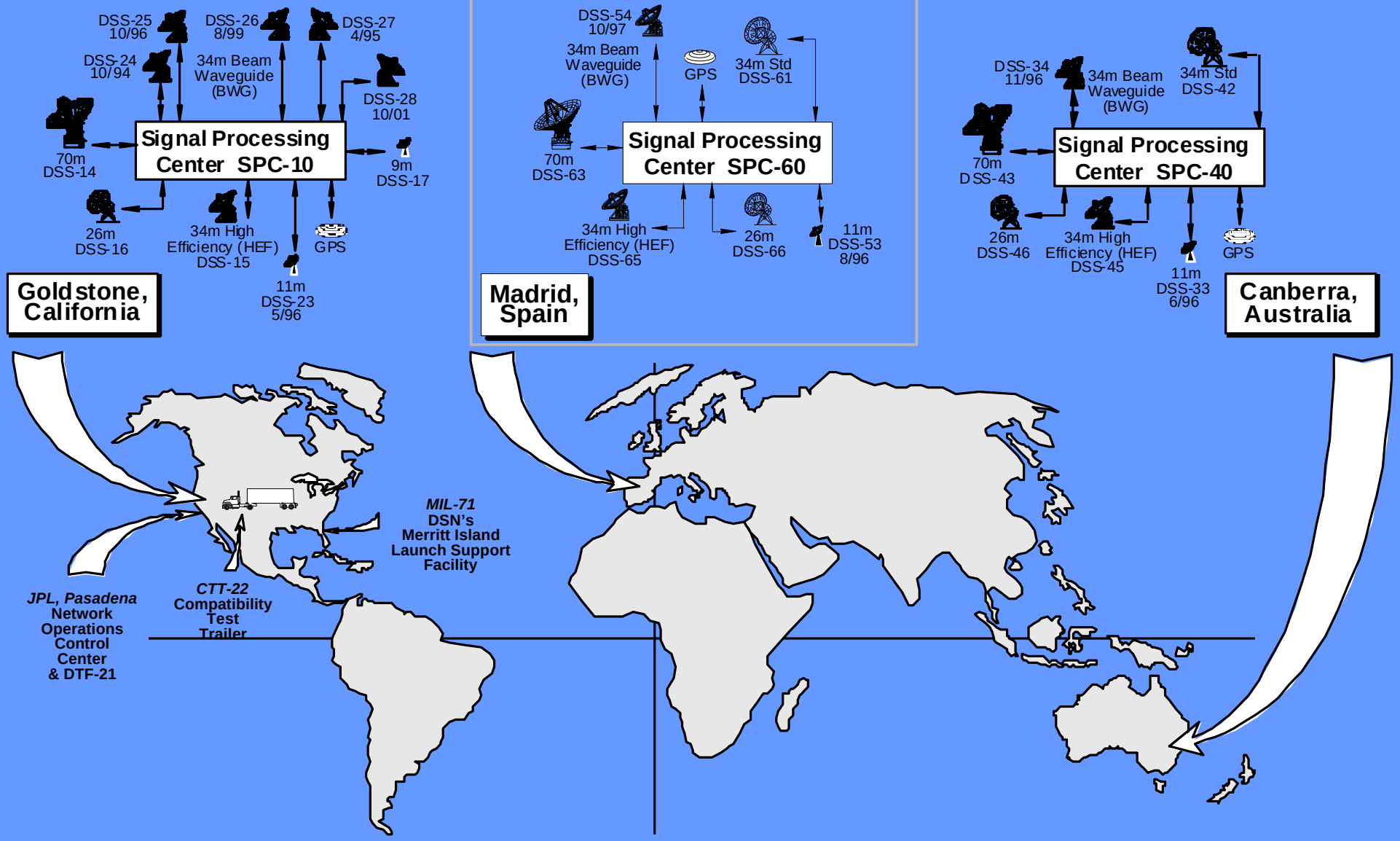
End-to-End System Elements



DSN Functions

- Telemetry - provide the capability to acquire, process, decode and distribute deep space probe and Earth orbiter telemetry data from the spacecraft to projects.
- Spacecraft Command - provide the means by which a Project controls the activities of its spacecraft.
- Radiometric Tracking - provide two-way communication between Earth based equipment and spacecraft, that will allow the position and velocity of spacecraft to be determined.
- Very Long Baseline Interferometry - provide the means of directly measuring plane-of-the-sky angular positions of radio sources.
- Radio Science - improves our knowledge of the solar system and the theory of general relativity through radio frequency experiments performed between spacecraft and the Deep Space Network's (DSN) Radio Science System.
- Monitor and Control - provide real time monitor data to projects which reflect the status of project support by DSN systems, and to provide monitor and control capabilities to operators of DSN systems' components.
- Science - the DSN may be used as an advanced technological instrument for scientific research and development.

DSMS: DSN Facilities



DSN FACILITIES

- **Programmatic function**
  - Focus on Safety & Environmental aspect for TMOD deep space ground communication systems
  - Mitigation of hazard and risk to personnel, equipment, systems and facilities from concept through implementation and operations.

- **Subject Areas**
  - occupational safety and health
  - equipment safety
  - system safety
  - fire protection
  - emergency preparedness
  - environmental protection

- **Active interaction with**
  - Deep Space Mission System
    - **Engineering**
    - **Technology**
    - **Operations**
  - DSN Complexes in California, Spain & Australia

- **Work Area**
  - New initiatives, developments, implementations and improvements in the DSN
  - Biennial Review of each DSCC
  - Working issues as they occur

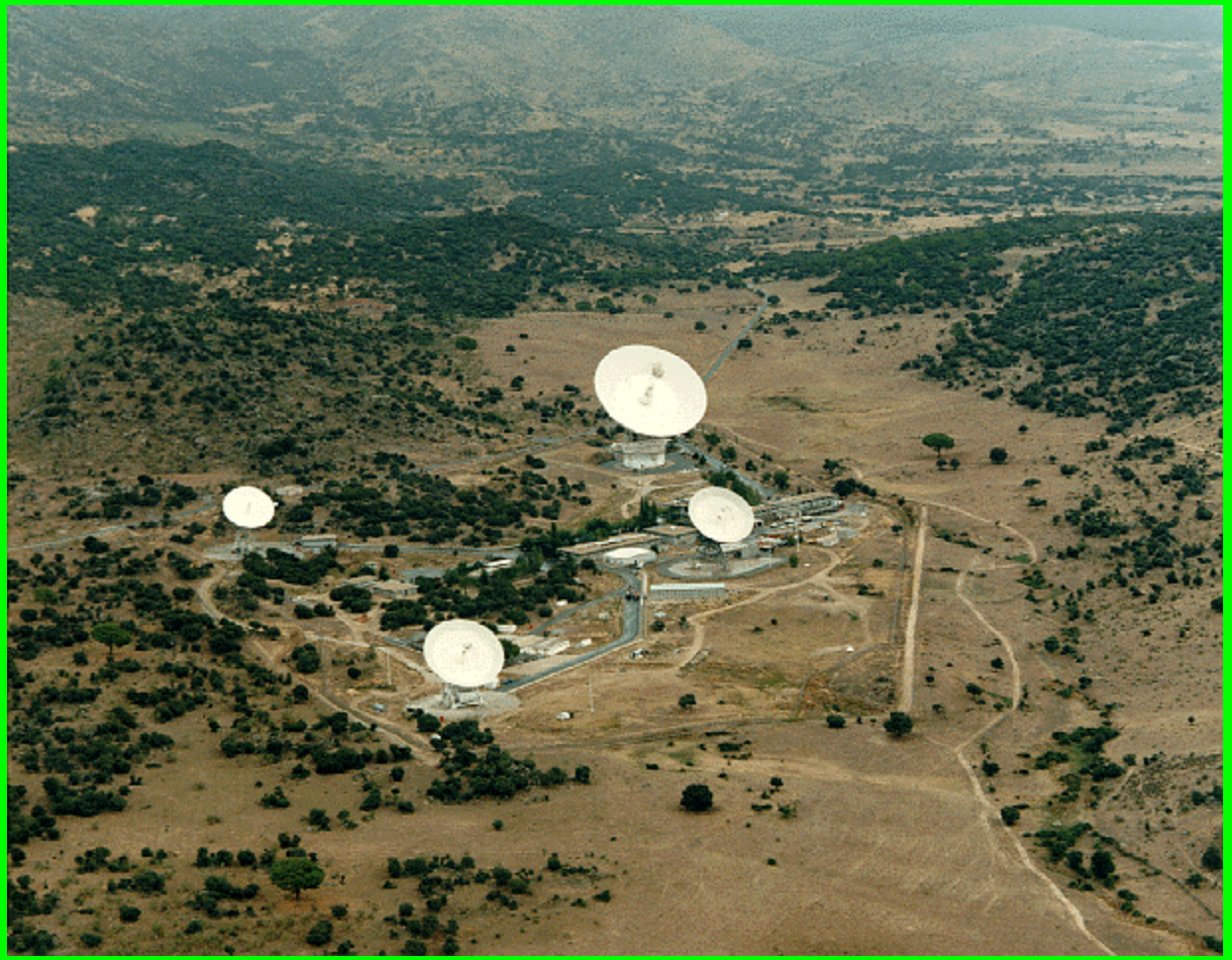
- **New initiatives, developments, implementations and improvements in the DSN**
  - Optical Communications Development
    - **Key Safety Issue: Air Space Coordination**
  - New Frequency Capabilities at the DSN including Ka-Band and X-Band
    - **Design Reviews**
    - **Having signed and approved drawings for construction prior to field work implmentation**
    - **Safety Plans**
    - **Engineered Lift Plans**

Upgrading Capabilities, DSS-14 Goldstone

Mars Overload 03/04 BWG Antennae

- Environmental Permits
  - MDSCC & CDSCC
- Fire Protection
- Safety Plans
- Lift Plans
- On Site Safety Officer during construction

Madrid Deep Space Communications Complex (MDSCC)



MDSCC

- **MDSCC Biennial Safety & Environmental Review**
  - Conducted October 16-20, 2000 with cooperation of NASA-Spain Resident, INSA Spanish Mangers and MDSCC Personnel

MDSCC

- **COMPLIMENTARY FINDINGS**
  - Non-ionizing Radiation Safety
  - Safety Organization and Management
  - Security (Terrorism)
  - Laser Safety Program
  - Hazardous Materials Storage
  - Record Storage at DSS-63 (70-meter antenna)

MDSCC

- **RECOMMENDATIONS**
  - Air/Space Coordination
  - DSS-63 (70-Meter Antenna)

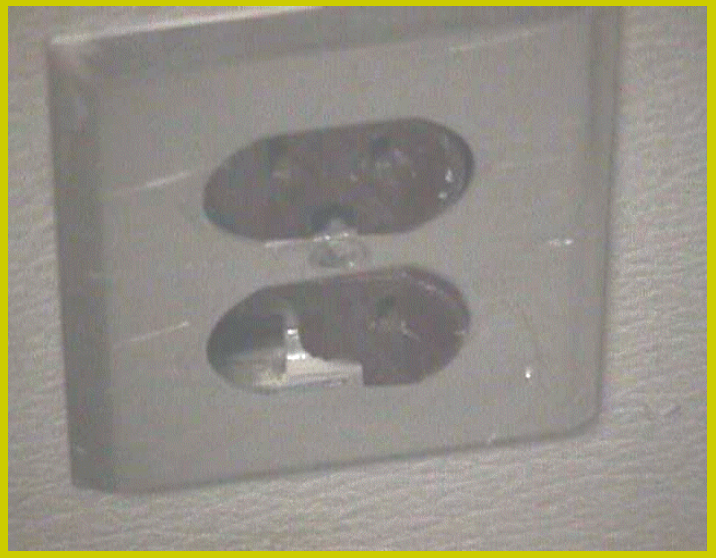
DSS-63

health and hygiene issue on the antenna

The Antenna Critical Spare Parts Building

MDSCC

- Electrical Outlets, Cords and Plates

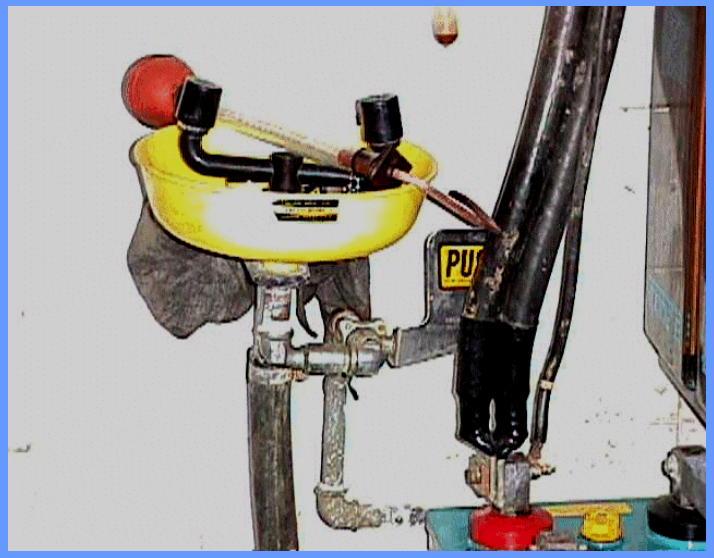


MDSCC

- Overcrowding

Powerhouse

- Battery Room



MDSCC 2000 Safety & Environmental Review Matrix for Action

Priority	Despcription	Issue	POC
1	DSS-63 Water Over 208V Breaker	Check condition of ceiling	A. Martin
2	Electrical Outlets, Cords and Plates	Unsafe Situations	A. Martin
3	DSS-63 Cone Hoist Certification	X-Band Uplink Installation	J. Sosnowski/A. Martin
4	Fire Pro Kitchen	Cooking Area Sprinklers	A. Martin
5	Fire Pro Visitor's Center	Wooden Wall	A. Martin
6	Paint Shed Chemical Storage	Chemical segregation, ventilatilation, spill capture	A. Martin
7	Overcrowding	Excessing of material clogging up MDSCC	B. Falin
8	DSS-63 Hygiene Bird Problem	Need time and personnel for cleanups	A. Martin
9	Fire Pro Antenna Spare Parts Bldg	Critical Parts Protection	B. Falin
10	Air/Space Coord	Hi Power Use	G. Pasero
11	Powerhouse Batter Room	Eyewash, ventilation	A. Martin
12	DSS-63 Injured Personnel Evacuation	Need Altenative Method to Condor	A. Martin
13	Engine Work Shop	Need Larger Door for Moving Large Parts	A. Martin
14	Lifting Equipment Load Rating Markings	Safe Lifting Operations	A. Martin
15	DSS-63 Additional E-Stops	Station Request	A. Martin
16	DSS-54 Emergency Light	Install on rotating structure	A. Martin
17	DSS-63 Additional Emergency Lights	No E-Lights on Elevation Gear Box Platform	A. Martin
18	Perimeter Security	Current System Malfunctions	B. Falin
19	Fire Truck	Request New	B. Falin
20	DSS-66 Secondary	Contain Hydraulic Leaks	A. Martin