AGENCY-GOVERNMENT-INDUSTRY PARTNERSHIPS FOR THE DSN

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Agenda

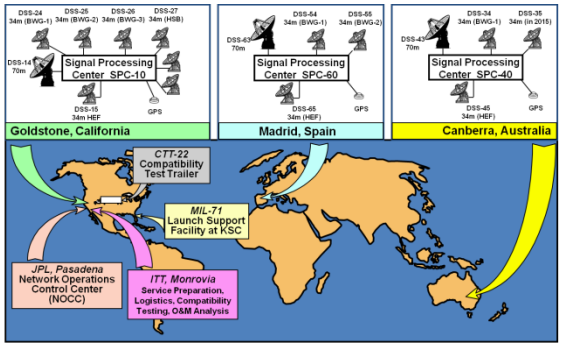
- Overview of the Deep Space Network
- Agency/Academia – Government – Industry Relationship for the DSN
- Where should the work be done?
  - Policy issues
  - Cost issues
- Goldstone arrangement
- Canberra arrangement
- Madrid Arrangement
- Summary
- Discussion

DSN Overview (1)

- Deep Space Challenges
  - Very Limited Spacecraft Mass, Power, & Volume
  - Unique Operational Segments
  - Extreme Communications Links
  - Complex Long-Distance Navigation
  - Trajectories Demanding Full-Sky Visibility
- Mission-Class Drivers
  - Observatory-Class Missions
  - Legacy Missions
  - Outer Planet Missions
  - Mars Exploration Missions
  - Ground-Based Science

DSN Overview (2)

Large 34m and 70m antennas, in three complexes ~120 degrees apart via global partnerships, with very sensitive receivers, very powerful transmitters, and very accurate clocks.

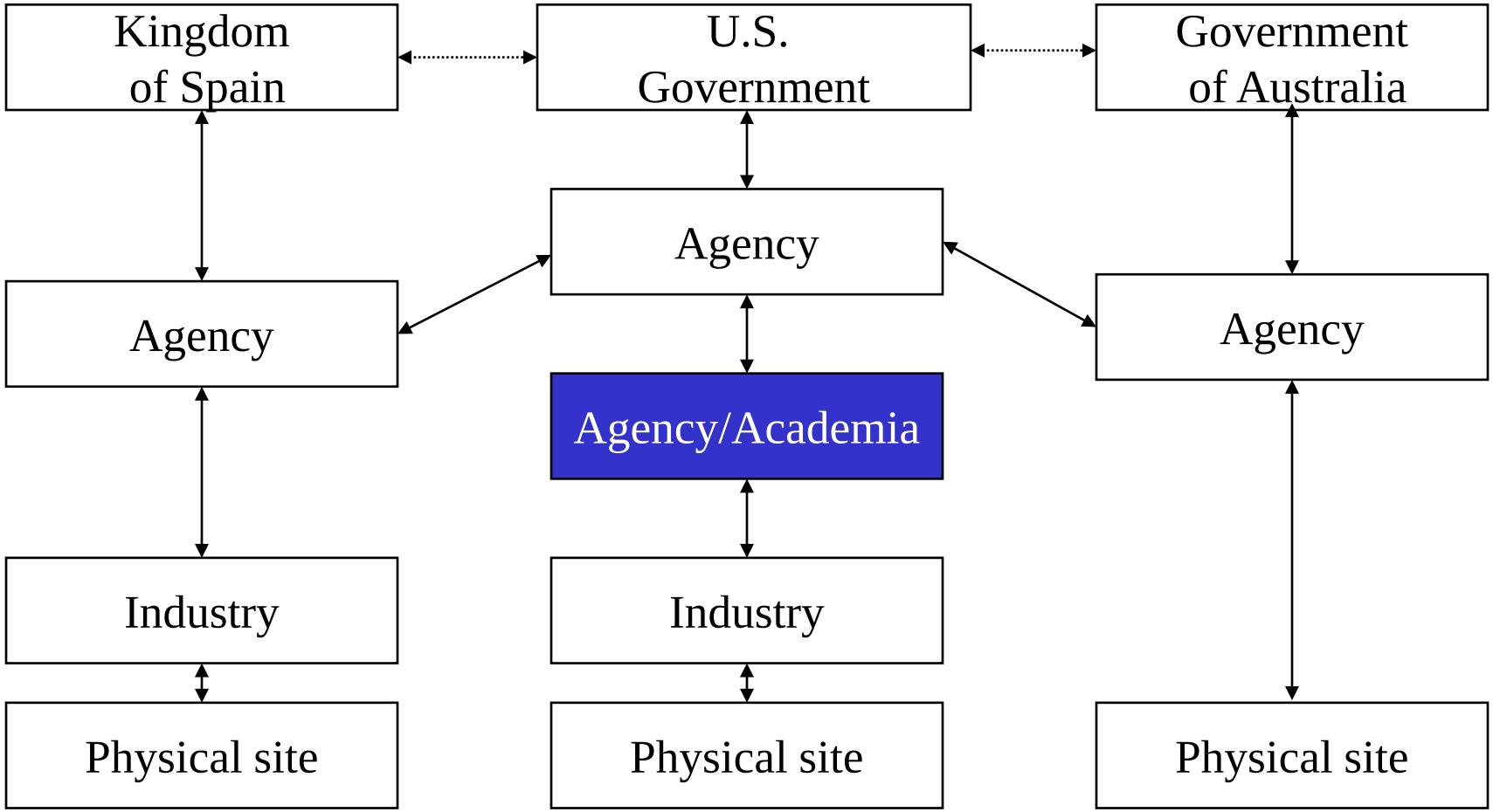


Global partnerships also present global challenges: foreign labor laws & unions, exchange rates, spectrum agreements, and myriad external interfaces.

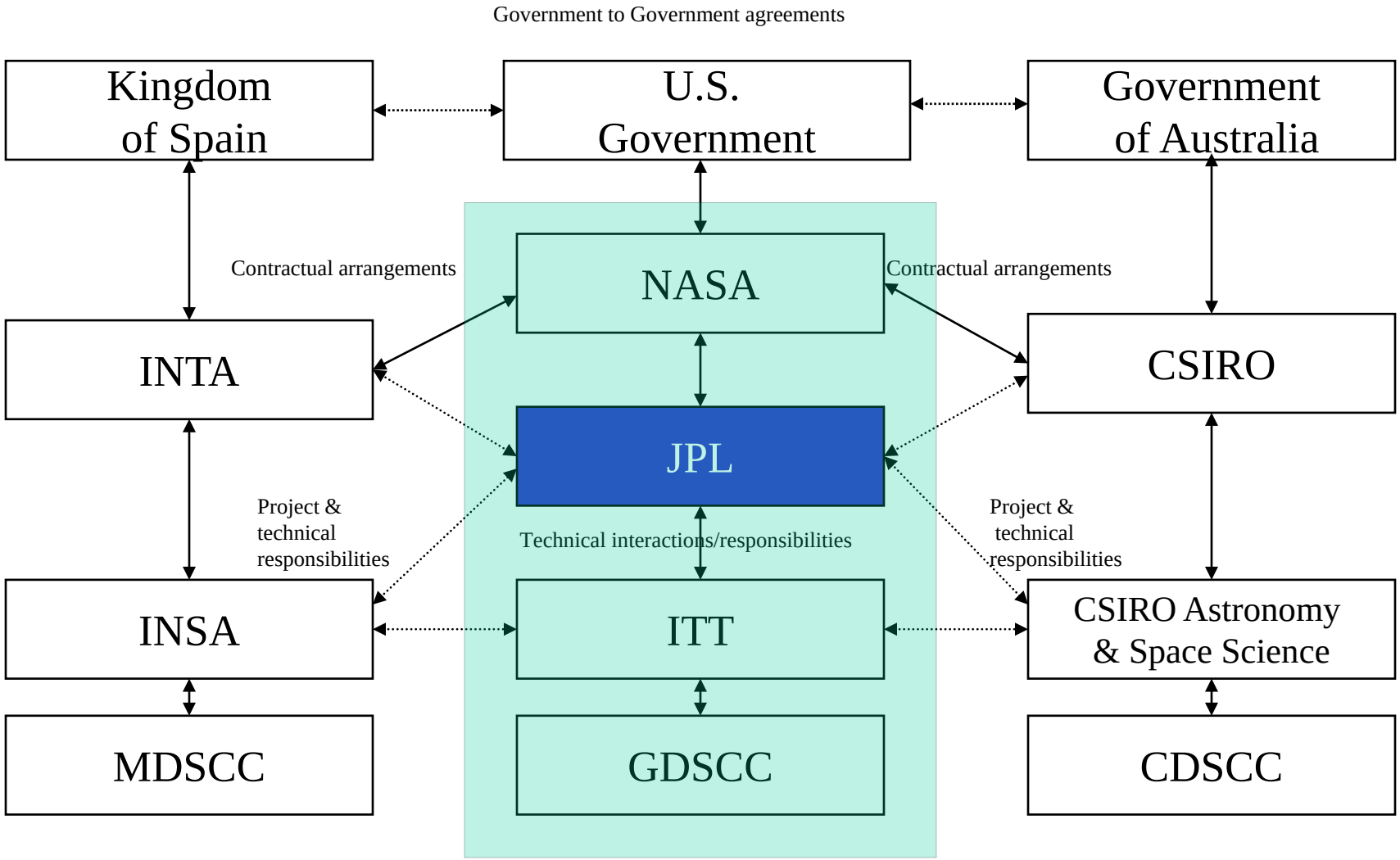
Capability Diversity

- Multi-band diversity: Different antennas have different combinations of Cat A S & X, Cat B S & X, Ka 26 GHz, Ka 32 GHz , & Ka 34 GHz; Ka-band operations can be weather driven
- Receiver/Transmitter diversity: High-rate Ka 26 GHz receivers vs. high sensitivity Block V receivers; transmitter power ranges from 50W to 400 kW, depending upon band & use.
- Coding & Modulation diversity: Multiple telemetry processing, decoding, and formatting schemes
- Antenna Utilization diversity: Single antenna links (1-way, 2-way, & 2-way coherent), multiple antenna VLBI schemes for navigation, multi-antenna arraying, MSPA, and radar.

Contractual Relationships (1)



Actual Relationships (2)



Where Should The Work Be Done? (1)

- Policy Issues
  - US Government policy with regard to assigning work to industry
    - Preference for assigning work to industry, where practical
  - Government-to-government agreements
    - The sites in Spain and Australia fall under government-to-government agreements, e.g. sites are managed via local government
  - Civilian vs. military use
    - Sites engage in civilian space use

Where Should The Work Be Done? (2)

- Cost Issues
  - US Government FAR (Federal acquisition Rules) apply
    - Open competition
    - Limited length contracts
    - Cost is a key, but not only, factor
  - Dealing with multiple layers of G/A and oversight
- Dealing with unique capabilities
  - DSN capabilities are often not available commercially (i.e. to be shared with other customers)

Where Should The Work Be Done? (3)

- Basic Assignment of Roles
  - Local O&M – assigned to a local entity (industry or government)
    - Often following common processes/procedures
  - Engineering
    - DSN-unique functions (e.g. antennas, high power transmitters, low noise amplifiers) are managed centrally
  - Customer interface – managed centrally
- Limited, appropriate exceptions:
  - Engineering functions managed by the contractors
  - O&M functions managed centrally

Goldstone Arrangement

- Single O&M contract to industry, awarded from Agency/Academia (JPL)
  - Duration – 5-10 years
  - Awarded based on competition
    - Currently, contractor is ITT
  - Real issue - Dealing with loss of expertise
  - Generally works well
    - Leverages on vendor's expertise elsewhere with O&M
    - While still keeping central/unified engineering

Canberra Arrangement

- Single O&M contract to CSIRO, awarded from NASA
  - Agency-to-Agency contract
  - Based on a Government-to-Government agreement
- Generally works well
  - Technical interface is JPL-CSIRO working level
  - Leverages on CSIRO's O&M capabilities, and also on CSIRO's engineering capability
  - While still keeping unified engineering for DSN-unique functions

Madrid Arrangement

- Single O&M contract to INTA, awarded from NASA
  - Agency-to-agency contract
  - Based on a Government-to-Government agreement
- Single O&M contract to INSA, awarded from INTA
  - Agency to industry
- Generally works well
  - Technical interface is JPL-INSA
  - Leverages on INSA's O&M and engineering capabilities
  - While still keeping unified engineering for DSN-unique functions

Summary

- The DSN has three different arrangements of Agency-Government-Academia-Industry, for the DSN sites
  - Arrangements driven by the DSN unique needs and by policy and cost factors
- Arrangements generally work well
  - O&M is largely relegated to industry
  - Engineering is largely centralized
  - Boundary requires tweaking as technology and contractual arrangement change
    - Example – move to follow-the-sun operations

Discussion