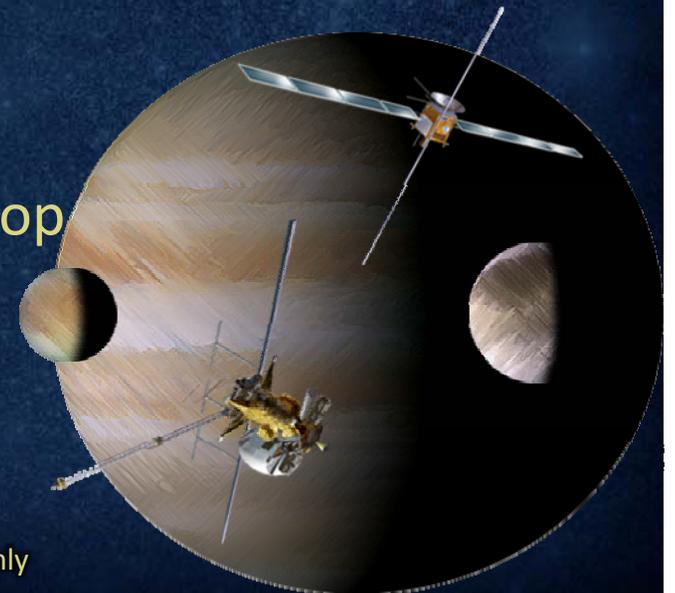




JEO Project Interactions with Instruments – Post Final Selections

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JEO Pre-Project

EJSM Instrument Workshop
July 27-29, 2010





Project Interactions with Instrument Teams Post Final Selection

Notional Plan

July 27 - 29, 2010

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Pallet Module

- JEO Project is currently evaluating a payload pallet module implementation
- The Pallet Module is a partitioned, pre integrated module that would eventually be delivered to the spacecraft
 - Separable mechanical structure where all of the instruments would be mounted
 - Consolidated power and data interface between the pallet and spacecraft
 - Instrument power distribution unit, data processing and mass storage provided by the pallet
 - Pallet/instruments integrated and tested in parallel with the spacecraft





Project Perspective

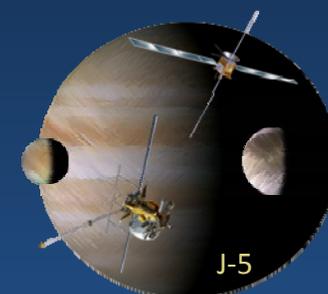
- Technical interaction with instrument teams to better understand
 - Instrument interface needs
 - Any unique accommodation needs
 - Requirements of the common science chassis and how to best implement
 - How best to deal with the planetary protection pallet wide
 - How best to optimize pallet integration and test
 - How potentially project provided interface electronics might best work
 - Potential uses of the data processing system (compression, etc)
 - Considerations for a pallet fault protection zone (isolation vs. protection)
 - How instruments would work together so we can put together operational plans





Instrument Perspective

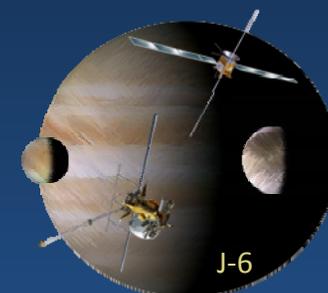
- To interact with the project to better understand
 - Potential radiation shielding from s/c and neighbors
 - I&T flexibilities
 - Pallet simulators (both provided to the instruments and by the instruments)
 - Implications of the pallet fault protection implementation
 - Payload centric operability across/between instruments
- To interact with the project to get guidance or help with
 - Use of the science chassis
 - Radiation analysis and coordinating radiation testing beam runs
 - Detector issues
 - Planetary protection requirements.
 - Shielding options, techniques and tools
 - Magnetic cleanliness
 - Microphonics
 - Identifying external sources of help
 - Spacecraft related items (pointing, jitter, etc)





Technical Kickoff Process

- Post final instrument selection by NASA HQ
 - Full project meeting (~3 days)
 - Project including science, instrument teams and technical team
 - Let everyone know the details of the mission going forward
 - Let everyone get involved in the path forward
 - Instrument team meetings with the project (~1 day each)
 - Allow the engineering team to fully understand the details of the instrument
 - Allow the instrument teams to discuss unique accommodation needs with the project

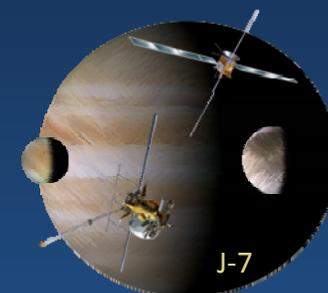




Technical Interaction Process

- Pallet Module system engineer will oversee the entire technical process
- Each instrument will have a project instrument system engineer POC assigned to them
 - Provide a single interface for the instrument team
 - Where applicable give help or find the help from project technical experts
 - Facilitate those interactions between technical experts and the instrument team
 - To assist in preparation for all major reviews and project milestones
- Interactions
 - Ad hoc via emails/phone – answering questions from the instrument teams
 - Scheduled telecons – status and touching base
 - Technical Interaction Meetings (TIM)

The technical challenges of this mission requires a mission-wide, coordinated effort to deal with the radiation environment and planetary protection





The JEO Project is interested in hearing from
you:
What has worked well in the past?
What hasn't worked as well?



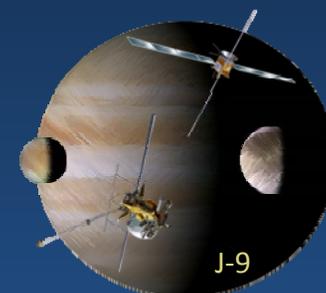


Resource Trading Board

Notional Concept

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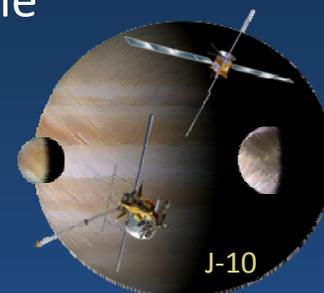
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Background

- A resource trading board was used by Cassini¹
 - Instrument payload
 - Development phase only
 - Instruments were allowed to trade resources allocated to them to solve other resource issues
 - Mass, power, data rate, funding
 - Project did not hold instrument reserves
 - All reserves were allocated to the instrument teams
 - Initial resource allocations occurred when the project issued the Letters of Agreement (LOA) to each PI
 - If an instrument could not meet their LOA, they became candidates for descopes or cancellation
 - If a spacecraft change adversely impacted an instrument, the investigation would be compensated by the project

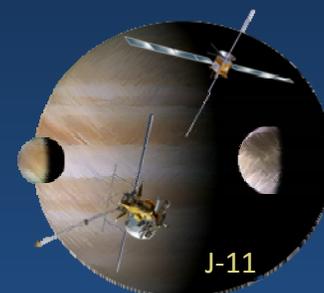
1. "A management approach for allocating instrument development resources", Randii R. Wessen & David Porter, Space Policy 1997 13 (3) 19-201 © 1997 Published by Elsevier Science Ltd





Cassini LOAs

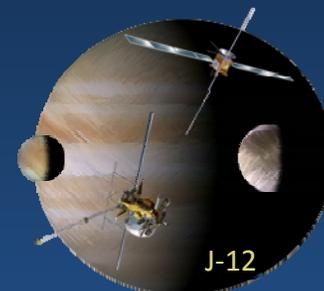
- Specified instrument resources
 - Mass
 - Power by operational mode
 - Data rate by operational mode
 - Funding by fiscal year
- All reserves were allocated
- Residual resources are returned to the project upon flight model deliveries
 - Too late to help out other instruments





Cassini Resource Trading Board

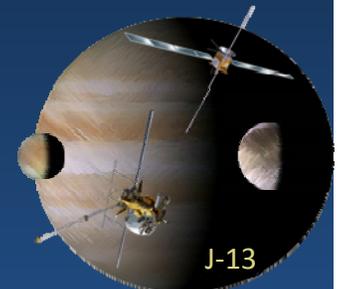
- Organized exchange to facilitate the trade of interrelated resources
 - Teams could submit bids that all participants could view and counter with offers, or accept the stated bid
 - Offers were to exchange one set of resource amounts for another set of resource amounts
 - Example bid
 - Trade 1 watt in mode A and 1 watt in mode B for \$12K in FY95 and \$13K in FY96 funds
- Cassini
 - Most trades involved mass and funding
 - Only two trades involved power
 - Power mode trading was a complication





Cassini Result

- Instruments were delivered
 - Less than 1% cost growth for the entire science payload
 - Science payload mass decreased by 7%
- Total of 29 trades were executed
 - \$4M
 - 12 kg





JEO Implementation

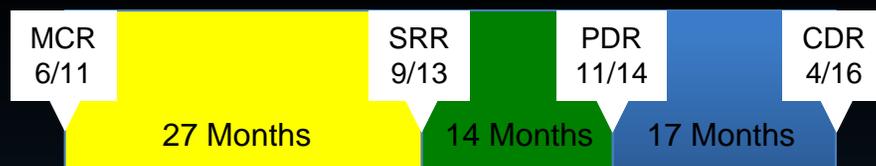
- Phases C & D
- JEO U.S. provided instruments
 - Funding (Phase C & D only), mass and power resources (including reserves)
- Non-U.S. provided instruments
 - TBD process to arrive at mass and power resources (including reserves)
- All available resources will be allocated to the instruments
- JEO trading board will start upon the completion of the mission PDR

Notional Concept





Timeline to Start of Trading Board



Total resources are proposed by the instrument teams at the end of the step 2 AO process

Resource adjustments (up or down) directed by NASA HQ from the STMC evaluation and project interactions in preparation for the SRR/MDR
Resources and reserves are put under configuration control

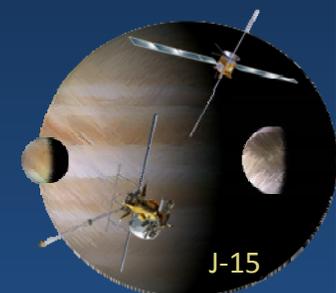
Resource changes may trigger NASA HQ to decide to :
 - Descope an instrument
 - De-select an instrument

Start of Trading Board

Resources and reserves changes as the result of the instrument PDRs by the project

Resource or reserves changes by instruments during Phase B will be through a formal configuration control requests/approval process

Notional Concept





JEO Trading Board

- JEO trading board will start post PDR
 - Instrument resources from the PDR
 - JEO U.S. provided instrument may trade funding, power and mass
 - Non-U.S. provided instruments may trade power and mass
 - Could be part of three way trades involving funding that does not end up outside of the U.S.
 - Power modes for resource trading will be defined by the JEO project
 - The project will adjust for project-responsible resource impacts
 - Instrument providers will need to maintain milestone based reserves according to JEO project policies
 - The project will hold 50% of funding reserves
 - An instrument will get to hold 50% of the reserves for each year.
 - An instrument will need to justify the use of the reserves and the need for more of their allocated reserves.

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JEO Trading Board (cont)

- The project will create a web-based trading board system to facilitate the instrument iterations
 - Will allow offers and blind bidding
- The project will be the final approver in accepting a trade
- If an instrument cannot meet its resource allocations, it becomes a candidate for descope or cancellation by NASA Headquarters

Goal for the trading board will be to allow the project to control resources while allowing the instruments maximum design flexibility

Notional Concept

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