Flagship Mission Studies

Study Overview and Purpose

May 2, 2007 – OPAG Meeting

Flagship Studies: Overview and Purpose

- In response to PSS/OPAG recommendations and discussions, PSD is conducting detailed studies for several flagship missions
  - Europa (JPL)
  - Titan (APL)
  - Enceladus (GSFC)
  - Ganymede/Jovian System Observer (JPL)
- At OPAG’s suggestion, studies distributed across several institutions
- Science community participation via SDTs and reports to OPAG
- Studies started in Jan 2007 and will be completed fall 2007
- Study results will undergo independent review
- Study results will be used as input to near term NASA strategic planning for flagship missions

Flagship Studies: Overview and Purpose

- Need studies to be as complementary as possible
  - Each study has unique heritage and readiness, but studies must address common items
    - Define and prioritize science
    - Characterize mission concept and implementation
    - Technology definition and readiness assessment
    - Estimate cost
    - Identify and assess risk
- Mission cost target of $3B
- Conservative Philosophy: cost estimates will not decrease as we move toward development
  - $3B is not a cost cap and teams are not encouraged to come in at $2.999B
  - Funds for technology development are limited, so adopt a conservative approach to the use of new technologies
  - Provide descopes with costs to provide flexibility in sizing mission

Science Definition Teams: Charter

- The SDTs are charged with defining the science content of the missions and working closely with the engineering team to define a mission concept(s) that optimizes science, cost, and risk. The SDTs are also responsible for defining and defending the science value of the mission concept(s).
- To accomplish this, SDTs must work closely with engineering teams
- SDTs should not work in a vacuum
  - Build upon previous work by other groups (Decadal Survey, OPAG, etc.)
Requirements and Groundrules: Study Structure

- **Phase 1:** define science, explore architectures, conduct trades, narrow concepts
- **Phase 2:** Refine concepts, define implementation, estimate cost, assess mission risk and value

Requirements and Groundrules: Overview

- Intent of groundrules is to simplify studies by providing a standard for content, final product, and common assumptions
- Intent is not to prescribe in detail how studies should be performed
  - Institutions should use its best practices
  - Each study has unique elements and heritage called out in SOW

Requirements and Groundrules: Final Report

- Final Report due to review panel on Aug. 17
- A public version of the report will be released in October

Flagship Studies: Final Report

1.0 Executive Summary
2.0 Target Body Science Goal and Objectives
3.0 Mission Architecture Assessment
4.0 Mission Concept A Implementation
  4.1 Architecture Overview
  4.2 Science Investigation
  4.3 Mission Design
  4.4 Flight System Design and Development
  4.5 Operational Scenario
  4.6 Planetary Protection
  4.7 Major Open Issues or Trades
  4.8 Technology Needs
  4.9 Technical Risk Assessment
  4.10 Schedule
  4.11 Cost
5.0 Mission Concept B Implementation (if applicable)
  Repeat as above
6.0 Changes if launched in second launch window
7.0 Summary

- RPS
  - Restricted to MMRTG, ARTG, SRG, RHU
- Planetary Protection
  - Categorizations obtained from PPO at HQ
- Launch Vehicles and Cost
  - Restricted to Atlas 5 and Delta IVH
- Technology Philosophy
  - Adopt a conservative approach to the use of new technologies and development plans for development of needed technology
- Launch Dates (2015-2022)
- DSN Capability
- International Contributions
  - Although international participation is expected to be an important component of any flagship mission, for the purposes of this study it should be assumed that no international collaborations or contributions are available
Flagship Studies: Independent Review

- All studies will undergo independent review
- TMC panel run by NASA Langley
  - Will assess technical factors, risk, readiness, cost, schedule, etc.
- Science panel formed by HQ
  - Will assess clarity and prioritization of science objectives, relevance, methodology, value of science floor, etc.
- Reviews scheduled for late September
- Study and review results will be factors considered by HQ when deciding how to proceed

Flagship Studies: OPAG Feedback

- This meeting is opportunity for broader community to provide feedback to SDTs on science definition and prioritization
- Afternoon breakouts provide opportunity for detailed question/answer and discussion with study teams and SDTs
  - Titan: Ballroom C
  - Europa: Queen Mary
  - Enceladus: Britannic A (downstairs)
  - JSO: Britannic B (downstairs)