



# SRR and PDR Charter & Review Team

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Review Chair

# Review Requirements



- Review requirements are taken from the following documents:
  - GSFC STD 1001 *Criteria for Flight Project Critical Milestone Reviews*
  - NPG 7120.5B *NASA Program and Project Management Processes and Requirements*
  - LRO AO
- The requirements for each review may be tailored by the Review Chair based on specific instrument design, heritage, associated risk, etc...
- As of this time, there has been no tailoring of the review process for any instrument

# Instrument Review Team Discipline



A typical review team for instruments consists of the following disciplines:

Chair, Co-chair

Linda Pacini, Brian Keegan

Science

Chief Engineer Office

Systems Engineering

Electrical/Power Systems

C&DH

Mechanical

Thermal

SW

Mission Assurance (risk management, reliability, safety, TBD)

Operations

Integration and Testing

Specialty: Optics, Contamination, UV, TBD



# Review Overview

- The reviews are a combined Instrument Systems Requirements Review (SRR) and Instrument Preliminary Design Review (PDR)
- A brief overview of the LRO Mission should be presented, along with top level requirements
- The review will focus on the instrument, and should include requirements and constraints from LRO
- There will be a brief overview of schedule and cost, however, this is not the focus of the review.



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# System Requirements Review (SRR)

# SRR Review Objectives



- The System Requirements Review evaluates the completeness, consistency, and achievability of the instrument requirements necessary to fulfill the mission, project, science, operations, flight system and ground system requirements.
- The project shall present the flowdown of the project level requirements to a complete set of system, subsystem and assembly level requirements from instrument level 1 to level 3.
- A successful PDR establishes that the project has completed the requirements and the traceability is provided.

# SRR Success Criteria



- The success criteria are established as follows:
  - A full set of system requirements and associated system, subsystem, and assembly or specifications for development and operations have been documented.
  - The requirements tractability has been established.
  - The requirements, fulfill the mission needs within the estimated cost and schedule.

# Requirements Flowdown Note



- During SRR specifically call out:
  - Requirements from S/C that are driving your design
  - Your requirements that are driving S/C design. For example:

Instrument Requirement  
Pointing accuracy <0.1 deg

Spacecraft Requirement  
Vibration isolate payload

- Presentation on requirements flowdown should be presented in showing the parent requirement, and how this drives the lower level requirement for the instrument. For example:

Measurement Requirement:

Sample along track surface elevation wavelengths to > 500m

Functional Requirement

Laser along track footprint spacing <175m  
Laser footprint 70m +/-10 m with Gaussian char (to avoid surface roughness)

Design Requirement

Laser PRF >40 Hz (orbit velocity 7km/sec)  
Laser Divergence 100microrad encloses 85% of beam energy





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# Preliminary Design Review (PDR)

# Review Objective

## PDR



- The Preliminary Design Review evaluates the readiness of the project to proceed with detailed design.
- The project shall present a credible and tractable design solution that complies with requirements, performance, NASA processes, functional and interface requirements. The overall technical approach, the specific design, and the hardware/software will be evaluated for soundness, achievability, resiliency, design performance margins and technical maturity.
- A successful PDR establishes that the project has completed a credible and acceptable formulation phase, is prepared to proceed with the detailed design, and is on track to complete system development.

# PDR Success Criteria



The success criteria are established as follows:

- The proposed design meets the instrument level 1 through level 3 requirements and measurement goals.
- The design meets interface requirements and constraints.
- Plans to resolve open issues are complete and consistent with available resources and the risk policy of LRO.
- There are adequate margins at this stage of the design.
- Integration and test approach and plans are adequate.
- The mission assurance and safety plans and processes are consistent with mission risk and NASA policy.
- The project has defined and implemented plans, processes, tools, and has in place the organization for managing and controlling the development and operation of the mission.



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# Backup Material PDR



# Risk Types

- Risk can be broken down into three elements: Inherent, Programmatic and Implementation
- Inherent Risks are risks that are unavoidable due to the investigation for example:
  - Launch environment
  - Space environment
  - Mission duration
- Programmatic Risks are uncertainties due to matters beyond project control. For example:
  - Budget uncertainties
  - Environment assessment approvals
  - Political impacts
- Implementation Risks are associated with implementing the investigation:
  - Development approach
  - Funding
  - Management



# Review Objectives

## *Review Objective:*

Evaluate the readiness to proceed with detailed design. The purpose of design reviews is to provide a thorough, objective, and independent assessment of the degree of readiness to proceed to the next phase. This assessment should address the following questions:

## *Requirements*

- Are the requirements clearly stated and understood? Does the design satisfy the requirements?
- Have requirements been allocated to lower levels in a logical and consistent manner?
- Are the I/F requirements complete within existing constraints? Are the driving requirements, functional and interface description of the proposed design compatible?

# Review Objectives (cont.)



## *Technical Maturity and Design*

- Has the technical maturity of the design been described (by TRL level)? Is the technical maturity sufficient to proceed to implementation? Has the design been analyzed in sufficient depth?
- Has new technology been discussed along with backup plans with scheduled decision criteria if those technologies cannot be achieved? Have the breadboards, prototypes, models, and simulations provided an adequate degree of understanding of the design and reduced the uncertainty to an acceptable degree?
- Have the resource margins and the rationale for margin allocations been discussed

# Review Objectives (cont.)



## *Mission Assurance and Safety*

- Have the reliability, safety, and security requirements all been covered?
- Have the processes by which the product quality is assured to meet specification and the parts selection strategy been defined and implemented?
- Is the Mission Assurance Plan, including plans for problem/failure reporting, inspections, quality control, parts selection and control, reliability, safety assurance, and software validation been defined, agreed and implemented?
- Have a safety assessment been completed? Does the design meet the safety requirements?
- Has the use of the appropriate engineering standards been adequately addressed?



# Review Objectives (cont.)



## *Integration and Test*

- Are the planned tests adequate to verify the design?
- Has the approach, techniques, and facilities planned for integration, test and verification been described?
- Does the I&T plan define requirements, as well as the planned process for physically and analytically integrating them with the flight system?

## *Margins and Reserves*

- Are the technical performance margins and management resource reserves in balance with the current uncertainties in scope of work, technical performance, and schedule estimates?

# Review Objective (cont.)



## *Risk*

- Have the top risks for the project been identified along with a risk reduction plan for each risk?

## *Pre- Review Actions*

- Have the action items from lower-level reviews - pre reviews - been responded to/closed adequately?
- What are the plans to resolve open issues?