



WFIRST KDP-C SRB Report

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EOS Virtual Meeting
March 17, 2020

• NASA GODDARD SPACE FLIGHT CENTER • JET PROPULSION LABORATORY •
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Agenda

- Standing Review Board methodology
- Executive Summary
- SRB Findings with SMD and Project Responses
- Programmatic Analysis
- Conclusion



Standing Review Board Methodology

- The NPR 7120.5 introduces the concept of SRBs performing independent assessments of space flight programs and projects as part of the Life Cycle Reviews to help increase the likelihood of success. It further requires the project and an independent SRB to conduct most, but not all, of the LCRs. The recently held Preliminary Design Review (PDR) for WFIRST, leading to Key Decision Point C (KDP-C) is one such review
- To carry out the duties, the WFIRST SRB:
 - Attended multiple pertinent subsystem reviews, kick-offs, planning events
 - Reviewed all required gate products, including performing and providing required independent analysis where appropriate
 - Attended mission PDR
 - Provided written input in the form of requests for action, Individual Member Independent Report, all which address formal success criteria
 - Chair provided formal summary output to NASA Directorate and Agency Program Management Councils (DPMC and APMC)
- Reference the NASA Standing Review Board Handbook, NASA/SP-2014-3706 for information, detailed guidelines, and instructions

SRB Expertise Coverage

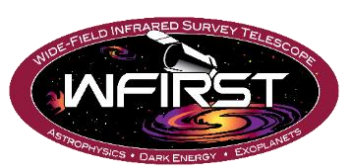
	Board Members	Affiliation	SRB Chair	Deputy Chair*	Risk Management	Project Management	Programmatic	WFI Science	CGI Technology	Mission Systems	Spacecraft Systems	Instrument Systems	Integrated Model	Mechanical System	Thermal System	Electrical System	GN&C System	Software System	Mission Operations	Ground System	SMA	Review Manager	Cost	Schedule
1	ES	DoD	P			S																		
2	SH	Aerospace		P	P	S																		
3	NC	GSFC				P	S																	
4	JY	Aerospace					P																S	S
5	PM	ARC						P	S															
6	AS	STScI						S	P			S												
7	DK	APL									P					S				S				
8	LF	GSFC										P	S											
9	ML	JPL										S	P	S	S									
10	JE	JPL												P	S									
11	SR	NESC											S	S	P									
12	SB	Battell Eng.									S	S				P								
13	ND	NESC								P	S						P							
14	KH	GSFC																P	S	S				
15	TW	NOAA								S							S		P					
16	DL	GSFC																S	S	P				
17	KC	GSFC														S					P	P		
18	LS	Aerospace					S																P	
19	ET	Aerospace					S																	P
Consultant																								
1	RB	Aerospace					C																C	C

P = primary
S = secondary
C = consultant



Executive Summary

- WFIRST conducted successful Mission PDR (MPDR) October 28 – November 1, 2019 at GSFC
 - Leading up to the PDR, numerous comprehensive subsystem reviews and peer reviews were conducted and reviewed by SRB members
- WFIRST project has satisfied all review success criteria for MPDR per the guiding review policies
 - Gate products were reviewed and are acceptable
 - Review contained the appropriate data and level of detail
 - Project team provided all information requested in a timely manner and was very open to questions and recommendations
- A successful APMC was held on February 28, 2020, confirming the project's readiness to proceed to Phase C of its life cycle; the council included input from the SRB



MPDR/SC PDR Findings - Strengths

- The WFIRST science is extremely compelling with three exciting science thrusts:
 - dark energy (expansion history, growth of structure in the Universe),
 - exoplanets (statistical census + CGI imaging and spectroscopy demonstration),
 - astrophysics through the guest investigator program
- Lower level design reviews were numerous, in-depth and comprehensive
- Successfully weathered the change in leadership, relevant-experienced team continues to incorporate lessons learned from extensive list of missions
- Programmatic presentation was transparent and detailed
- Procurement management is well thought-out and appears to be well-managed
- Big picture thought through in painstakingly detail, as demonstrated by maturity of modeling and analysis; integration and test planning; Operational Concept and design process demonstrates that the project is progressing appropriately
- The Design Reference Mission (DRM) continues to be helpful in maturing the system, and satisfaction of mission objectives and requirements.
- Disciplined approach to technical trades and liens; frank and open on concerns
- Multiple aspects of the design are mature for this phase
- SMA is doing an excellent job getting ahead of the activities prior to CDR.
- TPM budgets are being managed appropriately for this phase of the project

Great progress on one of the most difficult missions ever undertaken



SRB Concerns/ SMD and Project Response

(1 of 2)

- WFIRST is **cost capped**; concerns on management/systems continue that external dependencies are driving requirements: Starshade, servicing, and coronagraph instrument (CGI)
 - *Work at SMD level since DPMC has reduced risk, including:*
 - *partial descope of servicing mission*
 - *Hold on all starshade accommodation*
 - *System level approach to CGI, cost capping, joint SMD/JPL management focus*
 - Project response includes positive risk reduction, following through on SMD direction:
 - Servicing focus on refueling and facilitating integration/test only, revised interface documents, identified appropriate point of contact
 - Starshade accommodation on hold until Astrophysics Decadal Survey is received
 - Championed CGI Tiger Team with SRB; continuous engagement with SRB:
 - 15 potential offramps to reduce schedule and cost risk
 - Implemented changes to management approach
 - Dropped CGI to threshold requirements in Program Level Requirements
 - No change to current design: simply increases flexibility/likelihood of success



SRB Concerns/ SMD and Project Response

(2 of 2)

- A few SRB identified Project specific risks, not already appropriately tracked by project:
 - Deployable Aperture Cover development – project response: simplifying design, increase test
 - Ultra-precise predictions for verifications – project response: adding test, lessons learned from other large optical programs
 - Lack of certified Launch Vehicle - project response: working with LSP to envelope requirements, develop interface control doc early to lock-in observatory design



SRB Programmatic Analysis Approach

- SRB performed an independent Joint Confidence Level (JCL) analysis with Aerospace, using Project JCL as Point of Departure
 - Incorporated risks per independent analysis, uncertainties adjusted based on SRB findings
 - Also included results of benchmark cost and schedule analysis based on parametric models and historic analogies
 - Relevant historical missions data as reference for assessing schedule
 - Adjusted data to remove delays caused by out of scope issues
 - Schedule risk converted to cost using project burn rate; provides schedule adjusted cost estimate
- SRB also considered
 - Project JCL
 - Informal Grassroots bottoms up and top down estimates based on Subject Matter Expert experience
 - NASA Goddard Resource Analysis Office (RAO) estimate
 - Progress since KDP-B
 - SRB fund phasing recommendations followed by SMD/Project

SRB could then provide assessment of Management and Agency Commitments



SRB JCL Assessment

	Project Plan PDR	MA	SRB Assess	ABC	SRB Assess
	SRB – 42% Confidence Level		50% Confidence Level		70% Confidence Level
LCCE, RY\$M	\$3,308M	\$3,334M	\$3,334M	\$3,934M	\$3,538M
LRD Estimate	9/5/2025	12/31/2025	12/31/2025	10/1/2026	10/1/2026

MA = Management Agreement

ABC= Agency Baseline Commitment

SRB has high confidence that WFIRST is on-track to be programmatically successful



SRB Conclusion

- WFIRST MPDR was successfully conducted October 28 – November 1, 2019 at GSFC
- WFIRST project has satisfied all review success criteria for MPDR per the guiding review policies
 - Gate products were reviewed and are acceptable
 - Review contained the appropriate data and level of detail
 - Project team provided all information requested in a timely manner and was very open to questions and recommendations.
- Cost capped program is executable with improved risk management of CGI, system level management, adjustments to Starshade and servicing, quarterly communication at SMD level, and Agency approved MA/ABC

SRB concurs that WFIRST is ready to proceed to Phase C