

Planetary Data Ecosystem Independent Review Board

Charter

Background

The NASA Planetary Science Division (PSD) is engaged in one of the oldest scientific pursuits: the observation and discovery of objects in our solar system. We undertake this enterprise in order to better understand the history of our solar system and the distribution of life within it. For decades, NASA's planetary science program has advanced the scientific understanding of the solar system in extraordinary ways, while pushing the limits of spacecraft and robotic engineering design and operations. The central component of that scientific pursuit is the data – from the research data that drives us to our next mission to the mission data received from the farthest reaches of the solar system. PSD is currently supporting an ad hoc, interconnected Planetary Data Ecosystem (PDE)¹ to take this data from creation to dissemination. However, the PDE is not yet effective and efficient at making the most of our planetary data and supporting our planetary science community. As such, PSD will take the first step necessary to develop a comprehensive PDE strategy – an independent review of the PDE in its current state to provide findings and prioritized, actionable recommendations that can be translated into an optimized PDE strategy.

Strategic Goals

For the future PDE, we expect a coordinated effort that meets the following strategic goals.

Strategic Goal 1: The PDE supports the data needs of the entire planetary science community, including planetary scientists and researchers; past, present, and future mission teams; educators and students; citizen scientists; media and the general public, where appropriate.

Strategic Goal 2: The PDE fills the prioritized, required niche space, which is supported by stable PSD funding sources, and includes element redundancies only where necessary to support the needs of the planetary science community.

Strategic Goal 3: The PDE adapts to meet the evolving data and computing environments (e.g. cloud computing, new formats, ecosystem cybersecurity) and needs of the planetary science community. As such, the PDE will have pathways to onramp and offramp elements to address changes in the data environment and a transparent process for prioritizing competing community needs.

Strategic Goal 4: The PDE communicates across elements and has policies to facilitate effective work across a fully coordinated system.

The PDE IRB shall provide prioritized, actionable recommendations that would help PSD meet these strategic goals.

¹ The Planetary Data Ecosystem (PDE) is defined as the ad hoc connected framework of activities and products that are built upon and support the data collected by planetary space missions and research programs, primarily those funded by NASA. The PDE includes archives, tools, programs, projects, pipelines, and stakeholder groups, but that is not an exhaustive list. This definition is for the purposes of this document and should be updated by the PDE IRB to more accurately reflect the current state of the PDE.

Establishment, Authority, and Study Management

The PSD Director establishes the PDE Independent Review Board (IRB), hereafter the “PDE IRB” As such, the PDE IRB will report to the PSD Director.

This PDE IRB shall be organized by Cornell Technical Services (CTS), with additional support from NASA Research and Educational Support Services (NRESS). Members of the PDE IRB will be compensated for their participation and will, upon request and when possible, be allowed travel and per diem expenses as authorized and funded by PSD. The PSD Director will ensure the necessary support for the PDE IRB, including appointing NASA personnel as a Review Manager and ex officio members, as needed. The PDE IRB Chair and the Review Manager will support all activities of the PDE IRB and coordinate production and ensure the quality of review deliverables. The Review Manager will ensure that the information needs of the review members are met. The non-consensus final report will be verbally presented to the PSD Director and other NASA stakeholders, followed by the provision of a non-consensus final written report.

Purpose and Scope

The PDE IRB will conduct a wholistic review of PSD’s PDE with the goal of defining the full environment, identifying missing or overly redundant elements, and providing findings and prioritized, actionable recommendations for PSD’s long-term planning in support of the PDE. The scope of the PDE IRB, outlined in the Key Questions below, is broad and their deliberations will cover the entire data lifecycle, including initial processing, long-term archiving, scientific searches and utilization, ecosystem cybersecurity, ecosystem governance, and public dissemination. The scope of the PDE IRB will not include review of specific activities or projects within the PDE, as that is completed by a separate review process (e.g. Senior Review, peer review process). A successful PDE IRB will provide prioritized, actionable recommendations, that if implemented by PSD, would significantly advance the PDE towards a future state consistent with the Strategic Goals.

Key Questions:

1. Ideal State: What PDE elements are necessary to take planetary mission data from downlink to research outcomes (e.g. a successful data lifecycle)?
2. Current State: What are the current PDE elements and what does each element provide in terms of the data lifecycle?
3. Comparative State: What PDE elements are missing and where are there PDE element redundancies?
4. Future State: What is the PDE IRB recommended pathway to evolve the PDE from its current state to an ideal state?

Organization and Duties

The PDE IRB will be organized into Sub-Committees based on functional aspects of the PDE:

1. Archiving (storing data, formatting, metadata requirements, documentation)
2. Searching (discoverability of data, open access, translation)
3. Utilization (tools for analyzing data, open software, software development)
4. Mining & Automation (searching and using large datasets, high-end computing, cloud computing)

5. Inter-relational (relationships among the ecosystem elements, ecosystem cybersecurity, ecosystem structure, ecosystem governance)

The elements of the PDE listed in Appendix A may or may not be a comprehensive list. Additionally, the Sub-Committee organization is open for negotiation by the PDE IRB Chair. The Members of the Sub-Committees will conduct research and fact-finding as required to fulfill their duties, which will be more specifically enumerated in a kick-off presentation provided by the NASA ex officio member(s) of the PDE IRB. Each Sub-Committee will be led by a Co-Chair, and the Sub-Committees will report their findings to the full PDE IRB for its consideration.

Membership

The PDE IRB will consist of Members, selected to ensure a balanced representation across the topic areas of the Sub-Committees. The PDE IRB will be composed of Members from academia, industry, Government, and the general public and will span the necessary expertise areas of governance, project management, science, engineering, and user base. The PDE IRB Members will have, collectively, the expertise and experience required to provide a wholistic and accurate assessment of the PDE.

Recommendations for the Chair of the IRB, Co-Chairs of the Sub-Committees, and Members will be provided by Lori Glaze, the Director of PSD, based on input from NASA Headquarters personnel and self-nominations. The Members will be assigned to the Sub-Committees by CTS, in consultation with the Chair, Co-Chairs, and NASA ex officio member(s), and will participate only in the work of their appointed Sub-Committees, unless agreed upon otherwise.

Administrative Provisions and Schedule

The PDE IRB will meet in its entirety at least three times, either in-person or virtually, as appropriate and necessary to meet its responsibilities; the Sub-Committees will meet in addition to this as needed. We anticipate engagement at the Sub-Committee level on a weekly or biweekly basis over a period of about 3 months and estimate the level of effort to be 3 to 4 hours per week plus the possibility of travel. The PDE IRB meetings will be open to the public, but the Sub-Committee meetings will be closed.

The PDE IRB will draw on the expertise of its Members along with formal input solicited from the scientific community (white papers and invited discussions/presentations) and existing documentation to formulate its findings. The NASA ex officio member(s) will provide the Sub-Committees with a curated document library. A call for one- to two-page white papers will be announced to the community to provide additional input to the PDE IRB. It is anticipated that the majority of white papers will be received prior to the first meeting of the PDE IRB, but it will be possible for white papers to be submitted later in the process. Lastly, the Sub-Committees may request a presentation or discussion on a particular topic to be facilitated by the appropriate project personnel. The NASA ex officio member(s) will support these efforts as possible.

Tentative Schedule:

Week	
Pre-Week 1	Select and appoint PDE IRB Members Publish PDE Request for Information (RFI) to solicit responses from community
1	PDE IRB Organizational Telecon (1-hour); review background materials for all Sub-Committees

	Sub-Committee Break-out Session (2-hours); NASA ex officio member(s) presents additional guidance on Sub-Committee focus
2	Sub-Committee Meetings #1 – Identify additional presentations/discussions needed
3	Sub-Committee Meetings #2
4	PDE IRB Half-day Meeting
5	Sub-Committee Meetings #3 – Additional presentation/discussion
6	Sub-Committee Meetings #4
7	Sub-Committee Meetings #5
8	PDE IRB Half-Day Meeting
9	Sub-Committee Meetings #6 – Additional presentation/discussion
10	Sub-Committee Meetings #7 - Writing assignments/discussion
11	Sub-Committee Meetings #8 – Writing assignments/discussion
12	PDE IRB All-day Meeting
13	---
14	Develop and discuss draft findings for full PDE IRB report; decide on writing assignments
15	Draft any final questions for further discussion
16	Work on writing assignments and internal review; submit draft report to NASA and NASA review of draft report
17	Review NASA comments on draft report; close out remaining questions and revise draft report; and NASA reviews revised draft report and submits final comments
18	Complete draft report
19	Brief non-consensus final report to PSD Director and other NASA stakeholders in Washington, DC or virtually
20	Prepare non-consensus final report; deliver to PSD Director

Deliverables and Termination

The PDE IRB will provide a non-consensus report with observations, findings, concerns, and prioritized, actionable recommendations consistent with the above Purpose and Scope to the PSD Director. The PDE IRB will review the reports of its Sub-Committees and include them, if adopted, in its final report to NASA. Additionally, the PDE IRB will provide a presentation to the PSD Director and other NASA stakeholders summarizing the review results. The PDE IRB shall deliver its final report and presentation by 31 March 2021.