

## PDS SYSTEM REVIEW II

June 21-22, 2011

The Planetary Data System (PDS) System Review II was held on June 21st and 22<sup>nd</sup>, 2010 at the Goddard Space Flight Center. The Board membership was:

David Heather, ESA, ESTEC  
Dave Linick, JPL, Board Chair  
Jan Merka, GSFC, University of Maryland  
Andrew Schain, NASA HQ  
Peter Shames, JPL

The intent of the System Review II was to:

- Review and assess the design for data distribution
- Update review board on the progress for PDS 2010 since last SDR. (SDR 1 presented architecture, ingestion and operations concept)
- Review closure of the RFAs from System Review I
- Review delivery plans for build 2

The Review criteria were:

- Ensure the design is responsive to the architecture
- Ensure the design will support the key level 3 requirements for data distribution
- Assess progress since the build 1 delivery
- Assess plans for the build 2 delivery and support for the early PDS4 missions
- Assess the transition plan/approach from PDS3 to PDS4 operations to ensure continued operations
- Provide overall technical and project management recommendations

### **REVIEW BOARD FINDINGS**

The findings of the Review Board are presented in the following sections of this report:

- Executive Summary
- Assessment Against Review Objectives
- Requests for Action
- Summary Debriefing to the PDS Management Council

## Executive Summary:

The Review Board unanimously determined that the objectives of the Review were satisfied, that the evaluation criteria were met, and that the assessment criteria were positive.

Three major related observations, and associated recommendations, were noted that should be considered as the PDS evolves:

1. Much of the delivered capability planned for the near term replicates the functionality of the existing PDS in a more robust and flexible framework. However, this flexible architecture provides the opportunity for deploying more capability than is being exploited within the currently funded implementation, particularly with respect to cross-system capabilities like global search. The Board recommends that the PDS be aggressive in identifying these additional capabilities and in proposing additional implementations and an associated schedule that exploit these possibilities. This should lead to a " PDS Post-deployment Plan" that outlines the next steps in the evolution of the PDS.

Many of these opportunities will require cooperative engineering across the nodes. The Board was unanimous in noting that the federated approach has struck a productive and appropriate balance between discipline autonomy and system-wide coordination. This recent positive experience should serve the PDS well in accomplishing those future improvements that cross discipline boundaries. The Board felt that the most notable of such improvements may well be the implementation of a powerful global search capability and specifically recommends that global search be given high priority in the evolution of the PDS. This implementation may test the federated approach.

2. NASA has made a considerable investment in PDS-4. It is important that the benefits of this investment are understood and well communicated to the customer and sponsor communities, and that the benefits can be seen to be commensurate with the investment. Replicating existing functionality does not provide a very compelling justification. Therefore, the Board recommends that the Post-deployment Plan referred to in the previous item clearly outlines the benefits being provided by the proposed future capabilities and indicate how this is enabled by the framework being provided by PDS-4.
3. Ultimately, it is the PDS customers who should realize the major benefits of PDS-4. Therefore, it is important that the customer experience with PDS-4 is a positive one and that it represents a qualitative improvement. The Board recommends that the PDS define those improvements, planned and proposed, that will contribute to an improved customer experience and assure that the system requirements resulting from that definition be given visibility and emphasis.

## Assessment Against Review Criteria

**Ensure the design is responsive to the architecture.** The Board consensus was that the PDS design is responsive to the architecture and that it provides a very evolvable framework that will serve the PDS well into the future. The model-based, layered approach enables future flexibility for improvement and enhanced capability as customer needs and available technologies change.

**Ensure the design will support the key level 3 requirements for data distribution.** The Board agreed that the design will meet the data distribution requirements. Work needs to be done on some of the procedural aspects of fielding the new data distribution system (metadata management, maintaining the common data dictionary, interfacing with the international community, etc.)

**Assess progress since the build 1 delivery.** The Board was consistently complimentary in its view of the progress made since the last system review.

**Assess plans for the build 2 delivery and support for the early PDS4 missions.** The plans for the build 2 seemed sound and the support for the first users was well defined.

**Assess the transition plan/approach from PDS3 to PDS4 operations to ensure continued operations.** The planned transition has been given specific, focused emphasis and appears to be well thought-out.

**Provide overall technical and project management recommendations.** See the previous section and the submitted RFAs.

## **REQUESTS FOR ACTION**

<b>Title:</b>	<b>Kudos</b>	<b>Date:</b>	<b>21 June 2011</b>
<b>Author:</b>	<b>Peter Shames</b>	<b>Email:</b>	<b>Peter.m.shames@jpl.nasa.gov</b>
<b>Topic:</b>	<b>Good job!!</b>		
<b>Comment/Concern:</b>			
Kudos:			
<ul style="list-style-type: none"><li>- design for flexibility and extensibility</li><li>- defense in depth, info model driven configuration and execution, reconfigurable components, isolation layers to allow underlying technologies to be replaced</li><li>- good plan and approach for migration and infusion from PDS3 to PDS4</li><li>- handle both central searches and domain specific ones</li><li>- handle both core info model and domain and mission specific ones, allow evolution at the edges</li><li>- decoupling of producers, archive, and user views of the data and processing</li><li>- good process for community ownership &amp; involvement</li></ul>			
<b>Recommendation: Keep up the good work</b>			

<b>Title:</b>	<b>Service Registry functionality</b>	<b>Date:</b>	<b>21 June 2011</b>
<b>Author:</b>	<b>Peter Shames</b>	<b>Email:</b>	<b>Peter.m.shames@jpl.nasa.gov</b>
<b>Topic:</b>	<b>Extent of standardization of service registry and service binding</b>		
<b>Comment/Concern:</b> Given that the PDS 2010 is to integrate both PDS 3 and PDS 4 data sources and also to integrate data processing services and archives produced by outside organizations that may not adhere to any PDS standards, it may be useful to develop a more extensive Service Registry that permits different binding points and protocol suites to be documented. This should, ideally, also allow machine access and integration of different services and interfaces.			
<b>Recommendation:</b> Take a look at the Service Component Architecture (SCA) for some useful concepts and approaches. It may not be possible to incorporate any of this functionality directly, but some of the concepts for how to handle binding points and protocols may be of use.			

<b>Title:</b>	Architecture phase representation	<b>Date:</b>	21 June 2011
<b>Author:</b>	Peter Shames	<b>Email:</b>	Peter.m.shames@jpl.nasa.gov
<b>Topic:</b>	Clear display of what exists, what doesn't, how components are phased and connected		
<p><b>Comment/Concern:</b> The system is being developed in phases, and the high level architecture shows the whole planned deployment, but different parts, at different levels of completion, with other pieces, are connected in different ways in different phases. None of this is evident in any of the materials shown up to slide 12 of the data ingestion update. This lack of documentation leads to confusion and guess work (or questions) as to:</p> <ul style="list-style-type: none"> <li>a) Just what exists at each phase?</li> <li>b) How these pieces are connected for each phase?</li> <li>c) Which pieces are to be implemented next?</li> <li>d) What other (existing) pieces are linked in various configurations?</li> </ul>			
<p><b>Recommendation:</b> The top level diagram is fine for what it does, and it can usefully be “re-purposed” to serve this other need. Consider “greying out” parts that are not yet completed or use some other means to mark what is planned at each phase. For configurations, such as “Initial Ingest” where some pieces are used, but connected in different ways, show these connections in some other color. Show directionality of flows where appropriate. Add in existing pieces, distinguished in some way, when they are used (PDS3 ingestion).</p>			

<b>Title:</b>	<b>HTTP not == API</b>	<b>Date:</b>	<b>21 June 2011</b>
<b>Author:</b>	<b>Peter Shames</b>	<b>Email:</b>	<b>Peter.m.shames@jpl.nasa.gov</b>
<b>Topic:</b>	<b>Clarify use of the terms API and protocol</b>		
<b>Comment/Concern:</b> API means Application Programing Interface, it is typically shown as a set of “C” functions or Java classes. HTTP is a protocol. These are not the same. It appears that you have also defined an application protocol on top of HTTP that is used to formulate specific queries and to provide responses. This has its own “PDUs”, parameters and behavior. It would be really useful to clearly distinguish among these different types on access to the registry, especially since it appears that you really have both a protocol interface (HTTP/REST based) and an API (Java classes).			
<b>Recommendation:</b> Clean up the use of language and provide at least one diagram that clearly shows: <ol style="list-style-type: none"><li>1) The application protocol layer, on top of ...</li><li>2) The HTTP/REST layer, which accesses the core registry, that is also called by ...</li><li>3) The Java API for tightly coupled use of the registry.</li></ol> <b>Or, if this is not correct, produce a diagram that is correct.</b>			



## Planetary Data System – Comment Form

<b>Title:</b>	<b>PDS 2010 Review II</b>	<b>Date:</b>	<b>2011-06-21 to 2011-06-22</b>
<b>Author:</b>	<b>Dave Heather</b>	<b>Email:</b>	<b>dheather@rssd.esa.int</b>
<b>Topic:</b>	<b>Design Tools and documentation</b>		
<b>Comment/Concern:</b> There is currently no PDS data design tool planned for distribution, with either Eclipse or Oxygen being recommended for use along with the DPH and Standards Reference as information guides. I have no problems using Oxygen or Eclipse, but these are XML editors, not PDS data design tools. The current documentation is not easy to work through to design data or bundles just using the standard Oxygen or Eclipse editors.			
<b>Recommendation:</b>			
<ul style="list-style-type: none"><li>- Consider providing some sort of point-by-point guide as a plug in for Oxygen and/or Eclipse to guide a data producer through the process of developing their deliverables.</li><li>- Regardless of whether the above recommendation is followed, many updates are needed to the DPH and Standards Reference (comments sent separately to PDS) in order to guide the data producer.</li></ul>			

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<b>Author:</b>	<b>Dave Heather</b>	<b>Email:</b>	<b>dheather@rssd.esa.int</b>
<b>Topic:</b>	<b>Dictionary Governance</b>		
<p><b>Comment/Concern:</b> It is unclear how the PDS dictionary governance will work between EN and science Nodes / International collaborators. PDS2010 provides a good deal of flexibility in the dictionary and information model for use by the Nodes, but the mechanisms needed to validate these changes and manage the hierarchy of dictionaries across Nodes was not clear.</p> <p>The Standards Reference would normally ease this problem as it should provide a clear list of PDS level requirements and a description of the mechanisms that would allow for more specialized requirements from the Node. However, at the time of review the Standards Reference is still very drafty and needs a good deal more work before it can be issued. The information that is provided to describe the management of schemas and dictionaries seems to be spread across a number of documents, making it extremely difficult to track down the information desired.</p> <p>It is also worth considering the possibility to add a more automated validation layer at the top-level for the changes requested by Nodes, ensuring core PDS-compliance requirements are not compromised.</p>			
<p><b>Recommendation:</b></p> <ul style="list-style-type: none"><li>- Clarify the mechanisms for management of the Dictionaries and information model both at the core of the PDS and across Nodes and international partners.</li><li>- Close out the Standards Reference and make this document the core of the standards. Currently, the combination of the Standards Reference and DPH as the two main documents means the information is spread and it is not clear where to go.</li></ul>			

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<b>Author:</b>	<b>Dave Heather</b>	<b>Email:</b>	<b>dheather@rssd.esa.int</b>
<b>Topic:</b>	<b>Core registry and search facilities</b>		
<p><b>Comment/Concern:</b> During the review, there was much discussion on the core registry and the search facility that the EN aims to provide from the main PDS page.</p> <p>The link from / between the PDS main search page and the search facilities at each Node was not clear. The scope of the search from the main page was also unclear. It was understood that the Registry service will provide 'an improved search facility' at the EN, but this will not be at data product level.</p> <p>One aim of the main page would be to search across the entire PDS data holdings, while the Node pages would provide more focused science level searches across their own holding.</p> <p>There is a danger that a user may go straight to a Node page for a search and therefore be unaware of the holdings of another Node with relevant data. It is also possible that a user will find a different result for the same search from one Node page to another, or even from the main PDS page to the individual Node pages. This is very confusing to a first time user.</p> <p>Will the central registry and the Nodes all still be able to handle searches for old (PDS3) mission data? The meta-data will be very different from PDS3 to PDS4 and there will be a need to maintain searches for data from both for a while at least.</p>			
<p><b>Recommendation:</b></p> <ul style="list-style-type: none"><li>- Clarify the level of searches available at all levels within the PDS</li><li>- Clarify the way in which detailed searches at Node level will allow for data from other Nodes to be located (if applicable), or how duplication of the relevant data will be managed across Nodes.</li><li>- Consider providing the same 'top level' search at all Node pages, scanning the full PDS data holdings using the core registry at the EN. This would be identical to the top level search available from the main PDS page.</li><li>- Provide a consistent look and feel across the search pages for all nodes</li><li>- Clarify how the registry and search facilities at all levels of the PDS will manage the transition from PDS3 to PDS4.</li></ul>			

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<b>Author:</b>	<b>Dave Heather</b>	<b>Email:</b>	<b>dheather@rssd.esa.int</b>
<b>Topic:</b>	<b>PDS3 Maintenance pre/post conversion</b>		
<p><b>Comment/Concern:</b> During the review, it was mentioned that all nodes are intending to transition their data holdings from PDS3 to PDS4 in the next few years. There is a balance to be found between the cost of maintaining PDS3 holdings and software / documentation, and the possible loss of data usage with a full transition to PDS4.</p> <p>Many users (especially of the older mission data) will have science analysis tools and pipelines set up for PDS3 and will be reluctant to transition to PDS4, meaning a potential drop in data usage if PDS3 is no longer supported.</p> <p>International missions may require PDS3 maintenance for a longer period until they can manage the transition.</p>			
<p><b>Recommendation:</b></p> <ul style="list-style-type: none"><li>- Clarify how the transition from PDS3 to PDS4 will occur before and after conversion of older data holdings.</li><li>- Consider holding some older mission data in both PDS3 and PDS4 formats for a longer while to give the user community time to handle the transition themselves.</li><li>- Clarify how transition of International mission data holdings will be handled.</li></ul>			