The first entry is the initial version of Level 1 requirements derived from the PDSWG meeting in Tucson Arizona on April 12 and 13, 2004. It has been modified due to comments from the June PDS Management Council meeting made to Sykes. The Mission Statement has been expanded to clarify the relationship of PDS to non-mission planetary data. Level 1 requirement 3 has likewise been expanded.

June 13, 2004

PDS MISSION STATEMENT

The mission of the NASA Planetary Data System is to ensure that science data produced by or relevant to NASA's planetary missions and data generated by or relevant to NASA planetary research and data analysis programs are efficiently collected, archived and disseminated in order to ensure that scientists in the present and future can effectively use this data to achieve NASA's science goals.

PDS REQUIREMENTS (Level 1 in bold)

1. PDS shall be a distributed system in which data are archived, according to a documented standard, by planetary scientists at science Discipline Nodes.

1.1. PDS will develop, publish, and maintain archiving standards that shall be uniformly applied by all Discipline Nodes.

1.1.1. Standards that are optional for one Discipline Node shall be optional for all.

1.2. A Central Node shall maintain PDS archiving standards and monitor their application by Discipline Nodes.

1.2.1. The Central Node shall provide reference implementations that enforce standards through a tool set to be given to the Discipline Nodes.

1.2.2. The Central Node shall not duplicate the work of the Discipline Nodes beyond sampling to monitor Discipline Node application of PDS archiving standards.

1.3. Science Discipline Nodes shall be responsible for validation of all data products to ensure their compliance with PDS standards.

1.4 Science Discipline Nodes shall be responsible for conducting external peer reviews of data products and their ancillary information.

1.4.1 External peer reviewers shall be scientists not affiliated with PDS or the provider of the data they review.

1.5 Science Discipline Nodes shall be the advocates for the general user community of that discipline to the PDS and the missions submitting data to the PDS.

1.6 Science Discipline Nodes shall provide scientific and technical expertise to their respective user communities regarding data for which they are responsible for curating.

1.7. PDS shall use current best practices to ensure the integrityu and non-corruption of its data holdings.

2. PDS shall be the curatorial archive for all data from all of NASA's planetary missions, including both data transmitted from the spacecraft and all other supporting data and documents that may be required by scientists external to those missions to use the data.

2.1. A science Discipline Node shall be the principal interface between the PDS and missions and will be responsible for reviewing data pipelines for PDS standards compliance from the missions to the PDS.

2.2. All mission data products and/or the pipeline generating them shall be peer reviewed by scientists external to the mission and PDS to ensure that data products and their ancillary information are or will be complete and that data products will be consequently usable into the foreseeable future.

2.3. The PDS will be a resource to missions for samples of required data archiving documents and mission program requirements for their completion and approval.

2.4. The PDS will maintain an open tracking service that tells whether scheduled mission data products have been delivered and their stage in the PDS ingestion process from submission to making publicly available.

2.5. PDS is responsible for maintaining the continued usability and accessibility of the archive.

3. PDS shall be the curatorial archive for PDS standards-compliant data products that are produced under NASA planetary research and data analysis programs and data products produced under other NASA research and data analysis programs that are relevant to planetary science.

4. All data archived within PDS shall be electronically locatable and obtainable by members of the research community with typical internet access.

4.1. PDS will provide a means to search and select data and associated information in a cross-disciplinary fashion among PDS holdings.

4.2. PDS will provide a means for accommodating specific science-based queries that does not require knowledge of PDS architecture.

4.3. PDS will allow for searching at a data product level.

4.4. A PDS user shall be able to directly download data.

5. PDS shall have the capability for external investigators for their own purposes to link directly to on-line PDS data via their own electronic interface that is compliant with a PDS interface specification document.

6. PDS shall work with other scientific data archiving systems towards the goal of mutual transparency in accessing data.

7. PDS will ensure that all data holdings are permanently archived and usable.

7.1. PDS shall monitor and migrated data formats to ensure continued usability of its data.

7.2. PDS shall monitor and migrate PDS standards and their implementation to ensure continued usability of its data holdings.

7.3. PDS shall submit a copy of all data to the NSSDC for long-term (deep) archiving.

7.4. PDS shall work with NSSDC to assure the continued existence and readability of its deep archived data.

The second entry is an attempt by Dick Simpson to formulate an independent document

PDS MISSION STATEMENT

The mission of the Planetary Data System is to facilitate achievement of NASA's planetary science goals by efficiently collecting, archiving, and making accessible data produced by or relevant to NASA’s planetary missions, research programs, and data analysis programs.

Options:

1. Add wording that addresses "use" of the data rather than simply its "accessibility"

2. Add or remove "science" as a qualifier:
   a. "NASA's planetary science goals" --> "NASA's planetary goals"
   b. "making accessible data" --> "making accessible science data"

3. Clarify whether PDS has responsibility for "all" such data; if not, what are relationships to JSC samples, launch vehicles, etc.?

PDS REQUIREMENTS (Level 1 in bold)

1. PDS will assist missions, programs, and individuals in organizing and documenting data produced by and relevant to NASA's planetary science goals.

1.1 mission interfaces
1.2 research program interfaces
1.3 data analysis program interfaces
1.4 individual scientist interfaces
1.5 international interfaces
1.6 standards (formats, content, documentation)

2. PDS will collect suitably organized and documented data into an archive.

2.1 validation/review
2.2 ingestion procedures

3. PDS will make these data accessible to missions, programs, and individuals seeking to achieve NASA's planetary science goals.

3.1 supported search procedures
3.2 supported download procedures
3.3 screening, if any (who is allowed to access these data?)

4. PDS will archive these data in such a way that their long term preservation is assured and that both their ingestion and recovery are efficient.

4.1 long term preservation requirements
4.2 performance specifications on 1.5
4.3 performance specifications on 2.1
4.4 performance specifications on 2.2

THE FOLLOWING IS A COMPOSITE OF COMMENTS OFFERED BY THE DISCIPLINE NODES

COLOR CODE

The

BLACK—dated 061304 Was derived from the PDSWG meeting in Tucson Arizona on April 12 and 13, 2004. It has been modified due to comments from the June PDS Management Council meeting made to Sykes. The Mission Statement has been expanded to clarify the relationship of PDS to non-mission planetary data. Level 1 requirement 3 has likewise been expanded.

BLUEGREEN – PDS Central Node Response –dated 070504

GREEN – Beebe's comments

RED – Simpson's initial comment's

Blue – Lisa Gaddis

Magenta – Chuck Acton

Yellow Green – Mike A'hearn

Key elements in the mission statement are:

A. PDS ensures
B. science data
C. produced/generated by
D. relevant to
E. NASA planetary missions
F. NASA planetary research programs
G. NASA data analysis programs
H. efficiency
I. data collection
J. data archive
K. data dissemination

Comments:

If the mission of PDS is only to "ensure," then the enterprise can be reduced to a management company or auditing firm. Presumably PDS also needs to have an active role in the archiving process itself.

Limitation of PDS to "science data" may be too narrow. Are thruster firings "science data"; to some, the answer would be "yes." But do we want PDS to be responsible for

ALL data associated with planetary missions and programs? Probably not. Financial reports are not good fits to PDS as we understand it. Not sure how to fine tune this bit of wording.

"Disseminate" implies active distribution - to "spread abroad," to "sow," or to "disperse throughout" according to my on-line dictionary. Since suspension of the CD-ROM distribution program, PDS doesn't disseminate any longer. Instead, PDS "makes available" its data holdings. The closest it comes to "dissemination" is the e-mail subscription service announcing that new data are available. In the Level 1 requirements which follow, there is no "dissemination" - only "accessibility".

"Efficiency" can cover a wide range of sins. This is where you can tie requirements that PDS be staffed by knowledgeable people who are scientists, that there be rapid response, that data ingestion be straightforward, that there be standards, and that the system be distributed (because each of these, through some logic, makes PDS more "efficient").

I reviewed the attached document (level1_061304.doc).

I was preparing to edit it, using the MS Word change-tracking feature, when I discovered a similar document in my PDS folder that has a later date. The one you provided is dated June 13, 2004. The one I found in my PDS folder is named level1_070504.doc and is dated July 5, 2004. So maybe we're starting with the wrong document?

In any case, I think this is quite deficient: I would not agree to this were I asked to do so. It is a bit sloppy and incomplete. But the main problem is that it is often way too vague... thus leaving room for vastly different interpretations. Such vagueness has always haunted PDS--I think now is the time to tighten up such an important artifact.

It's clear that this type of Level 1 requirements document cannot go into great detail. But what we have in this document now, viewed against the variety of issues that have been raised from many fronts, emphasizes the need for a rather more carefully crafted document.

If I wear just my NAIF hat, I can say "I don't really care... almost all of this isn't relevant to NAIF/SPICE," and just keep on trucking. If the other nodes essentially like it, so be it. I've put in my two cents worth.

One of the key functions is missing. These requirements do not address the PDS-Headquarters interface to assure AOs are adequate, that proposals get adequate review and proposers get appropriate briefings. The entire wording of the document assumes all other components of NASA work perfectly.

NASA PLANETARY DATA SYSTEM (PDS) MISSION STATEMENT AND REQUIREMENTS V1.0

June 13, 2004

PDS MISSION STATEMENT

The mission of the NASA Planetary Data System is to ensure that science data produced by or relevant to NASA's planetary missions and data generated by or relevant to NASA planetary research and data analysis programs are efficiently collected, archived and disseminated in order to ensure that scientists in the present and future can effectively use this data to achieve NASA's science goals.

Removing last line and a quarter makes an awkward statement somewhat less so.

But, the following is a better mission statement:

The mission of the Planetary Data System is to facilitate achievement of NASA's planetary science goals by efficiently collecting, archiving, and making accessible data produced by or relevant to NASA's planetary missions, research programs, and data analysis programs.

PLANETARY DATA SYSTEM MISSION STATEMENT

The mission of the NASA Planetary Data System (PDS) is to ensure that ~~science~~ data and associated information produced by or relevant to NASA space missions and research and data analysis programs are efficiently collected, archived and disseminated ~~in order to ensure that scientists in the present and future can effectively use this data to achieve NASA's science goals.~~ …to ensure accessibility and viability of these data for scientists of the present and future.

PLANETARY DATA SYSTEM OVERVIEW

The Planetary Data System (PDS) is sponsored by the NASA Office of Space Science with the charge of actively developing and maintaining a dynamic archive of data products from NASA space missions. All PDS products are peer-reviewed, well-documented, and easily accessible via a system of online catalogs that are organized by planetary research disciplines into centers of expertise (or 'Discipline Nodes', DNs). The great majority of PDS data products can be downloaded or ordered directly from online

archives at PDS Web sites at one or more of these networked DNs. Experts at each DN are also available to help users select and work with PDS data.

The PDS Central Node (CN), advised by the PDS Management Council, serves as manager of PDS activities conducted at each of the DNs. The CN also provides engineering and technical expertise and support to the DNs, serving as the primary point of contact for issues such as standards (data, software, documentation, operating procedures), technology investigations, system software, coordination of data ordering and distribution, catalog development and implementation, and maintenance of the PDS online data catalogs.

PDS data products have been developed according to strict standards for describing and storing data. These standards have been designed by and for scientists to enable users who are unfamiliar with the original experiments to analyze the data, using a variety of computer platforms, with no additional support. PDS standards address data structure, descriptive contents, media design, and a set of terms for all PDS products, and the standards are readily available online for use by both data providers and users as new products are developed.

PDS Nodes serve as an interface between users and data providers (including space mission teams as well as individual data processors). PDS resources and/or members should be consulted early in the process of data archive planning and development to ensure the timely release of well designed, useful products. In this role, PDS Nodes are facilitators and ultimately the managers of online PDS data archives. In some cases, especially when older data are desired, PDS serves as a data provider in that it restores pre-PDS (originating before 1995?) data to current standards and makes them more widely available.

It is important to note that PDS Nodes do not negotiate and/or enforce deadlines and other requirements with missions and data providers. These must be determined separately between NASA and providers, and they must be made clear to the PDS. When deadlines or requirements are not met, it is the role of PDS to inform management parties at NASA and PDS and to continue to facilitate the development and delivery of PDS data products. Enforcement duties are the sole responsibility of NASA HQ [and the CN?].

To ensure that the PDS mission is accomplished, NASA levies the following requirements of the PDS and its partners in development and delivery of PDS data products. High-level or 'Level 1' requirements are noted in **bold** type below.

PDS REQUIREMENTS (Level 1 in bold)

1. **PDS shall be a distributed system in which data are archived, according to a documented standard, by planetary scientists at science Discipline Nodes.**

Key elements in Requirement #1 are:

data (traceable to mission statement element B)
archive (J)
documented standard (indirectly to H)

These key elements in Requirement #1 do NOT follow from the mission statement, though they could be derived at a lower level if #1 were rephrased to say something about the expertise needed within the archiving system to assist users with locating and using data holdings.

distributed system
planetary scientists
science Discipline Nodes

requirement 1: should it end with "... competitively selected, scienctific Discipline Nodes."?

PDS REQUIREMENTS ~~(Level 1 in bold)~~

1. **PDS shall be a distributed system in which planetary data and associated information are archived~~,~~ according to ~~a~~ documented standard~~s, by planetary scientists~~ at ~~science~~ Discipline Nodes. [Can a requirement for 'scientists' or 'science' at the DNs be enforced legally?] [What about: form of the data, accessibility, and relations with and roles of missions as well as non-mission data providers?]**

1.1. PDS will develop, publish, and maintain archiving standards that shall be uniformly applied by all Discipline Nodes, missions, and other data providers.

1.1.1. Standards that are optional for one Discipline Node shall be optional for all.

Standards that are optional for one Discipline Node shall be optional for all. [is this necessary?]

1.2 A Central Node shall maintain PDS archiving standards and monitor their application by Discipline Nodes.

A Central Node shall develop and maintain PDS archiving standards and monitor their application by Discipline Nodes. [Does the CN have authority to do anything if standards and/or deadlines are not met by a DN? If not, perhaps their role is facilitation more than monitoring and/or enforcing. Likewise, if a DN has no authority to enforce deadlines/standards, then its role is facilitation, not enforcement.] [What is the role of 'outsiders' in the development of standards?]

1.2.1. The Central Node shall provide reference implementations that enforce standards through a toolset to be given to the Discipline Nodes.

The Central Node shall provide the reference implementation toolset for the Discipline Nodes.

The Central Node shall provide reference implementations that enforce (employ?) standards through a software and informational tool set to be made available to the Discipline Nodes. [What? How 'bout: "The CN will provide explicit examples of the use of PDS standards to DNs and other data providers? Further, the CN will make application software and information available to providers that facilitate use of those tools for creating data with established PDS standards."]

1.2.2. The Central Node shall not duplicate the work of the Discipline Nodes beyond sampling to monitor Discipline Node application of PDS archiving standards.

The Central Node shall monitor Discipline Node application of standards.

The Central Node shall not duplicate the work of the Discipline Nodes ~~beyond sampling to monitor Discipline Node application of PDS archiving standards~~. [monitoring is not duplication…]

1.3. Science Discipline Nodes shall be responsible for validation of all data products to ensure their compliance with PDS standards.

Science Discipline Nodes will verify that all data products comply with standards

~~Science~~ Discipline Nodes shall be responsible for validation of all data products delivered by planetary missions and/or data providers to ensure their compliance with PDS standards. [What is an appropriate qualifier for 'all data products'? 'ingested'? Clearly DNs cannot be responsible for 'all data products' for NASA. What is the role of CN here?]

1.4 Science Discipline Nodes shall be responsible for conducting external peer reviews of data products and their ancillary information.

~~Science~~ Discipline Nodes shall be responsible for conducting and/or participating in (facilitating?) external peer reviews of data products and their ancillary information.

1.4.1 External peer reviewers shall be scientists not affiliated with PDS or the provider of the data they review. Is this the most cost effective way with full-cost accounting?
External peer reviewers shall be scientists not affiliated with PDS or the provider of the data they review. [This will be difficult, as more and more of our users and potential

reviewers will be involved with missions that provide data. And many of our current data product and panel reviewers are affiliated with PDS and/or PDS products, are they not?]

1.5 Science Discipline Nodes shall be the advocates for the general user community of that discipline to the PDS and the missions submitting data to the PDS.

~~Science~~ Discipline Nodes shall be the advocates for the general user community of that discipline to the PDS and the missions submitting data to the PDS. [This is a facilitation role, not an enforcement role. What happens when users are not happy with PDS products?]

1.6 Science Discipline Nodes shall provide scientific and technical expertise to their respective user communities regarding data for which they are responsible for curating.

Science Discipline Nodes shall provide scientific and technical expertise to their respective user communities regarding data they curate.

~~Science~~ Discipline Nodes shall facilitate the development of PDS products by provide~~e~~ing scientific and technical expertise to their respective user communities regarding data for which they are responsible for curating. [What are reasonable limits on such duties? Who are the primary customers, and who should get priority?]

1.7. PDS shall use current best practices to ensure the integrity and non-corruption of its data holdings.

~~1.7. PDS shall use current best practices to ensure the integrity and non-corruption of its data holdings.~~

PDS shall use current best practices to ensure the integrity and non-corruption of its data holdings. [What are these practices, and who determines them, and enforces their usage? How often are these evaluated? Why not just say that 'PDS will endeavor to ensure…'?]

2. PDS shall be the curatorial archive for all data from all of NASA's planetary missions, including both data transmitted from the spacecraft and all other supporting data and documents that may be required by scientists external to those missions to use the data.

Key elements in Requirement #2 are:

curatorial archive (J, except that "curatorial" is not traceable)
all data (B, but more comprehensive; perhaps TOO comprehensive?)
all NASA planetary missions (E)
all data transmitted from spacecraft (B, C)

all supporting data (D)
all supporting documents (D)
external scientists using data (traceable to mission statement text removed)

Requirement #2 targets telemetry data from spacecraft; it does not address data collected on the ground (e.g., radio science or Earth-based observatories) which may be integral to or support missions or which may have value to NASA planetary science in general.

PDS shall be the curatorial archive for all standards-compliant NASA planetary mission products .

PDS shall be the curatorial archive for all data from all of NASA's planetary missions, including both data transmitted from spacecraft and all other supporting data and documents that may be required by scientists external to those missions to use the data. [What about 'pre-PDS' missions that have not yet been restored? Does this include software? How do you define 'may be required'?]

2.1. A science Discipline Node shall be the principal interface between the PDS and missions and will be responsible for reviewing data pipelines for PDS standards compliance from the missions to the PDS.

One Science Discipline Node shall be the principal interface between the PDS and a mission and will be responsible for reviewing data pipelines for PDS standards compliance from that mission to the PDS.

~~A science~~ One or more Discipline Node(s) shall be the principal interface between the PDS and missions and other data providers, and will be responsible for reviewing data pipelines for PDS standards compliance from the missions to the PDS. The Mission and/or Data Provider is responsible for initiating contact with the DN for these purposes. All such contact information shall be readily available online at the PDS Web site.

2.2. All mission data products and/or the pipeline generating them shall be peer reviewed by scientists external to the mission and PDS to ensure that data products and their ancillary information are or will be complete and that data products will be consequently usable into the foreseeable future. Is this the most cost effective way with full-cost accounting?

All mission data products and/or the pipeline generating them shall be peer reviewed by scientists external to the mission and PDS to ensure that data products and their

ancillary information are or will be complete and that data products will be consequently usable into the foreseeable future. [Does peer review ensure indefinite usability, or merely attempt to ensure this?]

2.3. The PDS will be a resource to missions for samples of required data archiving documents and mission program requirements for their completion and approval.

The PDS will maintain a library of templates for and examples of required and customary mission interface documents. These templates and samples will reflect the current state of the standards.

PDS will be a resource to missions for samples of required data archiving standards, documents and mission program requirements for their completion and approval. These resources shall be made readily available to all, without prejudice.

2.4. The PDS will maintain an open tracking service that tells whether scheduled mission data products have been delivered and their stage in the PDS ingestion process from submission to making publicly available.

The PDS will maintain an open tracking service that tells whether scheduled mission data products have been delivered and their stage in the PDS ingestion process.

2.5. PDS is responsible for maintaining the continued usability and accessibility of the archive.

~~PDS is responsible for maintaining the continued usability and accessibility of the archive.~~

PDS is responsible for maintaining the continued usability and accessibility of its data holdings ~~the archive.~~

3. PDS shall be the curatorial archive for PDS standards-compliant data products that are produced under NASA planetary research and data analysis programs and data products produced under other NASA research and data analysis programs that are relevant to planetary science.

Key elements in Requirement #3 are:

curatorial archive (J, except that "curatorial" is not traceable)
PDS standards-compliant data products (indirectly to I, but this would be better if the requirement for standards were established separately)
NASA planetary research programs (F)
NASA data analysis programs (G)
relevant (D)

planetary science (traceable to mission statement text removed)

PDS shall be the curatorial archive for standards-compliant planetary-related data products that are produced under NASA research and data analysis programs.

PDS shall be the curatorial archive for PDS standards-compliant data products that are produced under NASA planetary research and data analysis programs and data products produced under other NASA research and data analysis programs that are relevant to planetary science. [As far as I know, there are currently no requirements levied by DAPs on the production of PDS archives. How can PDS be responsible for these? Again, I think PDS is a facilitator, not an enforcer. What are the levels of 'compliance', and are some of them more appropriate for DAP products?]

3.1. Science Discipline Nodes will be responsible for reviewing researcher-submitted data products for standards compliance.

3.2. All researcher-submitted data products and ancillary information shall be peer reviewed by scientists external to the PDS and to the submitter to determine completeness and assess their usability into the foreseeable future. Is this the most cost effective way with full-cost accounting?

3.3. The PDS will maintain an open tracking service that tells the stage of submitted data products in the PDS ingestion process (Note: Same as 2.4)

4. All data archived within PDS shall be electronically locatable and obtainable by members of the research community with typical internet access.

Key elements in Requirement #4 are:

- all data archived (B, J)
- electronically locatable (K, indirectly H)
- obtainable (K)
- members of the research community (indirectly K)
- typical internet access (K)

The PDS maintain a publicly accessible catalog to all data archived within the PDS.

All data archived within PDS shall be electronically locatable and obtainable by members of the research community with typical internet access. [what about documentation requirements, or the use of experts at the DNs?]

4.1. PDS will provide a means to search and select data and associated information in a cross-disciplinary fashion among PDS holdings.

PDS will provide a means to search and select data and associated information ~~in a cross-disciplinary fashion~~ among PDS holdings.

4.2. PDS will provide a means for accommodating specific science-based queries that does not require knowledge of PDS architecture.

PDS will provide a means for accommodating specific science-based queries that does not require knowledge of PDS architecture. [This (science-based queries) MUST be much more clearly defined!]

4.3. PDS will allow for searching at a data product level.

4.4. A PDS user shall be able to directly download data.

A PDS user shall be able to directly download data or order it for delivery.

5. PDS shall have the capability for external investigators for their own purposes to link directly to on-line PDS data via their own electronic interface that is compliant with a PDS interface specification document.

Requirement #5 is not a requirement that can be meaningfully addressed. It either needs to be rephrased or dropped.

The version of Requirement #5 in Sue_Lavoie_070504.doc is at least comprehensible; but accepting it as a requirement only makes sense if you have a very specific model of the archiving system. It does not qualify as a Level 1 requirement.

PDS shall provide a software portal and develop, publish and maintain an interface specification document for that portal to allow external investigators and data systems to access PDS holdings.

PDS shall have the capability for external investigators ~~for their own purposes~~ to link directly to on-line PDS data via their own electronic interface that is compliant with a PDS interface specification document. [Is this a way of avoiding the terms 'common Web browser'?]

6. PDS shall work with other scientific data archiving systems towards the goal of mutual transparency in accessing data.

Requirement #6 cannot be traced to the mission statement. All of the needed data needed to meet NASA planetary science objectives are in PDS; establishing interfaces with other systems is, at best, a diversion.

~~**6. PDS shall work with other scientific data archiving systems towards the goal of mutual transparency in accessing data.**~~

PDS shall work with other scientific data archiving systems towards the goal of mutual transparency in accessing data. [What other systems? Who has primary responsibility? What is the standard, who determines it, and how often is it evaluated?]

Nowhere does it address the question of non-US missions, whether there is US involvement or not. It could, in principle, be a part of requirement 6 but most people would read that as referring to NVO and the astrophysics archives.

7. PDS will ensure that all data holdings are permanently archived and usable.

Key elements in Requirement #7 are:

ensure (A)
all data holdings (not directly traceable to mission statement; but a minor issue)
permanently archived (indirectly to J)
usable (depends on what you mean by "use"; possibly to K)

6. PDS will ensure that all data holdings are permanently archived and usable.

7.1. PDS shall monitor and migrated data formats to ensure continued usability of its data.

6.1. PDS shall monitor and migrate data formats to ensure continued usability of its data.

PDS shall monitor and ~~migrated~~ manage data formats to ensure continued usability of its data.

7.2. PDS shall monitor and migrate PDS standards and their implementation to ensure continued usability of its data holdings.

6.2. PDS shall monitor and migrate PDS standards and their implementation to ensure continued usability of its data holdings.

PDS shall monitor and ~~migrated~~ manage PDS standards and their implementation to ensure continued usability of its data ~~holdings~~.

7.3. PDS shall submit a copy of all data to the NSSDC for long-term (deep) archiving.

6.3. PDS shall submit a copy of all data to the NSSDC for long-term (deep) archiving.

PDS shall submit a copy of all data to the NSSDC for long-term (deep) archiving. [What then are the NSSDC responsibilities?]

7.4. PDS shall work with NSSDC to assure the continued existence and readability of its deep archived data.

6.4. PDS shall work with NSSDC to assure the continued existence and readability of its deep archived data.

PDS shall work with NSSDC to assure the continued existence and readability of its deep archived data. [Who has primary responsibility?]