

**Planetary Data System Management Council Meeting
26-27 August 2014 (two days)
Institute of Geophysics and Planetary Physics
University of California, Los Angeles, CA**

Notes from the PDS Management Council (MC) face-to-face (F2F) meeting by Dick Simpson. This was a two day meeting; an executive summary begins here, detailed minutes from Days 1 and 2 follow. Action Items, in **UPPERCASE RED**, are embedded within the narrative and are also summarized at the end. Presentations can be found at:

<http://ppi.pds.nasa.gov/meetings/mc-2014-aug/>



Left to right: Mark Rose, Mitch Gordon, Ed Grayzeck, Nancy Chanover, Dan Crichton, Steve Hughes, Sue Lavoie, Lisa Gaddis, Susie Slavney, Ray Walker, Ludmilla Kolokolova, Tom Morgan, Debra Kazden, Anne Raugh, Amy Culver, In Sook Moon, Todd King, Dick Simpson, Steve Joy (partly hidden), Sean Hardman, Chuck Acton, Faith Vilas (partly hidden), Lynn Neakrase, Stef McLaughlin, Mark Showalter, Ed Guinness, Mike A'Hearn, Reta Beebe, Bill Harris, and Joe Mafi. (IMG_3601.JPG)

Executive Summary:

The two-day meeting began with node reports, each of which summarized mission support; FTEs being devoted to PDS4; migration activities; and software being developed, used, and/or needed for PDS4. All DNs have Build 4b system software installed except GEO (Build 4a) and NAIF (Build 3a). Some testing and anomaly resolution continues at DNs after Build 4b installation.

Most DNs noted the need for PDS4 training materials and documentation. Anne Raugh summarized her experience in organizing and leading PDS4 workshops for SBN staff, mission personnel, and 'curious potential users'. Reta Beebe gave a snapshot of lessons learned from LADEE; she promised a more comprehensive report in November. Dan Crichton described IPDA as "engaged" in PDS4, with PSA being an active partner; other agencies are ready to become involved but need help getting started — for example, JAXA, which needs help describing data which originate as CDFs.

There was discussion of the need for PDS4 tools (labelers, validators, bundlers, etc.) both within PDS and outside. Dan Crichton and Emily Law will update EN's PDS4 tools list and circulate it to MC, based on feedback from the meeting. MGSS representatives provided an

update on the AMMOS-PDS Pipeline Service (APPS); v1.0 will be released at the end of September. There were several node presentations on data transformations and visualizations, including one by NAIF illustrating use of existing visualization tools for observing geometry.

ATM reported that LADEE/LDEX data (PDS4) are now on-line; the first release from MAVEN is scheduled for April 2015. GEO was designated lead node for Mars 2020.

Sue Hoban provided an update on the Student Investigator Program, which is fully subscribed. There will be opportunities for two new students starting in Fall 2015.

MC adopted a policy on acceptable body-fixed coordinate systems, adopted a policy on involvement of PDS in mission archiving, and appointed a tiger team to review data retention within the PDS4 context. Mike A'Hearn explained how SBN will approach certification of Rosetta data — data sets which must be archived with PDS (*e.g.*, those from U.S. instruments) will be subject to normal SBN review and certification; data sets which are archived to PSA (and are therefore outside jurisdiction of SBN) must only clear PSA/DVAL validation in order to be certified by PSA (there is no peer review).



UCLA Doris and Louis Factor Health Sciences Building in morning light (IMG_3597.JPG)

Planetary Data System Management Council Meeting
26 August 2014 (Day 1 of 2)
Institute of Geophysics and Planetary Physics
University of California, Los Angeles, CA

Notes from Day 1 of the PDS Management Council (MC) F2F meeting by Dick Simpson. Action Items, in **UPPERCASE RED**, are embedded within the narrative and are also summarized at the end. See <http://ppi.pds.nasa.gov/meetings/mc-2014-aug/> for meeting details, including presentations.



UCLA 'bomb shelter' seating at sunrise (IMG_3600.JPG)

Participants:

Chuck Acton (NAIF)	Steve Hughes (EN)	Lynn Neakrase (ATM)
Mike A'Hearn (SBN)	Chris Isbell (IMG/USGS)	Anne Raugh (SBN)
Reta Beebe (PDS4 Sci)	Steve Joy (PPI)	Costin Radulescu (MGSS)
Carole Boyles (MGSS/JPL)	Debra Kazden (PPI)	Mark Rose (URC)
Nancy Chanover (ATM)	Rich Keller (UCD) [#]	Elizabeth Rye (IMG/JPL)
Dan Crichton (EN)	Todd King (PPI)	Mark Showalter (RINGS)
Amy Culver (IMG)	Bill Knopi [#] (PE)	Dick Simpson (RS)
Andy Downen (MGSS/JPL)	Ludmilla Kolokova (SBN)	Susie Slavney (GEO)
Lisa Gaddis (IMG/USGS)	Sue Lavoie (IMG/JPL)	Steve Spohn (MGSS/JPL)
Patty Garcia (IMG/USGS) [#]	Emily Law (EN)	Tom Stein (GEO)
Mitch Gordon (RINGS)	Joe Mafi (PPI)	Faith Vilas (CS)
Ed Grayzeck (Mgmt)	Mike Martin (Mgmt) [#]	Ray Walker (PPI)
Ed Guinness (GEO)	Stef McLaughlin (NSSDCA)	Dave Williams (NSSDCA) [#]
Sean Hardman (EN)	In Sook Moon (PPI)	[#] by phone/WebEx
Bill Harris (PPI)	Tom Morgan (PM, GSFC)	

Housekeeping (Morgan):

Tom Morgan called the meeting to order at 08:05 local time. All Discipline Nodes (DNs) were represented. Ray Walker welcomed attendees and reviewed logistics. After some adjustments, Bill Knopf confirmed that WebEx was working for remote participants.

Program Level Status (Knopf):

Funding: Knopf is trying to get funding extensions for DNs through September 2015, but only a small number of FY14 dollars are currently available. All paperwork is being processed by NSSC; IMG/USGS should have funding in place, and the others will follow.

Cooperative Agreement Notice: The CAN is still in development after more than a year of work. The first round of signatures has been obtained, and it is now back on the desk of the NASA Associate Administrator (AA) for Procurement, who needs to give it approval. There won't be further progress until at least 3 September when PDS Management will justify it to the AA again. The time line may not allow circulation of a draft CAN; the final version may need to go directly to the street so that proposals can be solicited, reviewed, and selected before extended funding (see above) expires in September 2015. There will also likely be a Stage 1 submission (similar to the previous Notice of Intent) before proposals themselves are due, which could be in late winter. Simpson asked whether a CAN in 2020 will be easier, after NASA has completed the first exercise in 2015; Knopf said that is difficult to predict because procurement laws change. There may be an opportunity to use a senior review to extend the original CAN once. Ten years ago, it appeared that grants would be easiest.

PPI Report (Mafi)

PPI is supporting 17 missions at various stages and levels of effort. Eleven of 13 MAVEN SISs have been signed; preliminary reviews of documents and sample products have begun. MESSENGER has a new EPS product in review. Two MSL RAD data sets have been in review a long time; the problems appear to be minor, but RAD has been very slow to resolve them. Several Cassini high-level data sets are in various stages of design, review, and production. Dawn Framing Camera higher-order products are stuck in coordinate system issues; Vesta VIR higher-order products are scheduled for production starting in September. ARTEMIS data are being archived as a test of PDS4 at PPI.

PPI has been migrating MESSENGER, MEX, MGS, Odyssey, and Voyager 1/2 data; 30 bundles and 134 collections have been created; many of the latter are document collections. Issues encountered include coordination among nodes on 'shared' archives and consistency across different versions of the PDS4 Information Model.

Staff is spending about 5% FTE on CCB, 30% FTE on DDWG, and 105% FTE on software development. Several attendees noted that DDWG notes by Kazden have been very helpful.

SBN Report (Kolokolova)

SBN is supporting OSIRIS-REx and LADEE-LDEX. There are no significant issues with either; reviews and deliveries are on schedule. Dawn is progressing slowly for some instruments, and imperceptibly on others. New Horizons Pluto-Cruise II data will be reviewed in October. Showalter asked whether an image rotation problem he discovered has been fixed; Raugh can't tell, but **SHE WILL SEND MARK A PRODUCT FOR TESTING**.

Raugh spends 15-95% FTE, Ed Shaya spends about 6% FTE, and Tony Farnham spends about 5% FTE on PDS4. The work includes software development and migration. SBN believes the community needs training materials, good user documentation for tools, visualization and conversion software, and modification and packaging of tools for production environments. SBN has migrated 14 data sets; but lack of a geometry dictionary and other issues mean these are not finished.

RINGS Report (Gordon):

RINGS has Cassini ring radial profiles from RSS, UVIS, and VIMS; the data sets have been certified although liens are still being resolved. There are 374 total profiles at different wavelengths, resolutions, and ring opening angles. The profiles are projected for migration to PDS4 in early FY15. RINGS provides OPUS support for HST ACS, WFPC2, and WFC3. OPUS2 is now in external beta testing; it uses the same search parameters as OPUS and is significantly faster.

Software development includes several projects with Python; results have been posted at <https://github.com/SETI/pds-tools>. The community needs the LDD design tool.

As a lower estimate, Mitch estimates that 40% FTE is devoted to supporting PDS4 working groups and tiger teams.

GEO Report (Guinness)

GEO supports eight Mercury, Moon, and Mars missions on which there are very few problems. GRAIL makes its final delivery on July 1, 2015. The MRO/CRISM MTRDR product will be released soon; it will have spectral measurements over 0.4-4.0 μm wavelength, and GEO expects it to be the most popular CRISM product. MRO/SHARAD at ASI has not delivered since December 2012; but the U.S.-based SHARAD team has begun delivering derived radargrams. MEX/MARSIS at ASI has not delivered since June 2008. The ASI delays follow from a decision by the Italian funding agency to move computers to southern Italy, keep the personnel in Rome, and scale back staffing overall.

InSight is the first GEO PDS4 mission. Slavney has been working hard to figure out what the ground schedule is going to be. GEO hopes to finish EDR peer reviews by July 1, 2015. MIPL will be generating image products; science teams are now responsible for

generating EDRs. HP3 and SEIS are revising their draft SISs; GEO is developing labels. RISE is working with EN and RS on archiving DSN tracking data. The Instrument Deployment Arm (IDA) team says it plans to archive data as tables, but GEO has no information on content.

The Mars 2020 payload has been announced; the mission will collect and cache samples for later return to Earth. Guinness proposed that GEO be designated the lead node since most of the investigations are geoscience; there will also be cameras, a ground penetrating radar, a meteorological package, and SPICE.

GEO has about 35% FTE working on DDWG, CCB, PDS4 designs for InSight, and registry activities. Tools needed include conversion software, XML label display, a PDS4-tailored XML editor, the LDD tool, and a binary table reader. GEO recently received 1 TB of MRO/LOLA data from Goddard in 8 hours; this was a test, results of which may help Washington University obtain university-wide, high-speed internet capability.

IMG Report (Gaddis)

Deliveries are nominal from LRO, Cassini, MESSENGER, MER, MRO, MSL, and Odyssey. IMG accumulates about 115 TB per year, much of which comes from LRO/LROC. MESSENGER would like to adopt a new radius value for the planet before delivering final products. There are ITAR issues with MSL user manuals that reference servers behind firewalls. The InSight camera design has been changed, leading to slips in the archive design schedule.

Isbell, Culver, and Rye contribute about 15% FTE to DDWG and tiger teams; Hare devotes 10% FTE to CCB. A 100 Mbps microwave LAN has been installed in Flagstaff (mostly for PDS); although there have been delays, it should be operational by October.

IMG will submit an unsolicited proposal to sponsor a second Flagstaff data workshop in June or July 2015. Gaddis hopes to have logistical support from LPI. She would like to see a series of such workshops on alternating odd-numbered years; by leap-frogging the even-numbered years, with their senior reviews, Gaddis thinks workshop attendance could be 200.

The PDS4 model needs calibration support, geometry and display dictionaries, collaboration with other nodes, translation capabilities, training materials and workshops, and a “generate” tool.

ATM Report (Beebe)

Cassini data production funding was cut early in the mission, and the Cassini has been trying to recover since. Bob Mitchell obtained overguide funding, but he has now retired. Cassini and ATM need a simple process to generate PDS4 products; RSS higher-level Titan and Saturn atmosphere products may be prototypes. The *RSS User's Guide* may be ready for release by the end of September. Juno will deliver Cruise data in April 2015. It is the last PDS3

mission; but some Juno teams are already expressing interest in PDS4. Bill Kurth is doing an excellent job leading the archiving effort.

LADEE/LDEX data are on-line; UVS and NIMS data are in lien resolution and should be available shortly. Lessons learned from LADEE include the benefit of having a team member committed to archiving, early interactions to establish designs and templates, ensuring that the coordinate system is understood and accepted, encouraging the simplest formats, doing early checks on data development, and working to develop team user notebooks. MAVEN is on schedule; its first data release will be in April 2015.

Mars data migration at ATM carries PDS3 labels forward as supplementary objects in the PDS4 products. Students are ready to start migrating.

Mission working groups take about 7% FTE. CCB takes a lot of Neakrase's time, the bulk of which goes to coordinating with EN and determining what is suitable for presentation to the CCB.

ATM is not ready to discuss software; there will be a complete report to MC on the LADEE experience in November.

MGSS Update (Downen)

Downen reminded attendees that NAIF, EN, and IMG/JPL are now under MGSS management at JPL. He does not plan to make major changes, but there may be some streamlining. He welcomes input and plans to present a plan for JPL/PDS management in November.

AMMOS-PDS Pipeline Service (APPS) Briefing (Radulsecu)

APPS 1.0 includes a label design tool (LDT) and transformation, validation, reporting, and bundling components. LDT is available and has been used by several in PDS, including SBN; other components should be ready by the end of the fiscal year. InSight has used LDT, and InSight/MIPL is working with bundle generation.

APPS 2.0 development begins in FY15. It will include Webtop, an integrated package that provides better look and feel. V2.0 will provide a science product SIS collaboration environment and Schematron validation.

NAIF Report (Acton)

PDS3 archiving is proceeding smoothly. The LADEE archive is in good shape, but it is being done in PDS3 style; that needs to be changed. Restoration work for Magellan, LCROSS, Galileo, and Phoenix remains on hold. NAIF has been essentially disconnected from Rosetta by

NASA/JPL travel policies. Tom Duxbury has reported that JAXA plans to use SPICE for Hayabusa-2, and ESA has officially requested NAIF/SPICE support for ExoMars 2016.

About 1% FTE at NAIF supports DDWG and related teams. There is a significant staffing shortfall on projects that are outside PDS.

SPICE labeling must be converted to PDS4; Acton will look at the LACE tool being developed at UCD. WebGeolCal V1.0 is being used around the world. Two summer interns demonstrated how to connect SPICE to Cosmographia; work remains, but the results have been intriguing.

The N65 Toolkit has been released for 47 environments. Future work includes finishing the tessellated plate portion of the Digital Shape Kernel (DSK, possibly released this winter) and finishing the Java Native Interface Toolkits.

UCD Report (Rose)

LACE 1.0 is now available; it provides support for label templates and drop down internal references. It gives a preview of XML labels, allows for cutting and pasting, and includes login/authentication capabilities (a NASA requirement). Login accepts NASA, Google, or Linked-In credentials. LACE is being used by LADEE and OSIRIS-REx; there has also been some DN testing and demonstration.

There have been a few bug fixes for the Volume Validator. Table Explorer now supports binary tables and displays some table values immediately while large tables are loading. In FY15 UCD is planning to focus on upgrading the Volume Validator to PDS4. Another possibility is to create a PDS4 replacement for NASAView. UCD can only do one, so Rose is open to recommendations.

RS Report (Simpson)

RS has been working with the JPL Radio Science Systems Group on resolving liens against Galileo raw radio science data and adding new data to that archive; but there has been no work in the past year. The Magellan radio tracking raw data set has been in restoration for about 4 years; the latest version of that data set was delivered to GEO at the end of July.

Simpson does little more than PDS4 (DDWG, tiger teams, and drafting SCRs) and data reviews (NH/REX and Dawn RS raw data reviews in the past two months). This focus is likely to continue indefinitely.

Stanford uses oxygen, but hasn't done much with it in the past year. RS has developed no software. It would like to see tools developed anywhere that would support validation.

Cartography (Isbell)

The Cartography Working Group has adopted the Federal Geographic Data Committee (FGDC) standard for PDS4. The ‘terrestrial’ standard is more detailed than PDS needs; but it allows planetary extensions that will be needed for PDS4. There was testing of an initial dictionary using Clementine data products; the dictionary meets ‘classical’ requirements but continues to evolve to meet special planetary requirements such as for irregular bodies, shape models, and landed spacecraft.

PDS Challenge (Grayzeck)

There will be a Challenge poster/workshop Sunday afternoon (November 9) at the DPS meeting. Software submitted so far finds Pan reliably but fails to find Daphnis; both are in Saturn ring gaps. “Propellers” leave distinct signatures in rings, but the software is not finding them. Checking for false positives is relatively easy; checking false negatives is very difficult.

Next steps include NTL contact with DNs interested in future challenge opportunities, refining the challenge with TC/Appirio, and determining the DN cost model.

SBN Experience with PDS4 Workshops for the Community (Raugh)

SBN has conducted workshops for SBN and mission personnel involved in archiving and programming. These people want to understand the mechanics of PDS4 archiving. A second workshop audience is composed of curious potential users and data preparers who have no immediate need to archive. Most of the latter have no PDS3 background; they are more interested in the overview and care relatively little about the details. The largest workshop included 10-12 people at SBN; workshops at DPS and in Moscow were about half the size, and people who lasted for the full training represented about half the original number.

SBN and Mission Personnel — What Worked: (1) Everything needed for the workshop should be on memory sticks that can be passed around and loaded onto laptops during the training. (2) Installation and configuration took some time because everyone wanted to have a working system when the training had been completed. (3) Using real PDS3 data for examples. (4) Not scripting the process; students learn more by watching real-time responses to real-time problems. (5) Posting the completed, worked examples.

What Didn’t Work: (1) Trying to rush through a completed label in a single workshop session. (2) Trying to cover more than one major topic in a single session. Plan separate sessions for label structure, finding information to fill in a label, validation, etc.

Curious Potential Users — What Worked: (1) Overview presentations. (2) Worked examples before the workshop. (3) Multiple worked examples for various product types. (4) Complete file sets of working examples that could be carried away or downloaded.

What Didn't Work: (1) Encouraging attendees to do any advance preparation. (2) Attempting to work anything other than trivial examples in real time. (3) Depth.

IPDA Report (Crichton)

Crichton and Stein just returned from the most recent IPDA meeting in Moscow on August 9-10. The first day was about PDS4 adoption and use; the second was on overall archiving activities and coordination.

IPDA seeks to “facilitate global access to, and exchange of, high quality scientific data products managed across international boundaries.” It supports construction of compatible archives, seeks sharing of tools and services, and defines standards. Dan believes there is now no question that PDS4 is the default international standard.

The IPDA Steering Committee has 28 members, representing 12 countries and international institutions. There are another 20 members in a technical experts group. An annual meeting, usually in summer, is typically held in conjunction with a major international meeting (*e.g.*, COSPAR). Regular teleconferences are scheduled every two months and attract 10-20 participants. Representatives from CNES/IPSL, ESA, IKI, ISRO, JAXA, and NASA attended the recent meeting in Moscow.

The 2011-2015 focus will be on development and coordination of PDS4 for construction of compatible planetary data archives, an international access protocol, international registries, and standards related to geometry and navigation.

ExoMars (ESA/IKI), BepiColombo (ESA/JAXA), and JUICE (ESA/IKI) will use PDS4. Of the three missions, Dave Heather is most concerned about ExoMars because PSA is starting late. ExoMars is supposed to have an ESA/PSA mission archive by 2016 and an IKI mirror or copy in 2018. Dave is also concerned about how interpretation of PDS4 itself can be coordinated (both among international agencies and also between common and mission or discipline levels). Heather would like a mechanical process (tool) that provides the only validation (no science peer review). Nothing has been started for JUICE.

JAXA is planning to go to PDS4 on Hayabusa-2. Simpson asked about JAXA's description of its “PDS4 (with CDF)” archive for BepiColombo; does this mean that JAXA will archive CDFs that may not be PDS4 compliant? Mike Martin said that documentation he has seen from MAVEN has some of the same problems. In particular, some field descriptions are identical; the user has to use and understand CDF in order to make sense of the array contents. He has seen similar problems with FITS files from SBN; content documentation is embedded in the FITS header, which is needed for understanding the PDS4 data. A'Hearn acknowledged that some of the FITS metadata may have been missed in translating to PDS4; those omissions should be fixed. Mafi then said that PPI's document on CDF restrictions has not been updated

because PPI is learning as it goes along. **KING AGREED THAT THE DOCUMENT UPDATE SHOULD BE MOVED UP ON THE PRIORITY LIST.**

ISRO is using PDS3 for MOM; but PDS4 will be the baseline for Chandraya'an-2. Crichton feels that ISRO doesn't know how to get started with PDS4; they don't have JAXA's connection to ESA through BepiColombo. ISRO has promised to provide an API so that PDS can access Chandraya'an-1 data by the end of August.

PDS has established a registry for IPDA data sets; PDS4 software is available for installation locally at IPDA-member sites.

Conclusions: All international agencies are engaged with PDS4 now. Coordination of common validation tools and processes are priorities at PSA. IPDA members recognize that coordination (as through CCB) is important. Training is also important.

PDS4 Updates (Crichton)

One of the recognized needs on the user side is transformations — such as for image data. JIRA tracks change requests; but Simpson asked whether JIRA can show implementation status (actions after CCB approval), since it doesn't do this now. **LAW WILL ADD NEW VALUES TO SHOW POST-APPROVAL STATUS.** Build 5a integration and test will begin in September; EN will report results to MC in November, before making a decision on implementation. Crichton believes that nine missions are committed to using PDS4 now. All PDS policies are now on an EN web site (<http://pds.jpl.nasa.gov/policy/>).

Crichton proposed a validation policy. He doesn't believe there is anything in our documentation that explains what it means to 'deliver PDS-compliant' data under PDS4.

Data providers delivering bundles to the PDS shall adhere to PDS4 standards by ensuring that the following criteria are met prior to delivery to PDS:

- 1) Syntactic validation: a) the XML label is validated against the appropriate schema rules; b) a mission schematron is syntactically correct; and c) a mission schema is syntactically correct.
- 2) Semantic validation: the XML label is validated against the appropriate schematron rules.
- 3) Content validation: the XML label accurately describes the data product.
- 4) Referential integrity: the relationships described in, and between, digital objects described in the XML label are consistent and represented

PDS supplied software validation tools support syntactic, semantic, specific content rules and referential integrity validation. Data providers must run these prior to delivery. Data Providers should use visual inspection to validate content that cannot be done programmatically (*i.e.*, by using software validation tools).

Discussion followed on whether PDS can require data providers to run validation software and what options PDS has when data do not meet PDS standards. There was consensus that the policy statement should be reworded to be a definition of what it means to be PDS-compliant. **CRICHTON AND SIMPSON WILL WORK ON NEW WORDING.**

CCB Report (Neakrase)

Ed Shaya has replaced Carol Neese on the Change Control Board. Twelve SCRs are now open; most are recent submissions and are going through Technical Assessment.

CCB-63 would change the structure under Product_Document; it is being worked by DDWG. Gordon noted that CCB-63 changes would not be backwards compatible, in which case Build 5a could become V2.0. He favors the changes in CCB-63 but wondered whether MC is ready to take the step to V2.0. Neakrase noted that ATM might need to look at LADEE and MAVEN to determine whether there would be advantages to migrating them to a newer version of the Information Model.

CCB-73 adds Microsoft Excel to the list of acceptable documentation formats. Simpson asked whether this was premature because the base list has never been approved and posted by MC. Hughes provided the current list, which was discussed and voted during the executive session at the end of Day 2.

The CCB process is continuing to evolve; options for author withdrawal of SCRs and instituting a consent agenda for minor fixes are being included. A document describing the process has been reviewed by Stein, Neakrase, and King; Neakrase and Law are negotiating the next round of changes.

King asked what the procedure should be for managing changes at the discipline and mission level. The CCB has been successful for the common parts of the Information Model; should similar change boards be established for disciplines and missions?

Information Model Update (Hughes)

IM V1.3.0.0 for Build 5a will be locked down during September. Model integration and testing begins September 8, and system integration and testing begins September 29. The common model remains stable; the majority of changes involve Schematron rules and new permissible values. V1.3.0.0 will include changes approved in CCBs 32, 56, 60, 62, 71, and 73. King noted that CCB-63 is not on the list; it would need to be approved by DDWG Thursday then voted by CCB on the following Tuesday. Simpson will update the draft CCB-63 in time for DDWG consideration. Raugh said she needs both Product_Document and the Geometry LDD in V1.3.0.0 or she doesn't do migration for another 3 months.

The Geometry Task Force met yesterday, exchanging views on a number of topics. The group is focusing on classes for flyby/orbital and landed missions. There should be a draft dictionary in September and a final version in November.

The goal of the NSSDCA/PDS4 Interface Working Group is to automate deliveries, provide the ability to return basic products, and to perform integrity checks. NSSDCA now has a draft logical data model for ingesting PDS4 data. Database and process development will be ongoing for the next 4-6 months.

The Metadata Consistency Team is defining an explicit set of attributes to be used as search parameters for products within the PDS4 archive. An implicit set of search parameters already exists. Unfortunately, no single query model works across all of PDS4. Discipline expertise is needed to craft appropriate queries; metadata sources, in addition to the label, may be needed to respond to queries.

Software Development and Deployment (Hardman)

Build 4b components include Harvest, Catalog, Generate, Transform, and Validate; the PDS4 Tool Set; Registry software; Search software; Transport Service; and Report Service. The Transform Tool generates a minimal label for the output object; it could use additional testing.

All DNs have Build 4b installed except for GEO (4a) and NAIF (3a). There are a few DNs with outstanding installation issues; the majority of problems can be traced to permissions. Hardman is working with ATM and SBN on exercising PDS4 software for product-level searches. The focus at ATM is on Product_Update and support for indices; the focus at SBN is on support for Primary_Result_Summary and facet-based search.

Sawmill software has been installed at EN; however, it brings the system to a crawl when generating reports. Sean noted that each Sawmill release seems to run slower. EN has started pulling web logs from DNs. Hardman does not want EN to become a repository for old web logs; Gordon recommended keeping the raw logs for two years.

Hardman is adding new features to Build 5a; included are more validation for bundle and collection integrity and better integration of search results with available tools and services. He also plans to get Tracking Service development underway; this will start appearing in Build 5b.

Tool Progress and Needs (Crichton)

Mike Martin wondered whether there was interest in coordinating development and use of PDS4 migration tools — specifically the PDS4 Library, which some in attendance didn't know existed.

Crichton went through a spreadsheet that lists tools that have been proposed and queued for development.

There are two Label Design tools (APPS/LDT and LACE).

There is a Label Generation tool on the PDS4 web site; PPI has developed a separate tool, which is also Velocity-based, but handles tables better. King suggested that these could be merged. Santa Martinez has complained that oXygen does not validate labels with variables.

LDDTool is for Local Data Dictionary generation; Gordon noted that creating the input file for LDDTool has a very steep learning curve. Rose has suggested that LACE might be a good way to create the input file.

The Validate Tool carries out Label and Data Validation on PDS4 product labels; later it will be upgraded to validate data objects. Discussion followed on whether there should be a web-based validator; Mark Rose thinks that the time required to validate a volume over the web makes web validation impractical in general. However, a GUI might make the validator easier to use locally than a utility working from a command line interface.

Label and Data Transformation can be carried out using PDS4 Tools and the Transform Tool, both of which need more work.

There is no PDS4 equivalent to NASAView for visualization. Showalter said there must be a way to display images and tables that is sufficient for validation and does not require a huge overhead development for the wide range of display devices.

CRICHTON AND LAW WILL UPDATE THE LIST SO THAT IT CAN BE REVIEWED BY MC.

Executive Session (Vilas)

Lead Node for Mars 2020: There was consensus that GEO should be the lead node. Morgan said that Bill Knopf probably has to sign off on the assignment.

Discovery and Europa Opportunities: ATM has received about five inquiries on each, PPI has had a couple, IMG has received one on each.

Action Items: Simpson reviewed new action items. **A DUE DATE OF OCTOBER WAS SET FOR THE NEXT VERSION OF THE CDF RESTRICTIONS DOCUMENT.**

Adjournment (Morgan):

Morgan adjourned the meeting at 17:45 local time.

Planetary Data System Management Council Meeting
26 August 2014 (Day 2 of 2)
Institute of Geophysics and Planetary Physics
University of California, Los Angeles, CA

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Malvaceae, *Dombeya burgesiae* 'Seminole' in the Mildred E. Mathias Botanical Garden
(IMG_3594.JPG)

Participants:

Chuck Acton (NAIF)
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Reta Beebe (PDS4 Sci)
Nancy Chanover (ATM)
Dan Crichton (EN)
Amy Culver (IMG)
Lisa Gaddis (IMG/USGS)
Mitch Gordon (RINGS)
Ed Grayzeck (Mgmt)
Ed Guinness (GEO)
Sean Hardman (EN)
Bill Harris (PPI)
Sue Hoban (UMBC)[#]
Steve Hughes (EN)
Steve Joy (PPI)
Debra Kazden (PPI)

Todd King (PPI)
Bill Knopf[#] (PE)
Ludmilla Kolokova (SBN)
Sue Lavoie (IMG/JPL)
Emily Law (EN)
Joe Mafi (PPI)
Stef McLaughlin (NSSDC)
In Sook Moon (PPI)
Tom Morgan (PM, GSFC)
Lynn Neakrase (ATM)
Anne Raugh (SBN)
Mark Rose (URC)
Mark Sharlow (PPI)
Mark Showalter (RINGS)
Dick Simpson (RS)
Susie Slavney (GEO)

Tom Stein (GEO)
Faith Vilas (CS)
Ray Walker (PPI)
Dave Williams (NSSDC)[#]
[#] by phone/WebEx

Housekeeping (Morgan):

Tom Morgan called the meeting to order at 08:05 local time. All Discipline Nodes (DNs) were represented.

Vilas said that NASA is still looking for a qualified Spanish-speaking planetary scientist who can give talks in Colombia (see MC F2F minutes from 2014-04-10 for details). Bill Knopf is agreeable to having GEO serve as lead node for Mars 2020.

Student Investigator Program (Hoban)

Student investigators are undergraduates who are supported 10 h/week during the academic year and full time during summer; they can also work during breaks. Students attend a professional meeting, chosen jointly with their mentors. Term of the award is two years; it has been necessary to be flexible about start times. There are currently 5 students — 3 from PPI, 1 from SBN, and 1 at Management — which is the maximum authorized and budgeted.

Two students in Year 2 at PPI are studying the possibility of stromatolite formation on Mars and long-term climate change, respectively. They will attend AGU. The third student at PPI just started three weeks ago; she will study Titan wind patterns and waves promoting cloud development. A student part way through Year 1 works with Hoban on inner coma and dust environments of comets. A sophomore at SBN is approaching Year 2, looking for specific volatiles in the Tempel 1 Deep Impact data; this student may go into planetary science and has submitted an abstract for the DPS meeting in Tucson.

With two students leaving the program next summer, there will be openings for two new students to start in Fall 2015.

Hoban has not been able to keep close track of SIP alumni. One former student has gone to graduate school in mathematics; another just received her Ph.D. in galactic astronomy. One former PPI student went to Cornell in biophysics.

NSSDCA Report (Williams)

148 PDS3 volumes have been submitted to NSSDCA for deep archive since the last MC F2F meeting; about 8% would not have passed volume validation and about 8% had volume and version conflicts. Problems were resolved quickly after contacting the submitting DN.

Network Attached Storage was received from USGS in July (about 40 TB of LROC data); there was a subsequent disk failure, but no data were lost thanks to RAID. A mandatory GSFC security scan and vulnerability rectification is in progress before transfer to the deep archive can be completed. USGS is ready to submit more data.

Walker asked whether there is a way for DNs to know which data have been received and accepted. McLaughlin can distribute reports; Williams said there is an e-mail sent when data are accepted. **MCLAUGHLIN WILL HAVE PAT MCCASLIN COMPILE AND DISTRIBUTE THE CURRENT DEEP ARCHIVE STATUS FOR EACH DN A WEEK BEFORE EACH F2F MC MEETING.**

Policy on Acceptable Body-Fixed Coordinate Systems (King)

King, A'Hearn, and Acton have revised a proposed policy that was discussed during the 11 August MC telecon. If a new coordinate system is used, PDS has a responsibility to make sure that it has been correctly specified. Gaddis discussed the proposal with Brent Archinal; USGS is comfortable with the recommendation. Guinness suggested that a member of the IAU Working Group be included in peer reviews covering new coordinate systems; this would protect against having a panel approve a new coordinate system without having had the appropriate expertise. The proposed policy (see Attachment A) was passed unanimously (9-0-0).

Transforms and Visualizations (King)

PPI determined that VOTable and CSV are among the most common table formats in its community. PPI then created transforms which convert PDS data in other formats to VOTable or CSV, provided REST access, and fed the transformed output to visualization tools. A wide variety of visualization tools (*e.g.*, Excel) is already available. Todd emphasized that large development efforts are not required if transformations to popular formats are used in conjunction with readily available display tools.

Mission Page Graphics (King)

King asked a summer intern to find good images of as many planetary spacecraft, instruments, mission logos, and trajectory plots as he could find. Image sizes of 80, 160, and 320 pixels were selected; suitable images from about 30 missions have been catalogued. Web pages are being constructed around the images to provide snapshots of missions. Instrument images can then be matched with data set information; users can then go from the mission page to the associated data sets.

Gordon noted that many DNs already have such pages. King replied that it may not be practical to have the same web page design at each DN because of discipline differences. Crichton and Hardman explained the philosophy behind web pages managed by EN. Several commented favorably on Cassini mission pages developed at ATM; but Beebe explained that ATM work has been motivated entirely by Cassini requests to make data from that mission easy to find.

Rosetta Data and Data Certification (A'Hearn)

Mapping and Coordinate Systems: Rosetta will comply with IAU guidelines in any area where guidelines exist; but construction of global maps for irregular bodies such as 67P/Churyumov-Gerasimenko is not specified by IAU. To complicate matters, Rosetta Flight Dynamics and Rosetta Science work with different shape models and different coordinate systems. The final Rosetta Science shape model will be delivered to SBN, where it will go through peer review and then be forwarded to NAIF. The 0° longitude will be specified later.

Candidate Landing Sites: Five landing sites were selected last weekend; that set will be reduced to a pair in September. The primary selection criterion is safety of the lander. Yesterday there was a telecon to schedule activities for December-March; this leaves little flexibility for responding to changes in comet activity. Rosetta instruments that measure gas production rates disagree by a factor of 10 in observed rates today.

Certification of High Level Products: The comet shape model will be reviewed first — before delivery of raw data.

Certification of Raw and Calibrated Data: Liens from the Steins and Lutetia deliveries remain unresolved today; in some cases, this affects certification. PSA has unilaterally decided that data will be accepted after passing a DVAL validation test; PSA does not have the resources to conduct peer reviews. DVAL is still in development, and it is difficult to install locally. Few teams are using the current version. So the standard for certification will be different at PSA and at PDS/SBN.

SBN has leverage over US-provided instruments and will conduct conventional peer reviews. For those data sets over which it has jurisdiction, SBN will require that Steins/Lutetia liens be cleared before any pipeline is approved for comet data production. Non-US data will thus flow into PSA with less scrutiny, be certified by PSA after passing DVAL, and be available to DDAP proposers. Complaints are expected from teams that must go through the SBN review process.

Mission Visualization (Acton)

There seems to be interest in spacecraft trajectories, instrument pointing, and visualization of these and other aspects of mission design. Acton wonders whether PDS is interested in supporting tool developments that could be used in reconstructing geometry or planning for future observations.

Chuck knows of many tools (*e.g.*, AGI Satellite Toolkit, SwRI GeoViz, JPL TBALL, etc.) that provide visualizations over a wide range of sophistications. *Eyes on the Solar System* was developed at JPL; it uses data files assembled in advance and runs over the Internet. *Cosmographia*, an open source descendant of *Celestia*, is installed and run locally. Acton demonstrated both. Both allow the user to set aspect angles, time control, etc. *Cosmographia* has some rough edges for users, but it also has a lot of potential for enhancement. Acton

believes JPL has worked out licensing issues with the primary developer and could release its own version(s) with upgrades if it chose to do so.

Showalter and Gordon voiced strong support, noting that anything that helps users understand viewing geometry is useful. Other comments were also favorable. King suggested that a single tool be adopted across PDS so that users don't have to learn multiple interfaces to obtain similar visualizations. Acton thinks that there is probably no single tool that meets all DN needs.

To proceed will require some commitment, work, and funding. Chuck asked that DNs forward comments and recommendations to him. These may be useful in securing support from JPL management and funding from TBD sources.

Lunar Mapping and Modeling Portal (Law)

LMMP was started under Constellation and is now under Human Exploration. The user interface is a photomap of the lunar surface; computing power and base maps are made available to users via a network connection. Polar and equatorial projections are available at various zoom levels; data may be layered. Input data can be selected from a number of past and current missions (*e.g.*, LRO). Map tiles come with metadata attachments in HTML. When topography is available, 3-D rendering, perspective views, and simulated 'flight' over the terrain is possible. The software has been adapted for Mars and Vesta.

Revising PDS 1-2-3 Level Requirements (Gordon)

Gordon sees a disconnect between Level 1-2-3 Requirements and PDS4 capabilities. Problems include the difference between 'data' (used in the Requirements) and 'material' (a more general term). The Requirements also state that submitted data must be either accepted or rejected; there is no recognition that submissions might be 'safed' or that supplemental formats might be accepted on a provisional basis but not be migrated when formats become obsolete.

Mitch would like to classify 'material' into four tiers:

1. Observational data: raw or derived data from instruments, experiments, or research submitted as Product_Observational.
2. Material essential for the interpretation and use of observational data
3. Useful, but not essential material; additional copies of observational data and documentation in contemporary formats, preview products, etc.
4. Material that has been rejected by PDS

Tiers 1 and 2 are the primary focus of PDS; there must be three copies of these materials, including one that goes to the deep archive. Tier 3 materials would be replicated and sent to the deep archive at DN discretion. Materials rejected by PDS are returned to the submitter; but should PDS retain a copy off-line for some period of time?

Mitch recommended that an MC tiger team be established to (1) review Level 1-2-3 Requirements within the PDS4 context, (2) decide if we need to revise the Requirements to allow for material which will be neither rejected nor fully archived, (3) if we need to make revisions, determine how we handle materials which are neither accepted or rejected (separate bundles?), and (4) name the classification tiers.

Most of the discussion centered on tier 3. For example, how should PDS handle ‘products’, generated as part of user services (footprint maps, on-the-fly calibrated images, etc.)? Are they part of PDS holdings, and are they tracked in the Registry? How about supplemental editions of documents that already exist in required formats? What do we do with old versions of data that have been recalibrated?

Policy on Depth of Involvement (Simpson)

At the November 2013 MC F2F meeting at Caltech, Michael New asked that MC consider whether it wanted to adopt a policy regarding PDS “depth of involvement” in mission archiving. Concerns include whether PDS staff are being drawn into archiving tasks that properly belong to the missions and whether there are conflicts of interest when PDS staff are involved in both data production and peer review. Simpson drafted and circulated a draft policy in February; there were responses at the time that ranged from “PDS generation of archives is acceptable in some circumstances” to “there is no problem”. Since then the action item (2013-11-18/06a) has been kicked from one MC agenda to the next without resolution.

Several points of view were offered in the discussion that followed. In the end there was consensus that the draft policy, written for all data providers, was too broad; for example, proposers to data analysis programs are not likely to be experienced enough to construct proper archives, so a lot of help is not unreasonable. King suggested that “depth” be removed from the title; A’Hearn suggested a couple wording changes that limited the policy to mission archiving. With those changes, the policy as shown in Attachment B was approved.

Next Meetings (Morgan)

The MC telecons scheduled for 8 September and 17 November were canceled. The next telecon will be October 13.

Dates for the next F2F meeting were discussed. 18-19 November was favored, although Mike A’Hearn will be out of the country. A venue in the San Francisco Bay Area will be sought so that representatives from LADEE and MAVEN (in Berkeley) can attend and give their perspectives on the PDS4 experience. Morgan will arrange WebEx for those who must participate remotely. Backup dates will be 19-20 November; these are less desirable for Showalter, who has significant travel beginning the next day. Bill Knopf can attend on either pair of dates; Michael New’s availability is not known.

Executive Session (Vilas)

Tiger Team: Responding to Mitch Gordon's recommendation to set up a tiger team which would address Level 1-2-3 Requirements in the context of PDS4, A'Hearn moved that such a tiger team be established but that the scope of its discussions be limited to PDS4 retention policy. Showalter seconded the motion, and it was passed 7-0-2 (Acton and Simpson abstaining).

Vilas asked for volunteers. Simpson, Beebe, and Guinness volunteered. Simpson recommended that someone from EN be included, and Crichton offered Hughes. There was also sentiment that someone from NASA HQ be included. Michael New was nominated; his availability was not known, but Bill Knopf said he would serve if New could not. Vilas designated the HQ representative to be the tiger team lead.

NAIF Visualization: Acton repeated his request that DNs provide him with feedback on mission visualization opportunities. He will distribute an e-mail reminder to DNs, and Simpson added an action item to the meeting record.

List of Acceptable Formats: Steve Hughes distributed the list of permissible values for <document_standard_id>. Simpson suggested that the list be approved and posted with the policy on acceptable data formats; then that loose would be closed. Discussion followed on whether version numbers should be included in the permissible values; there was consensus to drop them. The edited list then was unanimously approved:

7-Bit ASCII Test	LaTEX	Postscript
Encapsulated Postscript	Microsoft Word	Rich Text
GIF	PDF	TIFF
HTML	PDF/A	UTF-8 Text
JPEG	PNG	

Simpson agreed to submit an SCR (now CCB-78) so that the changes would be captured in JIRA. CCB-73, which adds Microsoft Excel to the list, should be applied after the above list is updated in the Information Model.

Future Meeting Formats: Morgan raised the possibility of suspending MC F2F meetings, using WebEx instead. There was mixed reaction to having no more F2F meetings; but attendees were sympathetic to using WebEx more and travel less.

Adjournment (Vilas):

There being no other business, Vilas adjourned the meeting at 13:20 local time.

Planetary Data System Management Council Meeting

26-27 August 2014

MC Action Items

Ordered by date of origin; current status is given in red;
action items which have been overstruck will be removed from future versions of this list.

- ~~2013-11-18/06a (Morgan, 2014-08-26): Consider whether to adopt a policy on how deeply PDS should become involved in mission archiving. Simpson drafted a policy in early February, which was distributed to MC. Draft policy amended and adopted at August F2F.~~
- ~~2013-11-18/06b (MC, 2014-08-26): A list of possible PDS4 workshop venues is needed. Then PDS needs to compile a list of training materials and their development. Raugh made a presentation to the August F2F meeting on workshops and training sessions she has conducted for SBN.~~
- 2014-02-10/01 (Vilas, ASAP): Continue MC discussion of proposed geometry policy via e-mail. Continuing.
- ~~2014-04-11/12 (Morgan, 2014-08-26): Schedule discussion of certification of Rosetta data during the August F2F meeting. A'Hearn presented status and plan at August F2F.~~
- ~~2014-06-09/07 (King; 2014-08-26): Present new draft policy on PDS review of coordinate systems. Todd made a presentation at the August F2F and the policy was adopted by MC.~~
- 2014-08-11/01 (All, ASAP): Notify Knopf when approved funding extensions reach institutions.
- 2014-08-26/01 (Raugh, ASAP): Send Showalter a New Horizons image product for rotation testing.
- 2014-08-26/02 (King, 2014-10-13): Complete the CDF constraints document so that it can be distributed to potential data providers working with CDF. It should include examples properly labeled for PDS4 ingestion.
- 2014-08-26 (McCaslin, November): Distribute a report of deep archive status to each DN a week before each F2F MC meeting
- 2014-08-27 (All, ASAP) Send Acton recommendations on mission visualization.

Planetary Data System Management Council Meeting
26-27 August 2014
Directives to EN

Ordered by date of origin; current status is given in **red**;
EN directives which have been overstruck will be removed from future versions of this list.

2014-08-26/A (Law, ASAP): Modify JIRA so it tracks and reports implementation status.

2014-08-26/B (Crichton with Simpson, ASAP): Convert the proposed validation policy to a definition of PDS4 compliance.

2014-08-26/D (Crichton and Law, 2014-10-13): Update the software/tool list so that it can be reviewed by MC.

Original (Simpson): 2014-08-29
Corrected typos (A'Hearn): 2014-08-29
Added that CCB-78 has been submitted under "List of Acceptable Formats" (Simpson): 2014-09-09
Minor editorial changes to improve readability (Simpson): 2014-09-09

Attachment A

Policy on Acceptable Body-Fixed Coordinate Systems

This policy applies only to body-fixed coordinate systems.

This policy applies solely to coordinate systems based on reference frames that are fixed relative to a body (body-fixed reference frames). For the purposes of this policy a body is any celestial object (planet, moon, asteroid, comet, etc.). This policy uses the SPICE definition of a reference frame "as an ordered set of three mutually orthogonal unit-length direction vectors." [4]. While the SPICE definition of a coordinate system is "A coordinate system specifies the method used to locate a point within a particular reference frame." (e.g., rectangular (x,y,z), spherical (lat,lon)/(RA,dec), and so on) [4], this policy adopts the IAU definition of a coordinate system, which has been used in IAU documents going back to at least 1980 and which defines a coordinate system as the combination of the way positions are measured in the reference frame (the SPICE definition), a defined origin and the reference frame itself.

Archival data that are appropriate for inclusion in NASA's planetary data archive must be in an internationally accepted coordinate system. The prevailing international authority for the body-fixed reference frames for the bodies of the solar system is the Working Group on Cartographic Coordinates and Rotational Elements (WGCCRE) [1] of the International Astronomical Union (IAU).

Acceptable coordinate systems for PDS-archived data are those that are defined and accepted by the IAU (i.e., including the reference frame) or a coordinate system which conforms to the WGCCRE guidelines [2] for defining or improving the accuracy of a coordinate system. One requirement for an acceptable IAU coordinate system is that a description has appeared in a refereed publication. The WGCCRE has indicated (memo to A'Hearn on 2014-Feb-25) [3] that it "considers datasets and documents that are peer reviewed and archived (thus publicly available) by PDS to be (an) appropriate reference".

It is therefore the role of peer review panels, organized to review data prior to acceptance by PDS, to determine if the coordinate system used in the data conforms to an IAU standard coordinate system, if one exists. If data are in a new coordinate system, whether it is an improvement for an existing coordinate system or the first defined for a body, the review panel is to determine if the coordinate system conforms to IAU/ WGCCRE guidelines and that a full description of the coordinate system is available in a refereed publication, whether that is a journal article or as an archival part of a PDS dataset. If the description of the coordinate system only appears as a document in the PDS dataset, then the peer review panel must take special care to verify that the proposed reference frame is both scientifically justified and conforms to the IAU/WGCCRE guidelines.

References:

[1] WGCCRE website [<http://astrogeology.usgs.gov/groups/IAU-WGCCRE>]

- [2] Archinal, B. A., M. F. A'Hearn, E. Bowell, A. Conrad, G. J. Consolmagno, R. Courtin, T. Fukushima, et al. 2011. "Report of the IAU Working Group on Cartographic Coordinates and Rotational Elements: 2009." *Celestial Mechanics and Dynamical Astronomy* 109 (2): 101–35. doi:10.1007/s10569-010-9320-4. [<http://www.springerlink.com/content/g272325h45517581/>]
- [3] Archinal, B.A, "IAU WGCCRE comments on use of PDS documentation and SBN coordinates document", memo to PDS, 2014 February 25
- [4] SPICE Definitions: Frames & Coordinate Systems, Presentation [internal document]

Adopted by PDS Management Council on unanimous vote: 2014-08-27

Attachment B

Policy on PDS Involvement in Mission Archiving Activities

PDS shall meet its obligations as recipient of archival planetary science data by providing advice, training, review, and validation as stated in the PDS Level 1-2-3 Requirements.

PDS shall not ordinarily become directly involved in the design of archives, development of production software, or production itself, when those are the responsibilities of mission data providers.

Data providers, wishing to engage PDS personnel in design, development, or production, may negotiate with PDS for those services with the expectation that PDS will be compensated for the work.

When PDS personnel provide design, development, and/or production services, which lead to products that are submitted to PDS for archive, those personnel will not have a vote in subsequent reviews of those data.

- Approved by PDS Management Council 6-1-2: 2014-08-27
- Amended by PDS Management Council 8-0-1: 2014-08-27