

International Planetary Data Alliance Meeting (June 30 – July 3)
MINUTES
Rome, Italy

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Executive Summary:

Four days of meetings were held. The first two days consisted of archive and technical splinters. The last two days were the Steering Committee. The archive splinter focused on questions related to coordinating development of international, compatible archives. Several questions were discussed and addressed. One of the major gaps is a step-wise guide for building compatible archives. An analog might be what PDS provides in terms of the Archive Process Guide (APG). In addition, the archive splinter discussed the PDS4 design and progress. There was general concurrence that the upgrade is important and that IPDA should be involved and assessing it. There was also a discussion on the handling of ancillary data and a review of a project proposal from Chuck Acton. Actions and a draft set of project proposals were discussed.

The second day covered topics relative to the technical aspects of IPDA coordinated with the Technical Experts Group (TEG). An overview of the architecture, data model and Planetary Data Access Protocol (PDAP) was discussed. PDAP discussions revolved around the extensions to support the interoperability projects as well as plans to build a more flexible query structure. In addition, PDS provided an overview of the PDS 2010 plan and design. It was stressed that as IPDA evolves, it must do so in a coordinated way and the architecture is critical. The TEG will be important for making sure the connections occur and validating the system architecture. There was also a discussion on sharing tools and beginning to coordinate their use. Actions and a draft set of project proposals were discussed.

The third day began the Steering Committee. All represented agencies provided reports of their major efforts and focus for their archives. Of particular interest is that Chandrayaan-1 was launched and they are now going through the process of trying to build and release the archive, along with publishing policies. Japan is working at the DARTS facility to build a PDS-compliant data archive and several of ESA's missions continue to be international. NASA reported that the PDS is in one of its busiest periods ever so increasing efficiency and providing more user support is critical to its future. CNES, BNSC and DLR provide supporting roles in planetary missions and archiving and serve on instrument and missions teams. Project reports from the 2008-2009 period were given. The PDAP project was presented with its latest status and suggestion on how to continue during the next year. Multiple interoperability projects were reported on Hyabusa and Venus Express. Venus Express is expected to go operational so Beebe wants an assessment since this will become a model in the future. The system architecture was presented and was recommended to be closed followed by an assessment by the TEG of the IPDA System Architecture documented posted to the IPDA website. Crichton anticipates reopening the System Architecture potentially at the next meeting for updates once more technical work is completed. The information model was presented and recommended for closure with a follow up project to be an assessment of PDS4 and its application to the international community. Hughes wants input quickly in order to help the PDS4 development within NASA. Beebe and Osuna provided reports on the archive and technical splinters. Finally, Kasaba replaced Maria Teresa as the new IPDA Chairman and Dan Crichton was selected as the Vice-Chairman.

The fourth day focused on next steps in the IPDA. Kasaba-son, the new chairman, provided an overview of how he would like to run the IPDA this next year. He would like the project leader to provide bi-monthly reports on progress. In addition, he stressed the importance of the website. More detailed discussion on the website occurred towards the end of the session as well. Kasaba would like to hold the IPDA meeting adjacent to COSPAR 2010 on July 16 and 17 (with two day of technical meetings prior to that) in Bremen since Maria Teresa Capria has already put organization of a session at COSPAR in this works. Thomas Roatsch will act as a local organizer. Each project was then presented and accepted. These projects focused on assessing PDS4, capturing and updating the IPDA standard webpage and associated process, updating the PDAP specification, extending PDAP to handle GIS-queries (particularly for Lunar data), defining of how to handle ancillary data as well as an assessment on the Venus Express interoperability project and using it as a model for future interagency agreements for data distribution. Kasaba requested that new interoperability project plans be completed by 31 July 2009. Capria then discussed the IDIS project under development by EuroPlanet and its requirements to use PDS and IPDA standards. A discussion was also rekindled on the topic of COSPAR and Beebe reminded agencies to send her a description of how archiving is organized within their agency to support next steps with COSPAR. Finally, a discussion was held regarding the IPDA website and ways to improve it. Crichton agreed to coordinate the updates to the website and to work its evolution.

Kasaba closed the meeting at noon on Friday, July 3, 2009.

Day 1: Archive Splinter Session (June 30, 2009)

Chair: Beebe, NMSU, PDS

Attendees: Peter Allan (BNSC) Reta Beebe (PDS, NMSU), Maria Teresa Capria (ASI), Dan Crichton (PDS, Engineering), Steve Hughes, (PDS, Engineering), Steve Joy (PDS, PPI), Jesus Salgado (ESA, ESAC), Alain Sarkissian (CNES), Yukio Yamamoto (JAXA/ISAS), Naru Hirata (JAXA/ISAS), Francisco Carloto (ASI), Gopla Krishna (ISRO)

Beebe opened the session making the following statement:

We must agree that we internationalize our standards, but we must support nationalization of our data holdings. Agencies fund management of the holdings so nationalization is a must.

Beebe posed several questions for discussion as follows:

How can we effectively work together on international missions to coordinate archive construction?

How do we work as early as possible with the missions?

How should we coordinate changes to standards, particularly changes to data standards internationally?

What tools would be useful for building compatible archives; what should be shared?

What is PDS doing for PDS4 and how should we coordinate its upgrade?

What parts of the archive process should be standardized internationally?
What support documentation, etc is needed by agencies for building archives?

Should we internationalize the Proposal Archive Guide (PAG) and the Archive Planning Guide (APG) or combine them into a general mission planning guide?

Should we standardize the capture of ancillary data (re: the Chuck Acton request)?

What projects are needed this next year?

How do we work as early as possible with the missions?

Several points were raised. One of the critical is to work with the announcement of opportunities to identify the archive requirements. In addition, not only getting to the AOs, but working with the proposers to

provide input on their proposed archive plans. Beebe noted that within NASA we want to enthusiastically work with the proposal teams.

Beebe asked each agency to write a paragraph on how to make archiving important.

Capria noted that finding “PDS experts” is a problem for the agencies. It was noted that having a “cookbook” that can be given to a graduate student or other person is critical. Beebe noted that within PDS, this has worked well.

One of the other ways PDS is working with the missions is having tools that can be interested into the data provider pipelines.

How should we coordinate changes to standards, particularly changes to data standards internationally?

Crichton noted that one of the original discussions that occurred with Joe Zender was with regards to the international community becoming a first class citizen in the standards change process. Currently PSA is not an equal partner in the change process. With PDS3, this is a challenge because it isn’t structured in such a way as to enable it to be managed that way. It would be very costly. This is one of the drivers for PDS4.

All agencies felt that it was important to be able to participate. However, they also felt it needed to be a light-layer of coordination. We need the ability to separate out the international components of the standards and to focus on items that change very infrequently. The concept of “layering” was introduced. This was further discussed within PDS4.

Crichton mentioned that this should fold into the standard project that is being planned for discussion at the Steering Committee. This project would plan the standards page and change process.

What tools would be useful for building compatible archives; what should be shared?

Beebe asked what tools should be shared. The following were items that were mentioned by various members:

Validation (syntactic/semantic, high level and local extensions)

Costing
Design
Software libraries for access/writing PDS products

What is PDS doing for PDS4 and how should we coordinate its upgrade (Steve Hughes)?

NOTE: Background on information model captured under day 2

Hughes provided an overview presentation of PDS4, its progress and plans. Substantial background was provided. Among the goals discussed:

- Major overhaul of PDS3 standards
- Restructure standards to support internationalization
- Built on early IPDA efforts
- Explicit structure of simple formats
- Need feedback from IPDA
- PDAP query models should be derived from the model
- Beebe suggested we need to accept a document format like PDF

Hughes is planning an IPDA project that will perform an assessment on PDS4.

What support documentation, etc is needed by agencies for building archives?

One of the most critical items discussed was the examples and templates. Capria noted that she felt that is one of the critical deliverables of the entire IPDA. It should be to provide guides to help agencies build compatible archives. It was noted that this should be a project for the next year.

Should we internationalize the Proposal Archive Guide (PAG) and the Archive Planning Guide (APG) or combine them into a general mission planning guide?

This was discussed in addition to the previous discussion. It was agreed that we need a “cook book” and that the answer to this question should come out of a project that recommends a way forward. This should be an international guide with steps and examples. There was also

discussion that there needs to be different guides and/or sections that are appropriate for different audiences. For example, managers need at least an executive summary. Pls may need something different, particularly for putting together an archive plan. The person developing the archive needs a much more detailed guide.

Should we standardize the capture of ancillary data (re: the Chuck Acton request)?

Capria discussed slides provided to her by Chuck Acton. The question raised in Acton's slides is whether data standards should be defined for ancillary data products. IPDA members all mentioned they are using SPICE. Training was raised as an issue. Gopola mentioned that India was considering simpler approaches in the future. Beebe noted that they may find these simpler solutions might be inadequate long term and that SPICE is based on what's been needed and in fact, Acton's group has been called in when other solutions have not worked.

A project proposal will be prepared for presentation to the Steering Committee.

What projects are needed next year?

- Standards Identification and Website Update
- International Guide for Archive Development with Steps and Examples
- Ancillary Data Standards Plan

Day 2: Technical Engineering Splinter Session (July 1, 2009)

Chair: Osuna, ESA

Attendees: Maria Teresa Capria (ASI); Yasamasa Kasaba (ISAS/JAXA); R. Beebe (PDS, Atmospheres), Steve Hughes (PDS, Engineering), Dan Crichton (PDS, Engineering), Peter Alan (BNSC), Tom Stein (PDS, Geosciences), Gopla Krishna (ISRO), Naru Hirata (ISAS/JAXA), Yukio Yamamoto, (ISAS/JAXA) Jesus Salgado (ESA, ESAC), Pedro Osuna (ESA, ESAC), Alain Sarkassian (CNES), David Heather (ESA, ESTEC), Steve Joy (PDS, PPI), Iku (ISAS/JAXA), Francisco Carloto (ASI)?

Architecture

Crichton presented the system architecture document that has been generated for IPDA. It is currently in draft form and available at <http://planetarydata.org/standards>

The architecture identifies three critical architecture views including process, data and technology. These views includes elements that identify the standards pieces that need to be developed within the IPDA. They are mapped to the IPDA level 1 and 2 requirements.

Of particular interest is capturing and posting the standards recommendations to the IPDA website, even for the existing set of standards that are being used by the IPDA member agencies. In addition, several commented on the need for a “cookbook” and set of examples for building archives.

One of the elements in the architecture identifies “repository standards”. Crichton said that this has been difficult to standardize on PDS. Osuna felt that IPDA should focus on developing a repository abstraction so we can get our tools and software to work, but allow for independence. Hughes proposed that we should also put out a simple repository structure for builders of new archives so they can incorporate lessons learned. Beebe said that was important in terms of getting agency budgetary support since the investment would be better understood.

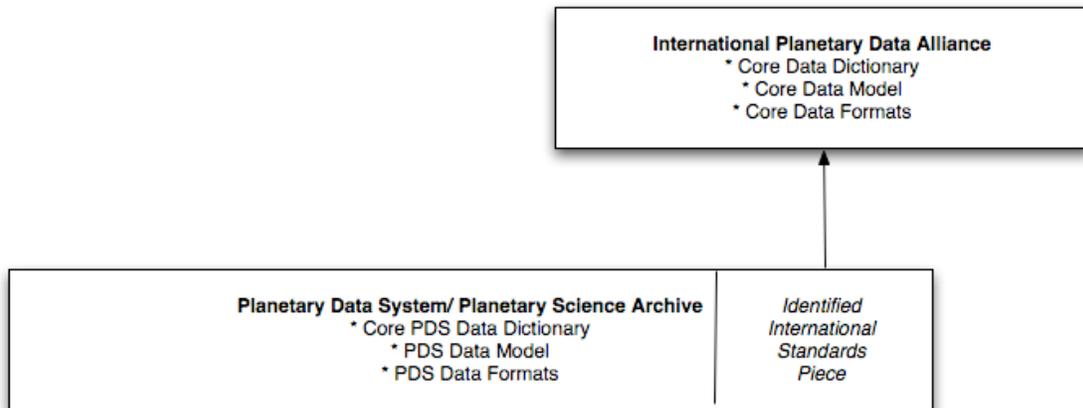
Crichton asked the agencies to review the document and provide input. He also said that he would be requesting that this project be closed with the possible follow on to be an assessment and finalization of the document.

Information Model

Hughes presented the information model effort that has been generated for IPDA.

The original IPDA information model effort focused on review and assessment of PDS3 and its ability to support internationalization. The working group found several anomalies in PDS3 and limitations that needed to be addressed for internationalization. In addition to ambiguity in its definition, there are limitations that need to be addressed in order

to better organize it so pieces can be governed by different levels (international, agency, node/mission/etc). See below.



The PDS4 effort grew out of the IPDA effort and can be considered a response in some sense to supporting internationalization. It's goal is to simplify and improve the management of the standards as well as be much more explicit so that the model is not descriptive, but explicit and manage in a modern tool that enforces best practices.

PDS4 is an intensive effort, meeting weekly, and is model-driven effort. Models are being produced regularly which produces updated documentation almost immediately. It explicitly defines structure which, in PDS3, was not defined. It also defines namespace, which in PDS3, was limited. Both introductions are viewed as necessary to better manage what goes into archives and to structure the standards for internationalization.

In the model, certain changes have been made. For example, software and documents are now first class objects in PDS4. In PDS3, this was a problem which forced them to be "shoe-horned" in.

Heather and Osuna raised compatibility concerns between PDS3 and PDS4. Crichton responded that PDS has the same concerns, however, PDS is not working to change agreements with existing providers, but planning for new missions. Heather agreed that made sense to them as well. They can start with a new sheet. Heather commented that he likes the look of PDS4, but is just a "little scared" of impact for those that might already have PDS3 tools. Osuna responded that the community

always has tools and this needs to be addressed. In terms of migration, Beebe suggested PDS will track usage and migrate what makes sense by prioritizing migration of highly used data sets first.

Stein responded that the system architecture PDS is proposing is one that enables transformation both into and from PDS.

Hughes noted that there seems to be a growing interest in moving to XML. Osuna asked whether that meant data. Hughes said that this is form representing the labels. It was noted that if labels were in XML, they can be easily viewed in ODL.

Hughes noted that query models can be derived from the information model. They can be discipline-specific. This will allow for construction of more comprehensive searches.

Osuna asked about the difference between PDS4 and an international model (aka IPDS). The answer is that the PDS folks would like to see PDS4 be promoted to be the IPDS model.

The Japanese really are not PDS-compliant in their implementations. However, they feel that migration to PDS for them makes more sense as PDS4, rather than PDS3. They believe PDS3 was a “grass roots” and like the direction of PDS4.

Hughes wants IPDA to review the PDS4 data. He is proposing a new project that will perform an assessment.

PDAP

Salgado presented the latest status on PDAP (Planetary Data Access Protocol). Two key prototypes have been performed. One to link to Venus Express between PSA and PDS and the other to server Hyabusa data products via PDAP. Previous incarnations included access to Mars map-projected data as well as discover and sharing of data set information. The map-projection prototype was done by Zender and the data set sharing was integrated into a prototype PDS home page that showed access.

Salgado and Osuna asked what the PDS plan was for PDAP. Crichton responded that PDS wants all data to be available via distributed services

in PDS 2010 and that those services could, at a minimum, be wrapped with a PDAP protocol so that it can be accessed internationally.

Crichton asked whether we can support a “google-like” paradigm where we download metadata in an XML-form (like XML/RDF) and that can then be fed into a full text search engine. This could be how PDS links to other agencies in a search.

Beebe stated that we are concerned about protecting the users from themselves. They need to understand the relationship between the data and we need to require that the users “de-select” the associated data rather than just natively give them a basic data file. Osuna is concerned that user’s wouldn’t want to always have to turn it off, but understands the point.

Osuna sees that we need a single prototype client for search.

Sarkissian showed a use case called “Cross-calibration of past FUV experiments” as an example of discovery of data. It has access to UV data from multiple places. It’s a single portal, but linked to the institutions. Beebe mentioned that some of these are linked to real experts so it is a good example model that we want to replicate. Its purpose is to increase the caliber at the EU level to compete. Osuna clarified that this is a portal, but that the underlying infrastructure could be built using PDAP to access the repositories.

Salgado continued and presented on comparison with generating services that can increase PDAP usage. One such example is generating KML-type files for integrating with Google services.

Osuna asked whether we can assign an action to PDAP to identify the best approaches for registries. Crichton recommended that this be coordinated with a larger registry plan. Beebe suggested that we need to capture actions on the IPDA web page and the “answers” can be made directly on the webpage for the actions.

Salgado discussed the need for a more flexible query model to support greater expression. The idea would be to extend and support a more simple expansion. IVOA has done some work that allows for SQL-like queries. PQL has also done some work, but the query is portioned a bit into logical portions. Hughes mentioned that PDS uses a reverse-polish stack and presenting distributed queries which is what Tom McGlynn seemed to be heading this direction a few years ago when Steve talked to

him. It was determined that “query model” was used differently in the PDAP and information model presentations. Query model, in this context, means a structure for sending queries over PDAP. Query model, in the context of the information model means the keywords, etc used to form a specific query. This distinction will need to be clarified within IPDA since these terms tend to overlap but have very different meanings in that they are different levels of the architecture.

Crichton requested that an action be coordinated by the TEG to capture a few planetary use cases, demonstrate that they are supported by PDS4, and demonstrate that they can be implemented in PDAP. The assumption is that this will both drive development and validate the design to support a query language and query scenarios.

PDS 2010

Crichton presented the PDS 2010 plan. There was extensive discussion around the concept of a product and whether attached or detached labels in PDS4 is superior. In general, most felt that history has shown detached to be better for PDS4, however, everyone noted that there are problems there as well. Hughes said the PDS4 team is planning for detached labels.

Significant discussion also ensued around the coexistence of PDS3 and PDS4. Crichton said that at the core, the PDS plan is to be able to catalog both PDS3 and PDS4 data and then provide access. It may be the case that PDS4 has more tool support, but both products can be delivered.

A discussion was held around how EuroPlanet should proceed. Some felt that EuroPlanet should jump now, others felt that it should wait. An action is to have the PDS4 assessment team perform an assessment, contribute to the evolution, and help formulate a presentation to information the international community regarding PDS4.

Tool Sharing

Osuna asked whether we should have a single validation tool for IPDA. Most noted that differences among agencies dictate that they may have their own, however, we should make validation tools available for use and adoption by everyone. However, it was noted that there should be a

recommendation of how “certification” should occur. It was suggested that this should be part of the standards identification project.

Other tools suggested including tools from the previous splinter:

Archive Costing
Design
Shared Libraries (read/write PDS labels)

Osuna raised the question as to whether we should add analysis/discovery tools. Beebe & Crichton responded that within PDS, tools for data analysis are generally not developed under archive funding.

Crichton suggested that all agencies should provide a list of tools that should be linked to on the IPDA webpage. The action was assigned to the TEG.

Day 3: IPDA Steering Committee (July 2, 2009)

Attendees: Maria Teresa Capria (Chair); Yasamasa Kasaba (Deputy Chair); R. Beebe (PDS, Atmospheres), Steve Hughes (PDS, Engineering), Dan Crichton (PDS, Engineering), Peter Alan (BNSC), Tom Stein (PDS, Geosciences), Gopla Krishna (ISRO), Thomas Roatsche (DLR), Naru Hirata (ISAS/JAXA), Yukio Yamamoto, (ISAS/JAXA) Jesus Salgado (ESA, ESAC), Pedro Osuna (ESA, ESAC), Alain Sarkassian (CNES), David Heather (ESA, ESTEC), Steve Joy (PDS, PPI)

E. Flamini, Director Observational Systems provided a welcome. Stressed the importance of capturing and managing the data and participating in the PDS archiving philosophy and EuroPlanet. He works very closely with Maria Teresa Capria. Is interested in supporting the IPDA effort as much as they can.

State of the IPDA

Capria provided an update on the state of IPDA. She mentioned that one of the major efforts has been to create the Technical Experts Group (TEG) led by Pedro Osuna. In addition, the IPDA website has been renewed and

improved thanks to Sean Kelly at JPL. There is still work to be done, particularly posting content.

IPDA has made several presentations in Europe and USA. IPDA is planning to hold sessions next year at COSPAR at the 38th Assembly meeting in July 2010. IPDA will also be presented at PV2009. Another session will be also held on IPDA at the European Planetary Science Congress, October 14–18, 2009 in Potsdam, Germany.

Capria said IPDA should be represented whenever and wherever planetary data archival and distributions are concerned. IPDA must be considered the official way to archive and capture data. The ISECG (International Space Exploration Coordination Group) Annual Report 2008 mentioned IPDA by stating the development of common standards should be undertaken by the IPDA.

Capria also discussed EuroPlanet. It has been funded for 4 years. It started operating on January 1, 2009. It is devoted to developing and coordinating infrastructures for European Planetary sciences. The system is called “IDIS” or Integrated and Distributed Information Services (IDIS). IDIS offers planetary science community a common portal for access to data. It is based on access to PDS data and has a “strong coordination” with ESA PSA.

Capria also raised some concerns. First, CNSA and RAS/RKA are not actively participating. CSA has not nominated candidates yet for the Steering Committee. China (CNSA) has been problematic. Some IPDA projects need better management with better reporting. She suggested discussing how to improve this IPDA-wide. Capria also believes that the interactions with the user community has improved, but would like IPDA to continue to do better.

Key points of the meeting

- Discuss status of projects
- How to improve project management (of projects)
- Decide on new projects
- New chair and deputy
- How to proceed with COSPAR
- What IPDA should do regarding SPICE
- Publications on refereed journals
- How to better interact with the community

Capria stressed that COSPAR was a big success last year. We need to continue to work on the IPDA evolution within COSPAR.

Agency Reports

Crichton presented on PDS activities discussing mission and management drivers, activities with data providers, continued support for data users and usage of PDS data, and major plans within PDS. Plans include PDS 2010, working with the U.S. National Academy of Science on decadal plans, and managing overall integrity of the system.

Heather discussed the PSA at ESA. He stressed they are different than the PDS in that they have a centralized infrastructure. He indicated that they first developed an advanced search, but users “cried out” for a simple search mechanism so they’ve just completed that. They do provide a number of services including a help desk, in addition to software services. They also provide a number of services for data producers. They provide workshops on data archiving on request and SPICE workshops and provide individual consultancy. They coordinate the “DAWGs” (Data Archive Working Groups) for ESA missions. They also provide tools including “generic data pipeline” (Generation Tool), Dataset Validation, Dataset Ingest. They do not release the generation tool. The validation tool is the “PVV” (PSA Volume Verification Tool). They are also running a tool called “PVS” which is performing qualitative validation. PSA, like PDS, has seen the realities of increasing amounts of data. Heather mentioned that Mars Express stressed the system and indicated how important it is to have a storage management plan. He specifically talked about status of Mars Express, Giotto, Huygens, Venus Express, and Rosetta. Heather mentioned that Rosetta is concerned about data release. He believes that data validation is a major issue since PDS and PSA “compliance” are not fully in sync and PDS node don’t always fully agree on compliance. He also discussed Chandrayaan-1, SMART-1, and BepiColombo.

Krishna presented on status of archiving at ISRO. Chandrayaan-1 was launched in 22nd October 2008. It contains an international payload. Indian Space Science Data Center (ISSDC) is setup at Bangalore. ISSDC is responsible for ingest, management and distribution. It is archiving the raw data. Distribution occurs to a limited set of PIs. Access to others will be allowed after the “lock out” period. The current schedule shows a six month collection period, a six month archive preparation period, and a six month peer review period for a total of eighteen months cycles for

each data release. Some development is occurring in the archiving including: archive plan, keyword changes, data set preparation for delivery to peer review, etc. Basic tools are developed for data browsing and dissemination for international teams including

- PDS viewer
- PDS verifier
- Data select (browse) and work-order generation
- Initial version of data dissemination
- Development of their own pipeline

A few points for discussion from Krishna include

- Implementation of IPDA guidelines and standards, when and how to start?
- Availability of sample data sets from other missions which is compliant with IPDA standards, for new implementations?
- Availability of tools to the IPDA members, developed under projects?
- Reference systems (frames of reference)?

Roatsch presented on archive status activities at DLR. DLR generally delivers to both PDS and PSA as part of the mission agreements. Missions include Cassini, Venus Express, DAWN, etc. Beebe mentioned that Thomas has been doing an outstanding job. She mentioned that Thomas would be a good review person for PDS4 for imaging data. ACTION: Hughes to send PDS4 image product definition to Thomas for his input and assessment.

Capria presented on status of archiving at ASI. ASI is the funding organization and supports archiving efforts. ASI is involved in several missions (Rosetta, Cassini, BepiColumbo, Mars Express, Juno, DAWN, Jupiter system mission). ASI is asking all ASI-funded data providers to build PDS-compliant datasets and deliver them as agreed in the Data Management Plans (DMPs). This ASI Science Data Center (ASDC) is a facility established in November 2000. The ASDC task is to support all ASI space missions dedicated to Observation of the Universe in the management and in the long-term preservation of scientific data. ASDC believes it should use international standards for all archives. It seeks a common infrastructure and reuse. The center is in Fiesole. It hosts data from VIMS (Cassini), VIRTIS (Rosetta), VIRTIS (Venus Express). It also hosts data from MARSIS and SHARAD. It currently requires a password for access since it is not intended to distribute data to the public. It is meant for PI and science teams. Beebe says it serves more as a science operations center (SOC). In the future, a planetary science expert will be

appointed, support to Herschel/Planck and more planetary data sets, full integration with International Virtual Observatory Alliance (IVOA) for non-planetary data.

Sarkissian presented on status of archiving at CNES. CNES supports French Institutes, international efforts (Euoplanet, ISSI, IPDA, IVOA), Universities, and Laboratories. Labs tend to have quite a bit of the data. More than 20 labs with databases related to planetary space missions. They also provide simulation capabilities as well as tools, etc. Sarkissian sees that they should plan to support PDS4 rather than PDS3. Tools services include: search engine, ephemerides service, bibliography search, workflows and support in areas of modeling (e.g., Atmospheric Modeling).

Peter Allan presented on status of archiving at BNSC. It is a partnership of organizations. Only about 20 people work for BNSC. The funding comes from multiple government departments the really form BNSC. Allan works for STFC. Pays for ESA, ESO, CERN, etc. Funds science and operates laboratories (RAL, Daresbury, etc). Planetary groups are largely at universities. Interested in future Europa mission (particularly the Ganymede orbiter). In terms of data, have extensive archives of astronomical, atmospheric and earth observation data (1 PB). Use ESA and NASA for planetary archives. Access to data via IVOA tools and AstroGrid project which completed and closed out July 1, 2009.

Yukio Yamamoto presented on status of archiving at JAXA. He presented a plan for interoperability and consolidation framework. Both science missions (ISAS) (Venus Climate Orbiter, Beppi-Colombo, Mercury Magnetosphere Orbiter) and exploration (JSPEC) (Hyabusa, Kaguya) are underpinnings that plug into a consolidated framework that supports data preparation, publication and management within a standards structure sitting on common hardware and software. Activities in 2008/2009 focus on DARTS Planet (Data Archives and Transmission System), SPACE development (<http://spice.iasa.jaxa.jp>), PDAP prototype, etc. Next target PDAP applications and capability. Yukio stressed that it is important that PDAP survive and not be subject to becoming obsolete like Gopher. Yukio asked whether NASA/PDS would mind if a PDAP interface was built for the Clementine data. Stein responded that it seemed fine. SELENE may have an HDTV feed through a commercial provider. The question is how to capture this data. They will probably use MPEG, but that is under discussion. Some discussion occurred on interoperability requirements between Stardust and Hyabusa and whether PDAP could support it. As an action, more investigation is required in

terms of requirements, organizations involved, and potential solutions (both data standards and protocols). JAXA has built a data distribution system called The Orbital Data Distribution Systems (ODDS) available at: <http://odweb.tksc.jaxa.jp/oddse/main.jsp> . They have explored use of Hadoop for building a planetary data access system. They have looked at column oriented databases type technologies (as opposed to relational). Both Yahoo! (who is spearheading Hadoop) and Google (who is spearheading Google File System) are pushing concept sof column-oriented databases that should be explored. Crichton mentioned that one member of his group is a committer on the Yahoo! Project.

Stein presented on the China interactions. It arose out of reciprocal visits between Washington University and Shandong University. It is a university-to-university agreement and led to an MOU in 2007. Wash U has provided tutorials and also hosted graduate level students working on degree programs. Visits have occurred by members of the Chinese National Academy. A June 2009 workshop in Beijing occurred. About 50 people attended from the university level. The Chinese lunar roadmap has been released which included ChangeE-2, a spare ChangE-1 orbiter to be placed in orbit in 2010. Yinghuo-1 (Mars Obiter) will detach from Phobos-Grunt and go into elliptical orbit. A PDS workshop will be held at Shandong in July 2009 to develop PDS standards. They expect to make data available via the WWW (but it isn't clear exactly what this means in terms of access). IPDA would like to have a CNSA representative. Stein said that they will work on that. Maria Teresa suggested that an IPDA presentation be given as well.

Project Reports

Salgado reported on the PDAP (Planetary Data Access Protocol) Interoperability Project. This included the PDAP specification, PDAP future changes, PDAP related projects, PDAP client/server implementation. PDAP v0.4 released. Minor changes. The VEX Interoperability Project allows PDS Atmospheres Node to access PSA metadata and data. More on this from Beebe's upcoming presentation. Hyabusa Interoperability will be presented later by JAXA. Salgado discussed the "fly by" product model. This may be deprecated with PDS4, but was put together with JAXA to allow for searching based on specific parameters/angles. They found it was difficult to do on-the-fly conversions and is looking at implementing a "network service" in SPICE. Another extension under consideration is "Free Query". This will enable

more flexible queries that are required for accessing planetary science data. Multiple approaches including PDS/OODT and IVOA are being explored. IVOA allows for relational queries via an SQL-like search called ADQL. The plan is to align with PDS4 after the splinter group discussions and to support a more object-oriented approach. This looks something like:

[http://address?query="select data_set.attr, ..., from data_set where data_set.mission_name like ...'MARS%'"& RETURN_TYPE=HTML](http://address?query=)

Salgado also reported on the Google-like approaches so a “registry” could be harvested and used to support full-text searches. Other parameters in clued pagination, asynchronous jobs (things like computational-intensive requests), and user credentials for authentication. Salgado also talked about the developed of use cases to help drive development. He also proposed that there should be work done to explore use of integrating PDAP with Google Map API and WMS (Web Mapping Service) standards from OGC. Jesus also proposed creating a “registry” of PDAP services.

Iku Shinohara presented on Hyabusa Interoperability. The project used PDAP to perform an interoperability project for PDAP. Two issues that exist. First, a small body is not always regular shape. Second, there is no appropriate resource defined by PDAP version 0.3 since it makes some assumptions. The prototype exists at <http://darts.isas.jaxa.jp/planet/pdap/indexx.html>. In order to support the prototype, PDAP was extended to support roll, pitch and yaw angle searches. Calculations for searches was done using SPICE.

Naru Hirata presented on activities of planetary data issues at University of Aizu. The university has a research group for planetary science and exploration, although the university emphasis is on Computer Science and Engineering. There are 6 staff members in the research group. They work closely with JAXA. Did an experimental project on 3D-GIS for irregular shaped bodies and Lunar GIS. 3D-GIS for irregular shaped bodies focus on using shape models for asteroids and using that to overlay and extra data. It is built from the OpenGL and GTK+ toolkits. The other project is the Lunar GIS of Kaguya map data. It uses a conceptual model of web-GIS for the Moon and is built on OGC standards (Web Mapping Services, Open Layers). They are interested in extending to implement PDAP and support PDS4 data model standards.

Yamamoto discussed the current status of assessing PDAP assessment. Achievement is measured at 80%. Yukio believes assessment is difficult because it depends on lots of pieces (system, model, implementation, etc) and has some subjectivity. He suggests an action should be to make an “How to do assessment” document. Issues found with PDAP include

- Lack of version control of PDAP data
- Lack of version control of PDAP itself
- Lack of repository information in PDAP general output
- Lack of mechanism to identify products in PDAP server (e.g., query by id)
- Image service should return reference frame as an output attribute (NOTE: result should match other systems such as SPICE)
- Should PDAP be derived/mapped to the models in PDS, PSA, etc?
- Query structure does not allow for greater expressions
- RETURN_TYPE=HTML is dangerous; concern is that VOTable information might be lost if preference is to get data in HTML result; recommends getting data back in VOTable form and then convert to HTML

Osuna responded that contributions have been very valuable. Pedro wanted to clarify that decisions need inputs and feedback, however since Yukio presented some concerns in how these decisions were made. Osuna was concerned that some of the comments mixed structure, metadata and data and he thinks these need to be separate.

Crichton gave the Architecture Project report. Much of the technical information is captured in the splinter notes. He indicated that the deliverable has been made and a draft architecture specification has been posted to the website. He requested that the TEG perform a review and provide comments. He also requested that the project be closed while the assessment occurs. Once the comments are gathered, Crichton will bring a report back to the Steering Committee with recommendations for updating the architecture.

Hughes gave the IPDA Information Model report. Much of the report is captured in the splinter notes. He thanked the IPDA for their input and indicated that it has been very useful for PDS4. After reviewing the status of the PDS4 effort, he requested that an assessment project be formed to review PDS4 and understand how it can be adopted by the IPDA.

Beebe provided a report on the Venus Interoperability project. The project has successfully demonstrated access between NASA/PDS and

PSA. As data becomes available, it will be distributed through this interface. Beebe believes the project can be closed on the merit that the goals have been met to demonstrate interoperability. Some final work will be done to clean up the web page and provide access to the data.

Osuna provided a report on the TEG (Technical Experts Group) splinter. First teleconf was held in February 2009 (on PDAP assessment issues and extension to non-map_projected data). Second teleconf was held in May. Osuna provided a summary of the splinter meeting from 1 July 2009. Osuna stressed that he agrees we need an "IPDA Cookbook" with recipes on how to write an archive from scratch. It was confirmed that this should be a project. Osuna confirmed that we need review of the architecture document within the TEG. He also gave an update on the PDS4 discussion and the need to evolve towards IPDS (international version of standards). Osuna confirmed that we agree PDS4 makes sense and is much needed and that everyone is in same boat of having to deal with PDS3 and PDS4. Pedro also reported on PDAP implementations (Venus Express/PSA, Hyabusa and Selene/JAXA, and PDS data) that have also already been presented to the Steering Committee. The registry concept came up, in particular, the registration of services. The TEG is taking an action to define the idea and fold it into an overall registry plan for IPDA. Pedro also clarified that he and Steve Hughes have used the word "query model" in different ways. They will work this out and post a result. Pedro also provided a quick update on PDS 2010. Finally, he gave an update on tool sharing and stressed the importance of consistent validation, which is a continuing theme at the IPDA. Beebe clarified that what we really want to define is where the "line" is drawn for interoperability. A last minute point Pedro raised was related to the PDAP assessment. The action on the TEG is look into the PDAP assessment input matrix, discuss its contents and make agreements for implementation. Feedback then goes back to the PDAP project. PDAP will then make the updates, but also have a historical record which keeps its pathway forward.

Beebe reported on the archive splinter. She reported on major discussions and actions that were captured in the notes from the first day. Beebe also discussed in detail the issue of forming a panel with COSPAR. Beebe is not sure that it is necessary or makes sense for IPDA and that discussions on the topic should continue.

Capria discussed the next chair position. She said it was decided that Kasaba-son will become the next chair. Capria and Kasaba said they

believe the United States should become the chair and nominated Crichton. It was confirmed by the Steering Committee. Kasaba will take over as chair.

Dinner will be held tonight at Restaurant Don Vito Viale Liegi, 64 at 20:00

Tomorrow, Capria will be late and asked that the meeting begin at 09:30.

Day 4: IPDA Steering Committee (July 3, 2009)

Attendees: Maria Teresa Capria (Chair); Yasamasa Kasaba (Deputy Chair); R. Beebe (PDS, Atmospheres), Steve Hughes (PDS, Engineering), Dan Crichton (PDS, Engineering), Peter Alan (BNSC), Tom Stein (PDS, Geosciences), Gopla Krishna (ISRO), Thomas Roatsche (DLR), Naru Hirata (ISAS/JAXA), Yukio Yamamoto, (ISAS/JAXA) Jesus Salgado (ESA, ESAC), Pedro Osuna (ESA, ESAC), Alain Sarkassian (CNES), David Heather (ESA, ESTEC), Steve Joy (PDS, PPI)

Overview of IPDA Next Year

Kasaba-son presented his vision for next year. He presented his background and mentioned that he is not directly in the chain of command at JAXA. However, Reta pointed out that he oversees a user community in his students and that gives him substantial input since they will be using NASA, ESA and Japanese data sets. Kasaba also identified key management for 2009-2010. This includes chair & co-chair as well as past honorary chairs and founders, the Steering Committee, TEG, and projects. Kasaba hopes to keep TEG in place for another year and then assess progress and approach. Under the Steering Committee, Kasaba asked whether there should be any changes. Under projects, Kasaba would like a report every other month. For new Steering Committee members, Crichton mentioned we should consider breadth in adding the agencies that aren't participating. This includes CNSA (who isn't actively participating) and CSA (who has mentioned interest, but not responded).

Kasaba wants to create a summary report of progress. The format would be a simple 1-page input to all projects & TEG. Capria mentioned that results could be pushed out through the COSPAR news publication. In addition, IPDA will release a newsletter. The website will be managed by Crichton.

In terms of next year meeting plans, Kasaba suggests we meet at COSPAR which will be at Bremen (NOTE: there is a local DLR installation there). The problem may be securing a facility. Therefore, a German space facility (ESOC@Darmstadt, ESTEC@Noordwijk) could be used. An action was assigned to Roatsch to help us secure a site. The proposal is July 16, 17 for the Steering Committee and July 14, 15 for the technical working meetings. For 2011, Kasaba has requested that the meeting be held in Japan.

New Projects

Crichton presented three projects which include “Standards Identification”, “IPDA Archive Guide”, and “Registry Plan and Architecture”. It was suggested that Elizabeth Rye and Gopola Krishna work together as co-leaders for the Standards Identification. Rye would focus on helping to populate the website and Krishna would focus on the standards change and acceptance process. For the IPDA Archive Guide it was proposed that Maria Teresa Capria and David Heather co-lead the project and also work with the understanding that this will evolve as PDS4 is introduced. For the third project (Registry Plan and Architecture), it was proposed that Dan Crichton lead it with heavy support from the TEG. Osuna proposed that all projects should have a mailing list. Crichton took an action to get them set up.

Naru Hirata proposed a project for extending PDAP to support GIS capabilities. It would focus on developing extensions for GIS-oriented data sets and working with USGS. Crichton mentioned that USGS Astrogeology team might add value. Crichton took an action to contact Lisa Gaddis.

Yamamoto proposed that the small bodies assessment project be closed.

Salgado discussed that the next phase of PDAP should be to create the standards document for it. Therefore, he is proposing this as the project for the next year. Osuna commented that we have no approval process for standards. He proposed that this should be a project undertaken by the Steering Committee. Crichton said that should be folded into the Standards Identification project as a deliverable. An action to the project leaders will be to include the end-to-end flow for standards approval.

Hughes presented a new project for assessment of the PDS4 information model. Hughes believes this should begin immediately so he proposed a

schedule and that it start immediately. It would have monthly telecon to educate the team and then start the assessment. Crichton said that this brings up a hole in that IPDA does not have a standard format for assessments. Beebe suggests we create a spreadsheet that captures the issues that can then be used to perform the follow-on work. The question came up whether a “query language” (in reality how we search for data) is going to be considered. It was suggested that Hughes be the project leader since NASA has such as vested interest in seeing this succeed.

Beebe discussed the Venus Express project follow-on. Beebe suggested that an assessment be performed by ESA, JAXA and NASA of the portal to assess access to Venus data. The result could be used to drive interoperability forward. The proposed project leaders will be Beebe and Heather. Beebe’s comment, an assessment is coming because users are coming!

Capria walked through Chuck Acton’s presentation on managing ancillary data. She mentioned that during the archive splinter, it was already decided that this was important. Capria proposes that this be a project led by Chuck Acton. This may be a multi-phased project Capria is concerned that Acton has too many items for a 1-year project. Capria prepared a project description, but is suggesting the Acton re-work the project description and what can be achieved over the next year. Kasaba questioned what should be the deliverables. The action on Acton will be to finalize the project plan. Beebe said Acton should think about the 1-year goal followed by an assessment, and then next phase. Roatsch asked why we need a project. Everyone seems to be using SPICE so why don’t we just accept it? Beebe said we could fast track this and not wait until next summer, but start active work this year. Crichton accepted an action to discuss this with Acton. Beebe suggests that some items, like SPICE, should be a recommendation that comes out of IPDA that goes forward to our agencies for concurrence.

Kasaba requested that project plans be finalized by the end of July.

Related Efforts to IPDA

Capria presented on IDIS. Its purpose is to coordinate development of an integrated and distributed information system. This is funded by EU via EuroPlanet. Its purpose is to capture data, software and tools, etc. EuroPlanet is formally accepting PDS as a standard. They also recognize

the importance of the IPDA. Capria and Sarkissian are coordinators to IDIS. They have a close cooperation to ESA working with Christophe Arviset. Beebe was suggested to be part of their review board. Capria said they have started, but funding has not been received so she expects more progress to be reported next year.

Beebe discussed that she has an action to work on the COSPAR panel topic which was previously been discussed. Beebe, as part of that, reminded everyone to define their structure and organization. Crichton volunteered to write one for PDS as an example that others could follow.

Capria discussed the website. She would like us to decide what is open and what is closed for access. She also encouraged everyone to upload pictures. Kasaba wants to make sure it is updated with action items. Beebe wants a link to the participating agency site (e.g., links to where it makes sense). We can add detail on the background. Allan suggested that the documents section be better organized and simplified. Osuna wants more use of Wikis. Capria said that Wikipedia is becoming an important tool and we should make sure our description is correct. Allan was asked to help write an eloquent description. Members were encouraged to send input to Allan.

Kasaba went back to confirm the dates for the IPDA meeting next year which will be July 16 and 17. COSPAR will be held in India in 2012.

The meeting was adjourned by Kasaba at noon.

Appendix

A. Recommended Projects

1. Standards Identification (Krishna, Rye): Develop IPDA standards webpage and standards process
2. IPDA Archive Guidelines (Capria, Heather): Develop a webpage with steps for archive developers for building IPDA compliant archives
3. IPDA Registry Plan (Crichton): Develop IPDA registry architecture and plan. Integrate with TEG registry services

4. GIS PDAP (Naru): Extend PDAP to support OGC GIS standards working with the Astrogeology group
5. PDAP Specification (Salgado): Develop and update the PDAP specification
6. PDS4 Assessment (Hughes): Assess and develop plan for adoption of PDS4 within the IPDA
7. Venus Express Accessibility Assessment (Beebe); Assess the approach for accessing the Venus Express data as a model for future interoperability projects
8. Ancillary Data Plan (Acton): Identify plan for capture of ancillary data and assess the plan to internationalize SPICE to meet satisfy the plan

B. Action Items

1. (All, ASAP): Beebe asked each agency to write a paragraph on how to make archiving important.
2. (Project Leaders, September 2009): Send project reports to chair
3. (Osuna, Ongoing): Coordinate with Crichton on registry plan for PDAP
4. (Crichton, ASAP): Setup a section of the IPDA website to capture actions from the meeting
5. (IPDA Assessment Team, ASAP): Develop a presentation that explains PDS4 to agency leadership
6. (TEG, March 2010): Provide a list of tools that should be linked to on the IPDA webpage.
7. (Hughes, ASAP): Send PDS4 Image Descriptions and Model to Roatsch for input and comments

8. (JAXA, October 2009): Provide comments on PDAP and its application to supporting SELENE and Hyabusa
9. (Beebe/Crichton, September 2009): Provide a spreadsheet for assessments as part of a “how to”
- 10.(TEG, February 2010): Develop a few planetary use cases that can validate both PDAP and PDS4 queries (e.g., the structure of a query in PDAP and the semantics in the PDS4 model)
- 11.(Stein, Arvidson, ASAP): Work with IPDA to distribute a presentation to the Chinese and to request a Steering Committee member
- 12.(Krishna, Rye, July 2010): Define end-to-end process flow for standards approval and change as part of the standards identification process
- 13.(TEG, December 2009): Develop assessment matrix for PDAP
- 14.(Roatsch, Ongoing): Help secure a facility for the 2010 IPDA Meeting
- 15.(Crichton, December 2009): Work with Sean Kelly on content management updates to website
- 16.(Crichton, December 2009): Setup mailing lists for projects
- 17.(Crichton, ASAP): Distribute a sample agency description that can be used as a template for Beebe
- 18.(Crichton, ASAP): Meet with Acton to discuss ancillary data project
- 19.(All, Allan, July 2010): Send inputs to Allan for a Wikipedia description of IPDA; Allan to develop a write up
- 20.(Kasaba, September 2009): Create a report for the COSPAR newsletter with support from other IPDA members
- 21.(Kasaba, ASAP): Find/update the members from China, Russia, Canada
- 22.(Beebe, September 2009): Establish the strategy towards the next COSPAR

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