

# **IPDA Prototyping Using PDS4**

IPDA TEG Meeting  
January 27, 2011

# Topics

- IPDA Project Definition
- PDS4 Status
- PDS4 Documents
- IPDA Project Resources
- Next Steps

# Project Definition

- The IPDA Steering Committee feels that it is important to initiate a project to prototype data sets using the PDS4 Data Standards. The goal of the project is to test the capabilities of the PDS4 Data Standards for preparing data sets for use in the international planetary science community under the auspices of the IPDA. This project plans to collect a set of tools that translate from PDS3 to PDS4.
- Team: P. Allan, D. Heather, G. Krishna, T. Roatsch, A. Sarkissian, I. Shinohara, T. Stein, M. Teresa, Z. Ling

# Project Schedule

30-Aug-2010 - Project defined and project members identified

27-Jan-2011 - TEG Presentation

11-Feb-2010 - Website created

03-Mar-2011 - Orientation Telecon

15-Mar-2011 - Follow-up Telecon

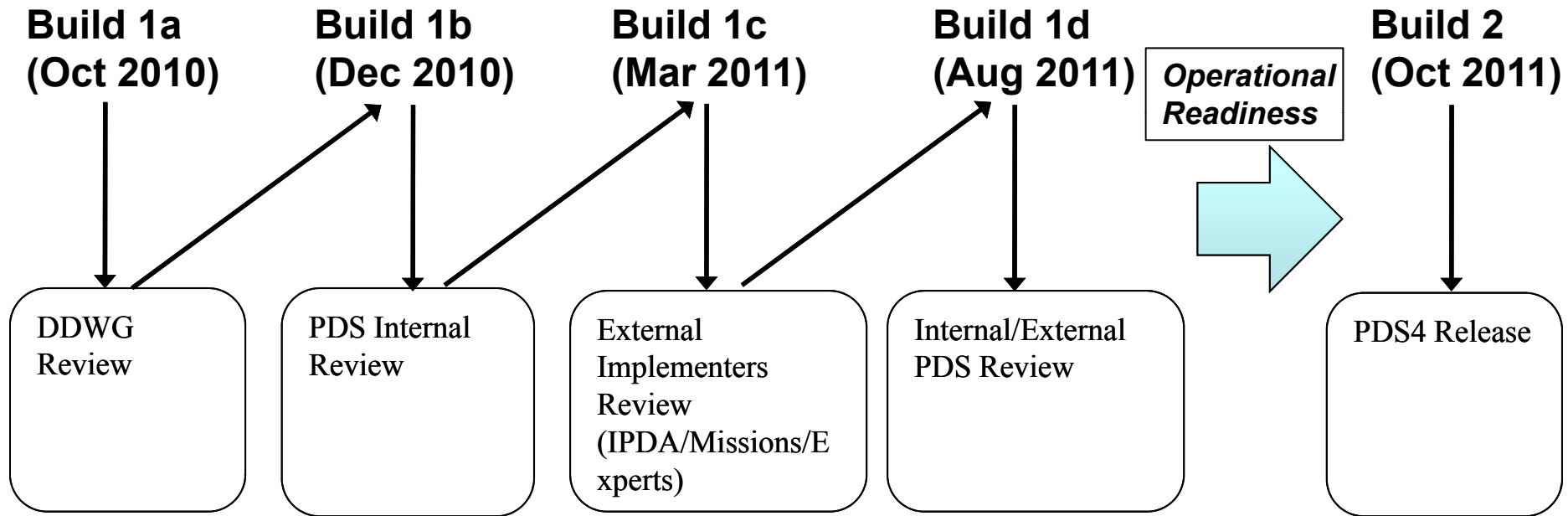
30-May-2011- Comments on Standards Documents forwarded

15-Jul-2011 - Review and exercises completed

01-Aug-2011 - Final reports written

01-Sep-2011 - Present results to the IPDA Steering Committee

# PDS4 Assessment/Input Process



# Project Deliverables

- Specific PDS4 XML schemas for data products (Created from generic PDS4 schemas)
- Compliant XML data product labels
- Archive\_Bundle and data product Collections (aka PDS3 Data Set)
- Review comments on Standards Documents
- Draft Tutorial information for training PDS4 users.
- List of Tools
  - PDS3 to PDS4 translation tools
  - PDS4 to PDS3 translation tools
  - Design and Validation Tools

# **PDS4 Data Standards Build 1b**

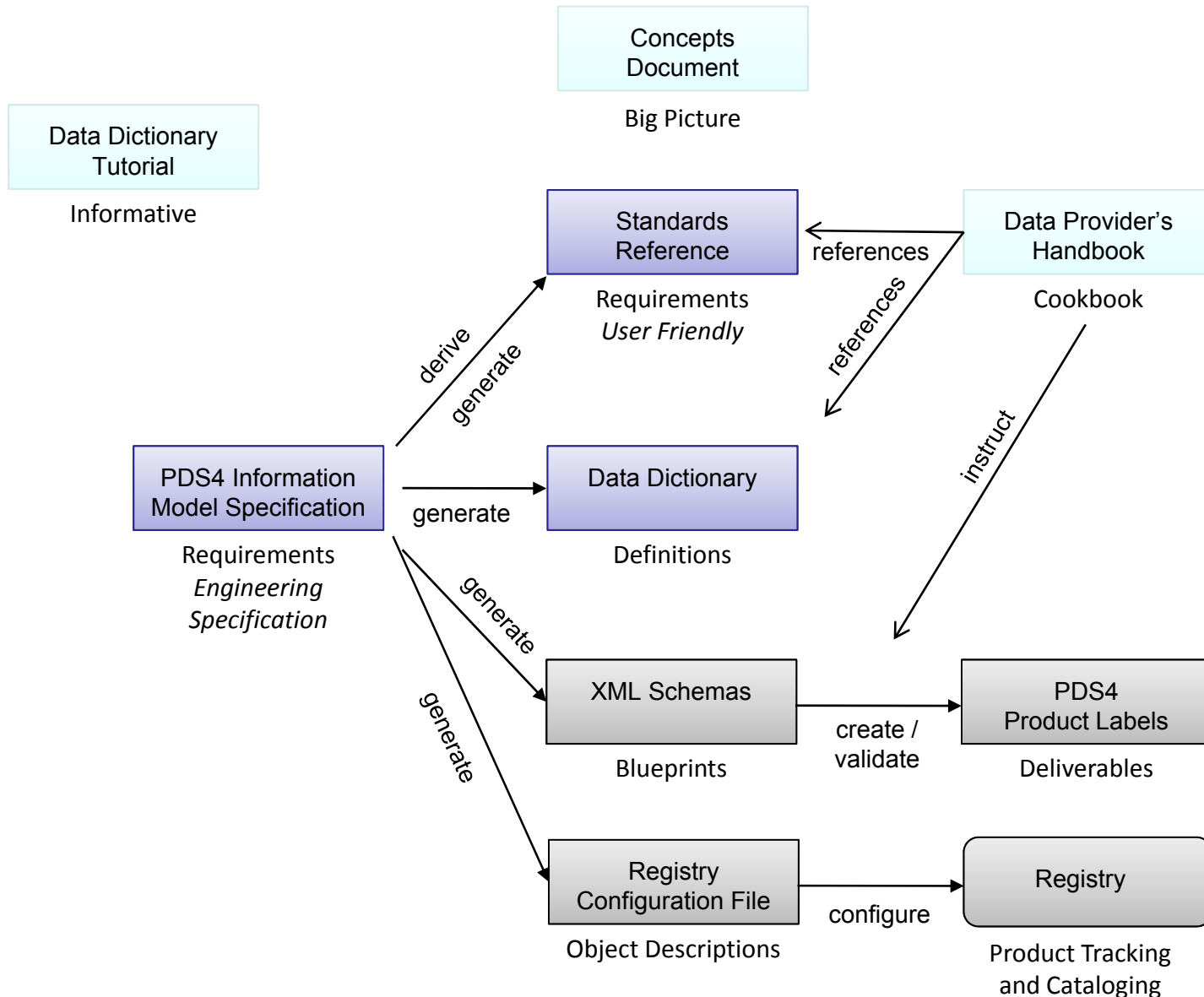
- Items delivered on December 15, 2010
  - Data Standards Concepts Document
  - Standards Reference Document
  - Data Providers Handbook
  - Data Dictionary (abridge and unabridged)
  - Data Dictionary tutorial
  - XML Schemas for generic products
  - Example PDS4 Products
  - PDS4 Information Model Specification

# PDS4 Internal Review

- PDS4 Internal Review – Dec 15, 2010 – Jan 15, 2011
  - Data Standards Concepts Document
  - Standards Reference Document
  - Data Providers Handbook
  - Data Dictionary (abridge)
- Results indicate that the project is on the right path
- Tasks to be completed by Oct 2011 – Build 2
  - Reduce document overlap, fill in holes, and remove inconsistencies.
  - Finalize Core Standards – The standards need to be exercised to identify gaps and problems
  - Develop Discipline Level Classes – e.g. Coordinate Systems and Camera Models.



# PDS4 Documents and their Relationships



**Legend**

- Informative Document
- Standards Document
- File
- System

# Project Resources

- Instructions for the process
- Website with details
- An orientation presentation
- PDS4 Standards Documents
- Examples
  - Documented Examples
  - Process and Results for a complete data set. (Atmos Node)
- Support people from PDS

## **Next Steps**

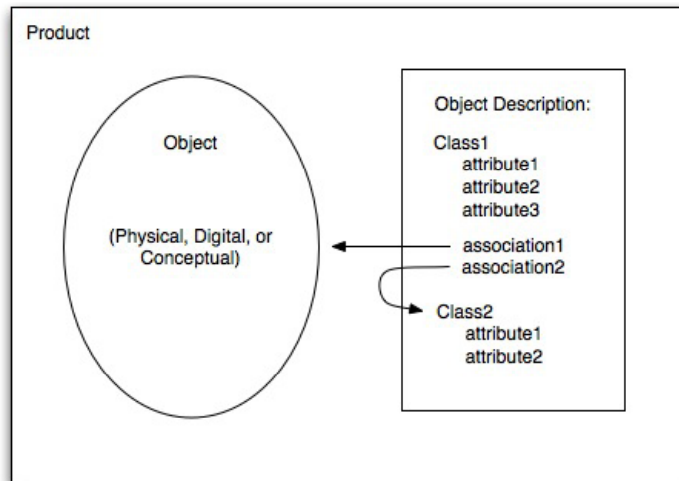
- Setup Website
- Schedule the orientation telecon

**Thank You**

**Backup**

# Standards Reference

- The PDS4 Standards Reference document is intended primarily to serve as a reference document detailing PDS standards used in the preparation of PDS compliant data.
  - Documents the data standard requirements
  - Serves the community of scientists and engineers responsible for preparing planetary science data sets for submission to the PDS.



# Data Providers Handbook

- The Data Providers Handbook (DPH) is a guide for preparation of data being submitted to the Planetary Data System (PDS).
- The DPH functions in the capacity of a tutor/coach to provide information and examples to guide data providers in the design and preparation of data to be archived with the PDS.

Under PDS4, the above example would be decomposed into three separate files where each would have a homogenous record structure.

```
FILE_AREA
FILE_CHARACTER_STREAM = "file-HEADER"
FILE_CHARACTER_FIXED  = "file-TABLE"
FILE_BINARY_FIXED     = "file-IMAGE"
```

Files

HEADER

TABLE

IMAGE

# Data Dictionary

- The PDS4 Data Dictionary defines the organization and components of PDS4 product labels.
  - Classes - A template from which individual members may be constructed – E.g., Image\_Grayscale and Table\_Character.
  - Attributes – A property or characteristic that provides a unit of information about a *class*. – E.g., *axes and fields*.

- **axes**

steward: pds

name space id: pds:

class: Array\_Base

version: 0.1.1.1.c

- data element - data element concept: **DEC\_COUNT** - administration\_record: Beta\_DD\_0.1.1.1.c
- description: **The axes attribute provides a count of the axes.**
- value domain - conceptual domain: **CD\_INTEGER** - administration\_record: Beta\_DD\_0.1.1.1.c
- data\_type: **ASCII\_Integer**
- minimum\_value: 1
- maximum\_value: 16



# XML Schema

- An XML schema is a description of a type of XML document.
  - Used to create and validate XML documents (aka PDS4 Product Labels)
- The PDS4 information model is implemented into XML schemas.
- Status: Beta version released; In sync with PDS4 information model

```
<xsd:complexType name="Image_Grayscale_Type">
  <xsd:sequence>
    <xsd:annotation>
      <xsd:documentation>
        The Image Grayscale class is an extension of array_base and defines
        a two dimensional grayscale image.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:element name="comment" type="pds:comment_Type" minOccurs="0" maxOccurs="1">
    <xsd:element name="axes" type="pds:Array_2D_axes_Type" minOccurs="1" maxOccurs="1">
    <xsd:element name="axis_order" type="pds:Image_Grayscale_axis_order_Type" minOccurs="1"
    <xsd:element name="encoding_type" type="pds:Array_Base_encoding_type_Type" minOccurs="1"
    <xsd:element name="Data_Location" type="pds:Data_Location_Type" minOccurs="1" maxOccurs="1">
    <xsd:element name="Array_Axis" type="pds:Array_Axis_Type" minOccurs="2" maxOccurs="2">
    <xsd:element name="Array_Element" type="pds:Array_Element_Type" minOccurs="1" maxOccurs="1">
  </xsd:sequence>
  <xsd:attribute name="base_class" type="xsd:string" fixed="Array_Base"> </xsd:attribute>
</xsd:complexType>
```

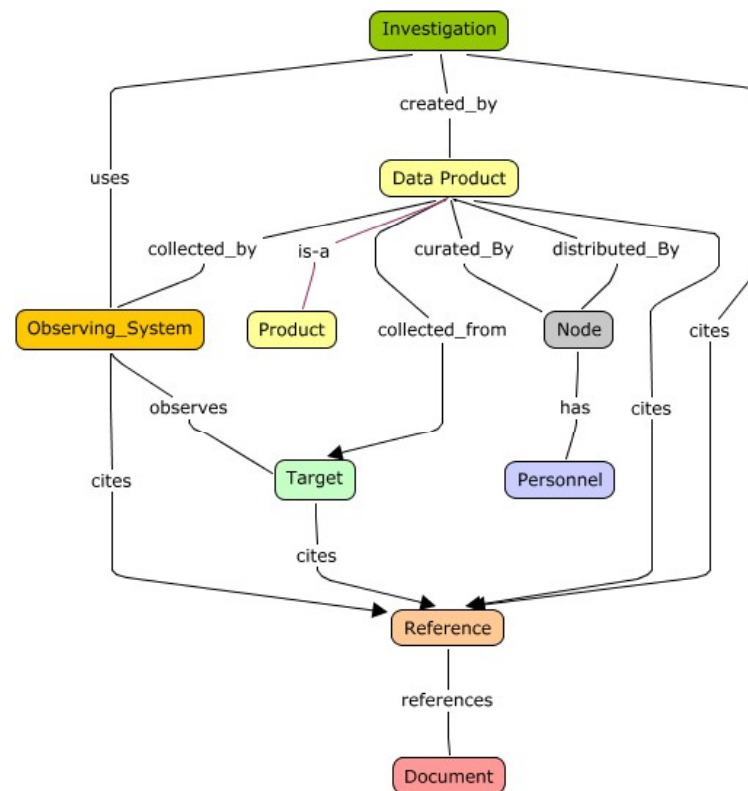
# Product Labels

- Generic XML schema are used as building blocks to create a specific XML schema for a particular product.
- An XML document (aka Product Label) is created from and validated by the specific XML schema.

```
<Image_Grayscale base_class="Array_Base">
  <comment>-comment-</comment>
  <axes>2</axes>
  <axis_order>FIRST_INDEX_FASTEST</axis_order>
  <encoding_type>Binary</encoding_type>
  <Data_Location>
    <file_local_identifrier>-local_identifrier-</file_local_identifrier>
    <offset>-0-</offset>
  </Data_Location>
  <Array_Axis>
    <elements>-800-</elements>
    <name>-name-</name>
    <sequence_number>-0-</sequence_number>
    <unit>-unit-</unit>
  </Array_Axis>
  ...
  <Array_Element>
    <data_type>-data_type-</data_type>
    <unit>-unit-</unit>
  </Array_Element>
</Image_Grayscale>
```

# Information Model Specification

- PDS4 Information Model Specification document defines the components of the PDS Data Standards.
  - Intended for use by programmers and data engineers who require formal definitions of various parts of the PDS.
  - Defines all classes in use in the PDS
    - Archival elements
    - Context descriptions
    - Operational support
- Defines associations among classes
- Status: Beta version released; Contents in sync with PDS4 information model



# Standards Reference

- The document is to be used in conjunction with other Planetary Data System publications:
  - Archive Preparation Guide - a brief overview of the archiving process
  - Data Provider's Handbook - an introduction and basic "how to" manual for archiving data with the Planetary Data System
  - Planetary Science Data Dictionary - contains definitions of the standard classes and attributes used to describe PDS data
  - Proposer's Archiving Guide - provides basic information on the archiving process (including PDS expectations) to scientists proposing for NASA planetary programs
  - PDS Policies and Processes
  - Tutorial Material