PDS Technical Session

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September 24 - 25, 2008

First, things first

- Welcome and Thanks for coming!
- Thanks to the WGs for all their hard work and preparation

Logistics

- Restrooms
  - North/West corner of the building
- Escorts
  - Make sure you walk with someone who has a JPL badge
- Lunch
  - JPL Cafeteria
- Group Dinner
  - IL Fornaio Italian Restaurant in Old Town Pasadena
- Introductions

What is the purpose?

- Ensure PDS-4 is based on the needs of the discipline nodes
  - PDS-4 is responsive to our drivers
  - Nodes provide input into the system engineering process
- Understand the gaps in planning PDS-4
  - If there are policy issues, let's raise them to the MC
  - If there are gaps in the needs, let's identify them
- Answer questions which begins to form the high level architecture
- Note: Don't be too confused over PDS-4 vs PDS 2010
  - PDS4 is the system version
  - PDS 2010 is a project name we can use to tell HQ

What is the format?

- This is intended to be a collaborative session
- This is not a design review, but rather input into the design
- We don't want exhaustive presentations, but rather to engage in discussions
  - We want and need input so we can formulate the architecture and prepare an initial design
- We are attempting to be implementation agnostic
  - We want an architecture that will last independent of the implementation
  - We want an implementation that will be responsive to the architecture
- Consider deployment options
  - We want to understand the architecture tradeoffs and have a solid rationale for picking between them

Agenda

- Agenda online at
  - http://pds-engineering/index.cfm?pid=7&cid=123

Background

- Las Cruces/December 2007
  - Reviewed PDS4/PDS 2010 concepts
  - Began project planning with planning WG
- Washington DC/April 2008
  - Discussed characteristics of PDS 2010, initial project plan and vision statement
- Flagstaff/July 2008
  - Discuss core projects and timeline
  - Begin system formulation phase
  - Formulated architecture (data, system) WGs
- PDS Technical Session/September 2008
  - Discuss the formulation of PDS-4 as a technical group
- Pasadena/November 2008
  - Brief MC on results of the tech session and formulation of PDS-4; next steps

PDS Roadmap

- Published in February 2006 by the PDS MC
  - http://pds-engineering.jpl.nasa.gov/projects/PDS4/Exchange/PDS_Roadmap.pdf
- Addresses critical upcoming challenges
  - Mission and Data Provider
  - User and Customer Challenges
  - Challenges Associated with International Collaborations
  - Operational Challenges
  - On-going Challenges given budget constraints

The Famous Arvidson Questions

1. How will PDS-4 enable “one-stop shopping”, I.e., seamless access to data that reside at multiple nodes?
2. How will PDS-4 help users by delivering derived data products in the format, coordinate system, and map projection from the user requests?
3. How will PDS-4 help data providers by automating the design, production, and delivery of PDS data sets?
4. How will PDS-4 ensure that PDS standards are simple, straightforward, and consistent so that data providers and users can easily understand [**and uniformly**] apply them?
5. How will PDS-4 ensure that data sets can be safely and efficiently archived in NSSDC and retrieved on demand?
6. How will PDS-4 improve the data transfer, data integrity, and maintenance of PDS data sets?
7. What about PDS-4 will simplify addition of future user services -- for example, the hypothetical “geometry engine”? Do we have robust building blocks at the foundation of our structure so that it is easy to grow services that we haven’t yet imaged?

PDS4 Vision Statement*

PDS 2010 will provide the community with planetary science archiving standards that are consistent and simple to use. It will provide online services for using its data archives, allowing users to access and transform data quickly from across the federation of PDS nodes. Data providers will be given adaptable tools to design, prepare, and deliver data efficiently to PDS. PDS 2010 data and services will be managed and delivered from a highly reliable and scalable computing infrastructure that is designed to protect the integrity of the data and virtually link PDS nodes into an integrated data system.

** Approved at April 3/4 MC F2F Meeting with Simpson edits*

Key goals from vision statement*

- Simplified, but rigorous, archiving standards that are consistent, easy to learn, and easy to use
- Adaptable tools for designing archives, preparing data, and delivering the results efficiently to PDS
- On-line services allowing users to access and transform data quickly from anywhere in the system
- A highly reliable, scalable computing infrastructure that protects the integrity of data, links the nodes into an integrated data system, and provides the best service to both data providers and users

* PDS 2010 Executive Summary, July 2008

System Engineering Approach

NASA Phases	FORMULATION		APPROVAL	IMPLEMENTATION		
Life Cycle Phases	**Pre-Phase A:** Advanced Studies	**Phase A:** Mission & Systems Definition	**Phase B:** Preliminary Design	**Phase C:** Design & Build	**Phase D:** Assemble & Test / Launch & Operations	**Phase E:** Operations

Current State

- At the Las Cruces MC, there was a strong recommendation that we should think of "PDS-4" as a mission. We can think of our progress in terms of the NASA engineering lifecycle.
  - It provides a useful framework to an extent, but is H/W centric and focused on a single launch
- At the same time, we've been discussing the implementation as a set of projects which each have their own project definition, requirements, design, implementation and deployment
  - Follow an interative development model for software
- For PDS, I see a hybrid model where we will generate a high level design for PDS4, and then kick off projects which implement to that design

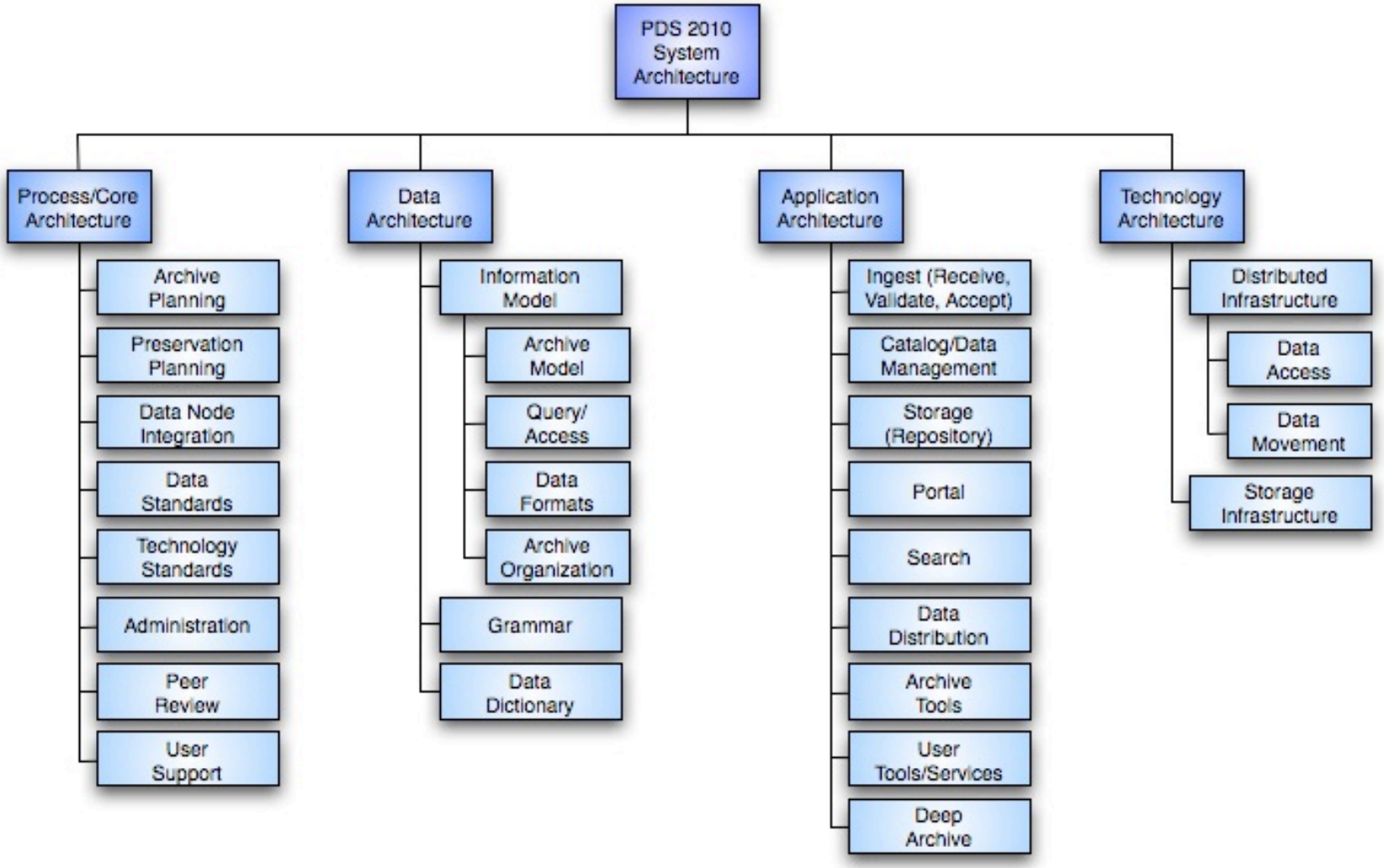
Architecture…what is it?

- Architecture: The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution. (ANSI/IEEE Std. 1471-2000)

- PDS4 Reference System Architecture is decomposed into four core pieces:
  - Process Architecture
    - Describes the core processes PDS follows for its system
    - PDS examples: archive management, preservation planning, peer review, standards management, etc
  - Data Architecture
    - Describes the information models and data standards PDS follows for its system
    - PDS examples: PDS data model, PDS data dictionary, ODL (Grammar), etc
  - Application Architecture
    - Portals, tools, etc
  - Technology Architecture
    - Infrastructure elements

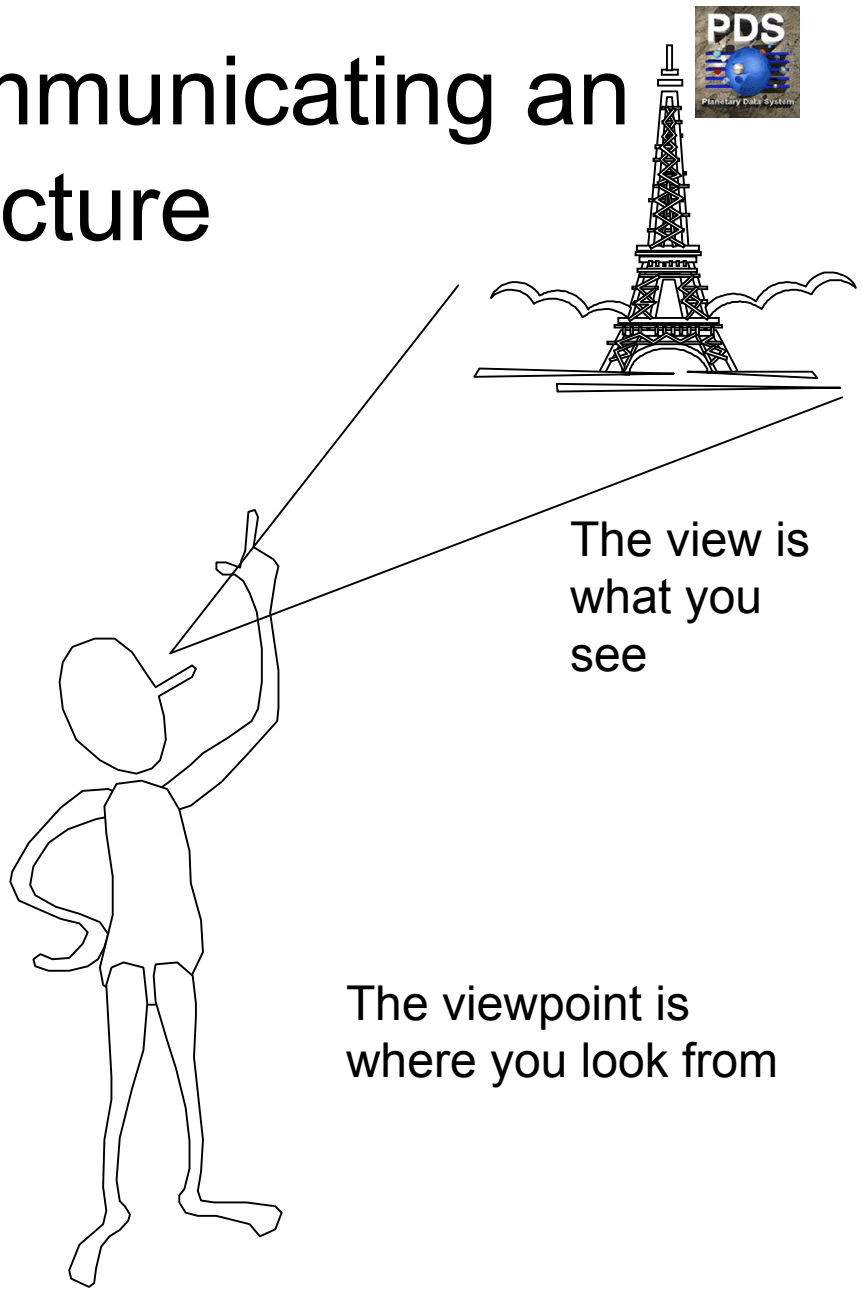
Decomposition of the architecture

Elements derived from PDS 1,2,3 Requirements



Challenge in communicating an architecture

- One of the major challenges is communicating an architecture
  - Determine a useful view of the system for the stakeholder
  - Projects have suffered because a useful view wasn't provided
- Who are the PDS stakeholders that care about the architecture?
- How do we communicate their care-abouts?



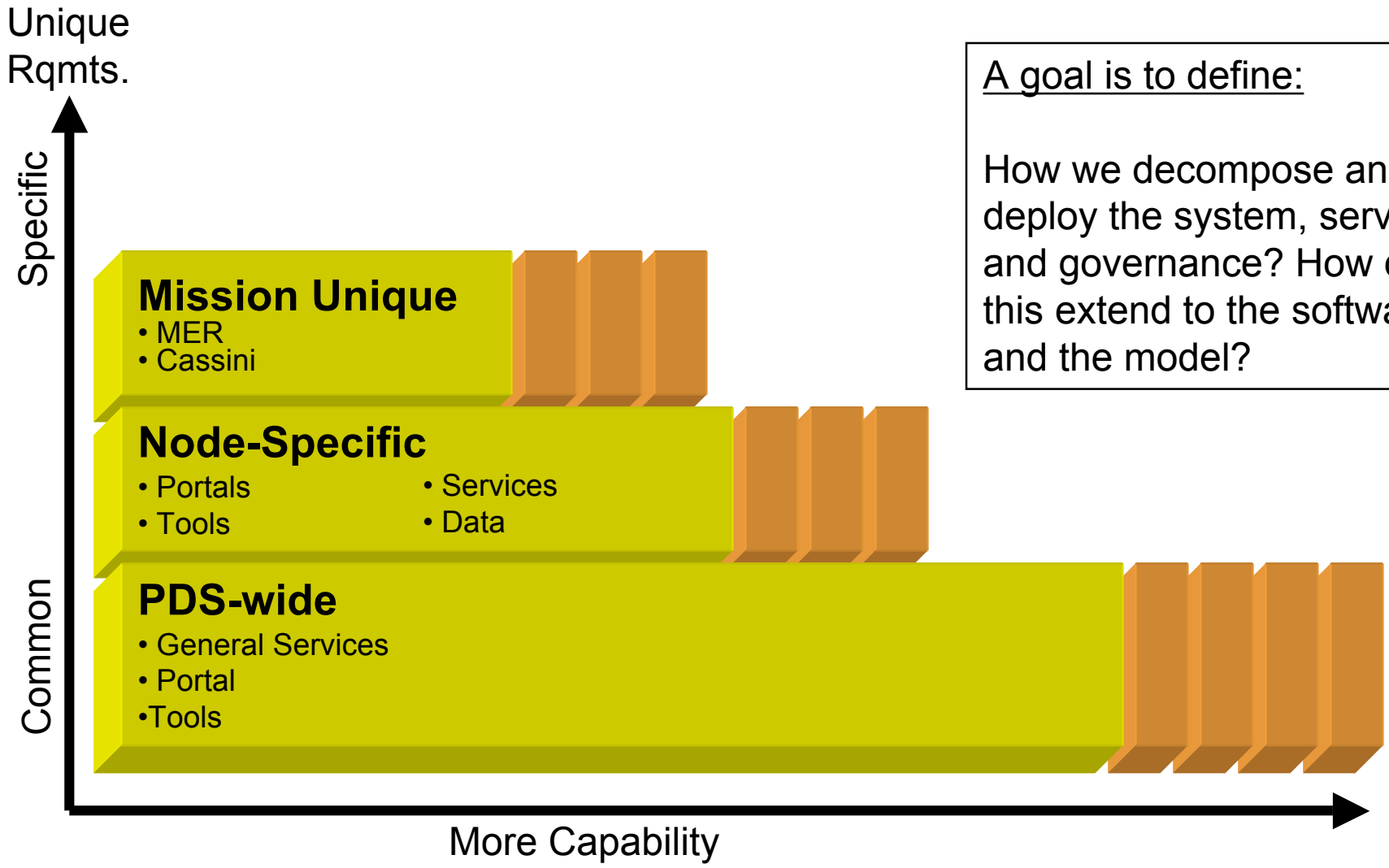
(Management Council, System Engineers, Data Engineers, etc)

PDS views and proposed artifacts for the architecture

	System Architecture Aspects			
Stakeholders	**What (Data View)**	**How (Functional View)**	**Where (Deployment View)**	**Viewpoints**
NASA Program	Scoping Model (Where does PDS fit in Space Science Disciplines?)	Context (Where PDS Fits in Mission Pipeline?)	Distributed Nodes	Scope (Contextual)
Management Council	Conceptual Map	Service Identification	Service Provisioning	Project (Conceptual)
System Engineer	Logical Model (Class Diagrams, PDS Specification)	Service Definitions	Distributed Service Architecture	System (Logical)
Data Engineer / Software Engineer	Data Dictionary / Standards Reference	Service Interfaces	Deployed Service	Technology (Physical)
Data Provider	ODL Templates / XML Schema	Active Services	Service Usage	Detailed Representation (Definition)
Data Consumer	Data Instance	Active Services	Service Usage	Operations (Instance)

Derived from the Zachman Framework

Scoping PDS



A goal is to define:

How we decompose and deploy the system, services and governance? How does this extend to the software and the model?

Resources

- Roadmap
  - http://pds-engineering.jpl.nasa.gov/projects/PDS4/Exchange/PDS_Roadmap.pdf
- PDS Level 1, 2, 3
  - http://pds-engineering.jpl.nasa.gov/index.cfm?pid=5&cid=72
- PDS4 Concept Papers
  - http://pds-engineering.jpl.nasa.gov/index.cfm?pid=100&cid=119 (Architecture)
  - http://pds-engineering.jpl.nasa.gov/index.cfm?pid=100&cid=120 (Data Model)
  - http://pds-engineering.jpl.nasa.gov/index.cfm?pid=100&cid=121 (User Support)
- PDS Vision and Exec Summary
  - http://pds-engineering.jpl.nasa.gov/projects/PDS4/pds2010-execsummary20080701.pdf

Questions?