Preliminary PDS 2010 System Architecture Specification Plan

PDS Management Council Meeting

Flagstaff

July 7-8, 2008

http://pds.nasa.gov

Topics

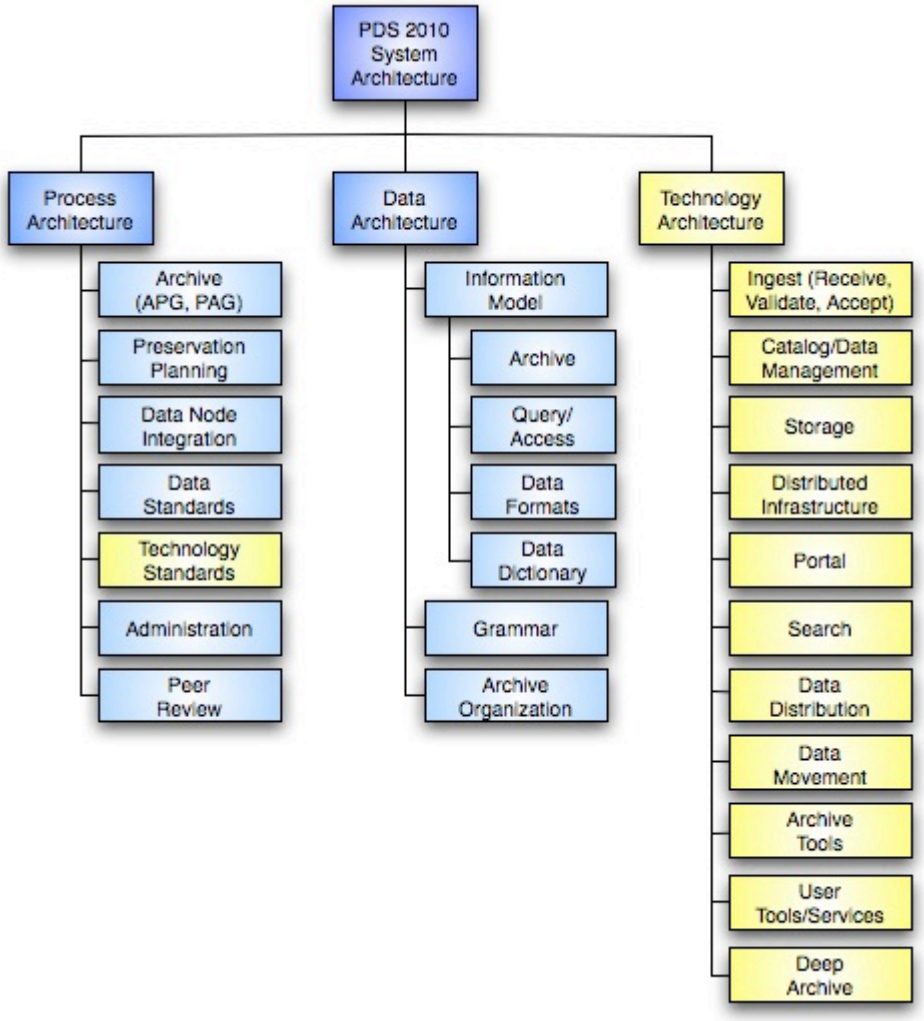
- Definitions
  - Give a brief definition of Architectures pertaining to PDS-2010.
- Goals
  - What we plan to achieve by undertaking this effort.
- Approach
  - Initial approach for developing the System Architecture.
- Timeline/Tasks
  - Focus on the portion of the PDS-2010 schedule related to this effort as well as the tasks at hand.

Definitions

- Enterprise Architecture (applies to NASA)
  - Simply stated, enterprise architectures are "blueprints" for systematically and completely defining an organization' s current (baseline) or desired (target) environment. [1]
- System Architecture (applies to PDS system as a whole)
  - A formal description of a system, or a detailed plan of the system at component level to guide its implementation. [2]
  - The structure of components, their interrelationships, and the principles and guidelines governing their design and evolution over time. [2]
- Software Architecture (applies to PDS software components)
  - The two main aspects of software architecture are that it provides a design plan (a blueprint) of a system, and that it is an abstraction to help manage the complexity of a system. [3]
- Service Oriented Architecture (specific approach to software)
  - A software architecture for building applications that implement business processes or services using a set of loosely coupled black-box components orchestrated to deliver a well-defined level of service. [4]

System Decomposition

- Although the System Architecture normally encompasses the entire system, this effort will focus on the Technology Architecture portion as defined by the PDS Planning & Assessment WG. [5]
  - The Data Architecture is covered by the Preliminary PDS 2010 Data Architecture & Information Model effort.
  - The Process Architecture is covered by ongoing efforts to update and amend PDS policy.
- This decomposition will be revisited during the system architecture effort.



Goals

- The main goal of this effort is to define the over-arching System Architecture for PDS, which will encompass all PDS-2010 and future projects.
  - This includes projects developed at the Engineering Node as well as the Discipline Nodes.

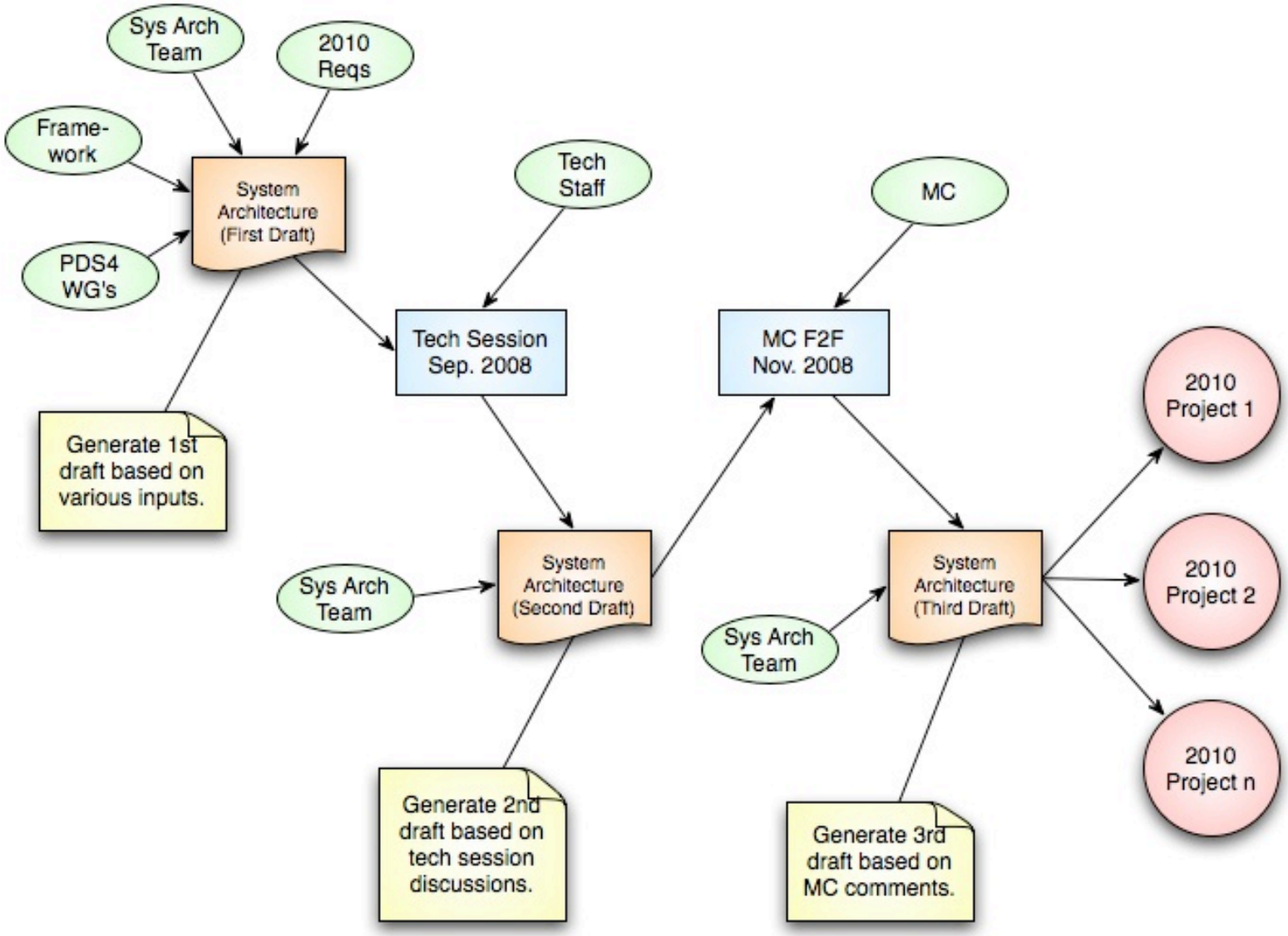
- A System Architecture will facilitate the development of PDS-2010 via:
  - Consistent use of common terminology for ease of integration.
  - Commonly defined and implemented interfaces increase usability and portability of applications.
  - Well defined and loosely coupled services increase scalability and adaptability for future expansion.

- The end result of this effort will be a document detailing the various aspects of the PDS-2010 System Architecture.
  - This document will evolve as the system evolves.

Approach

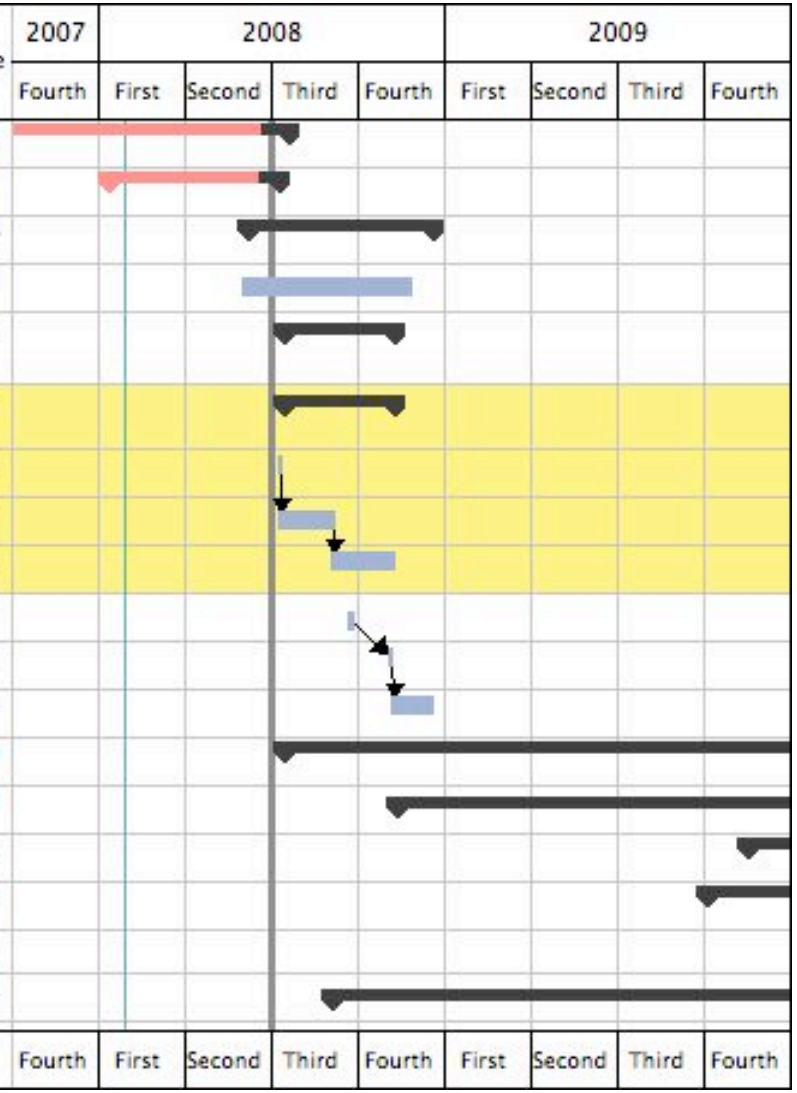
- Decide early on whether a specific industry standard approach or framework should be followed to guide this effort.
  - For example, The Open Group Architecture Framework [2] or the Federal Enterprise Architecture [1] or the Zachman Framework [6], etc.
- No matter the approach or framework, identify the artifacts that this effort should produce to move forward into development.
  - For example, we don't need to produce all 30 model views of the Zachman Framework, but 4 or 5 of them could be very useful.
  - The team will determine the artifacts best suited for PDS.
- Build on the work previously produced by the PDS4 Working Groups.
  - Artifacts from the Architecture and User Support WGs should feed directly into this effort.
- Keep it simple
  - The result of this effort should not require a "System Architect" to decipher. No training will be required to move forward.

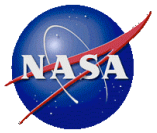
Approach
Roadmap



Timeline/Tasks

Activity Name	Start Date	Finish Date
Concept/Study Phase...	8/20/07	7/18/08
Project Planning...	1/7/08	7/9/08
PDS 2010 Architecture	6/2/08	12/18/08
Finalize PDS 2010 Level 1,2,3 Requirements	6/2/08	11/25/08
Preliminary PDS 2010 Data Architecture & Information Model...	7/10/08	11/7/08
Preliminary PDS 2010 System Architecture Specification	7/10/08	11/7/08
Form Design Team	7/10/08	7/10/08
System Definition and Decomposition	7/11/08	9/4/08
Service Definitions and Service Model	9/5/08	11/7/08
PDS 2010 Tech Session	9/24/08	9/25/08
MC Summary Presentation (Fall MC)	11/6/08	11/6/08
Finalize High Level Architecture	11/7/08	12/18/08
P1. PDS 2010 Data Standards Project...	7/10/08	5/27/10
P2. Distributed Infrastructure Project...	11/7/08	2/18/11
P3. PDS 2010 Tools Project...	11/13/09	9/23/11
P4. Distributed Catalog System Project...	9/30/09	5/31/11
P5. Portals, Search and Distribution	6/14/10	10/14/11
P6. Data Movement and Delivery Project...	9/1/08	8/11/11





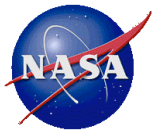
Form Design Team

- Members should expect to spend about 3 hours a week (for four months) generating and reviewing content including attending weekly telecons.

- Members should also attend the Tech Session in September where the preliminary System Architecture will be presented and discussed.

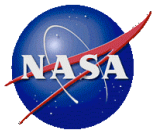
- Prospective Members (* confirmed interest)
  - Dan Crichton*
  - Sean Hardman* (Lead)
  - Todd King*
  - Sue LaVoie*
  - Mike Martin*
  - Tom Stein

- Will be completed by the end of the week of July 7, with the first telecon planned for the week of July 14.



Timeline/Tasks
System Definition and Decomposition

- Define the scope of the PDS-2010 system.
  - Will it apply to administrative tasks (e.g., budgeting, metrics, etc.) performed at the Discipline Nodes?
  - Will it apply to sub-nodes and data nodes?
  - How will existing customer interfaces be impacted?
- Identify any constraints to be placed on the system.
  - Day-to-day operations have a higher priority.
  - Institutional constraints or other funding source constraints on node systems.
  - Limited funding and learning curve issues.
- Define architectural principles to guide system design and development.
  - The new system must be easy to use.
  - It must be scalable to help nodes deal with increasing data volumes.
  - Must be designed independent of technology choices to enable future upgrades.
- Revisit the system decomposition produced by the Planning and Assessment WG.
  - This will help identify the services to be defined and developed.



Service Definitions and Service Model

- Define the software services to be developed for PDS-2010 along with their interfaces and any dependencies.
  - The service definitions will be a great starting point for Level 4 and 5 requirements.
- Map those services to one of the PDS-2010 projects.
  - The services should be prioritized based on importance to the overall function of the system and any dependencies from other services.
- Determine technology options for a Service Oriented Architecture (SOA) approach to be used in development.
  - Decisions made when defining the system scope and constraints will have an impact here. For example, any platform or programming language limitations.
  - This is where consideration will have to be given to any sort of learning curve by the Discipline Nodes.

References

[1] Federal Enterprise Architecture (FEA), Office of Management and Budget (OMB). (http://www.whitehouse.gov/omb/egov/a-1-fea.html)

[2] The Open Group Architecture Framework (TOGAF), The Open Group, 2007. (http://www.opengroup.org/)

[3] Applied Software Architecture, C. Hofmeister, R. Nord, D. Soni, 2000.

[4] Service Oriented Architecture for Dummies, J. Hurwitz, R. Bloor, C. Baroudi, 2006.

[5] PDS-2010 Project Planning, PDS Planning and Assessment WG, April 3, 2008. (http://pds-engineering/projects/PDS4/pds2010-project-overview-20080401.pdf)

[6] Zachman Framework, The Zachman Institute for Framework Advancement. (http://www.zifa.com/)