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GSAW 2010: Innovation on the Ground

Session 11B: Innovation at JPL – GDS Modernization: A Case Study

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Agenda

Institutional View

- JPL's **G**round **D**ata **S**ystem Modernization Strategy
- Product Data Accountability Introduction
- Product Data Accountability Case Study
- Use of Industry Patterns / Best Practices
- Use of Common Infrastructure Services Framework
- Use of Component Level Integration
- Use of Inherited Architecture
- Summary



Ground Data System Modernization Strategy

JPL is pursuing an architecture modernization strategy to innovate the development and deployment of a GDS to flight projects.

Goal is to modernize AMMOS and the DSN through the application of industry best practices in both software and enterprise architecture.

Provides infrastructure services framework common to AMMOS and the DSN, which has a unifying effect both programmatically and technically

Component level integration, which facilitates reuse and interoperability

Facilitates reference architecture adoption by both AMMOS and DSN

Emphasis is on inherited architecture rather than inherited code



Product Data Accountability Introduction

Product Data Accountability (PDA) refers to the capability of automated tracking of mission data items (e.g., Science Data Products) through the entire data item lifecycle across distributed flight and ground systems.

A typical data product lifecycle includes the following stages:

- Product Planning (Prediction)
- Command Sequencing
- Sequence Uplink
- Sequence Received Onboard
- Instrument Commanded
- Product Ready for Downlink
- Product Received in Raw Telemetry
- Product Assembly
- Product Storage
- Product Distribution



Product Data Accountability Case Study

The Product Data Accountability case study will provide an example of how the strategy is influencing subsystem implementations and GDS modernization

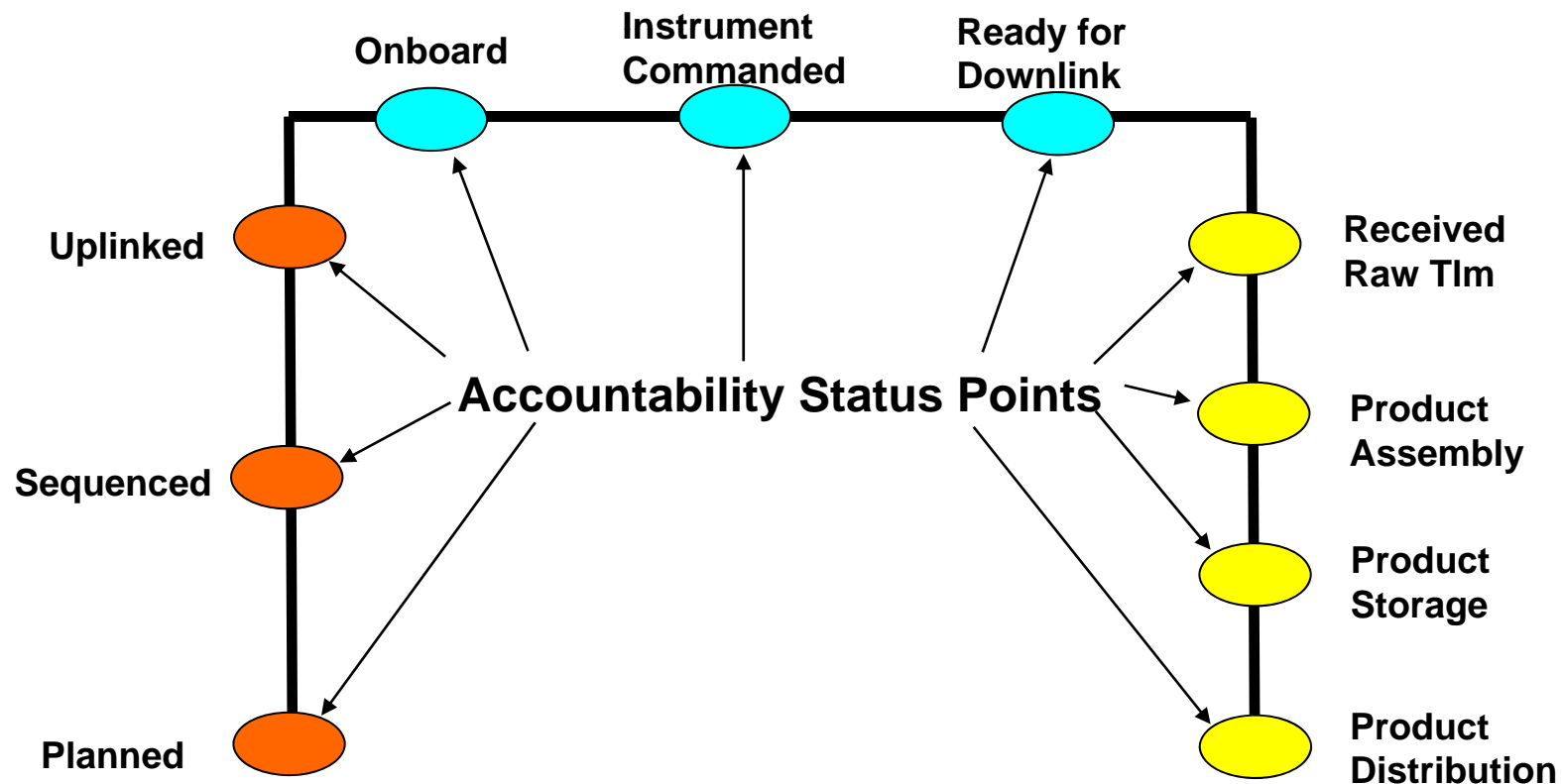
- Use of industry patterns / best practices
- Use of common infrastructure services framework
- Component level integration
- Emphasis on inherited architecture



Use of Industry Patterns / Best Practices

The Product Data Accountability subsystem utilizes the “FedEx” design pattern for tracking and visualizing product status

Product status is reported as various accountability status points along the route from product prediction to product delivery



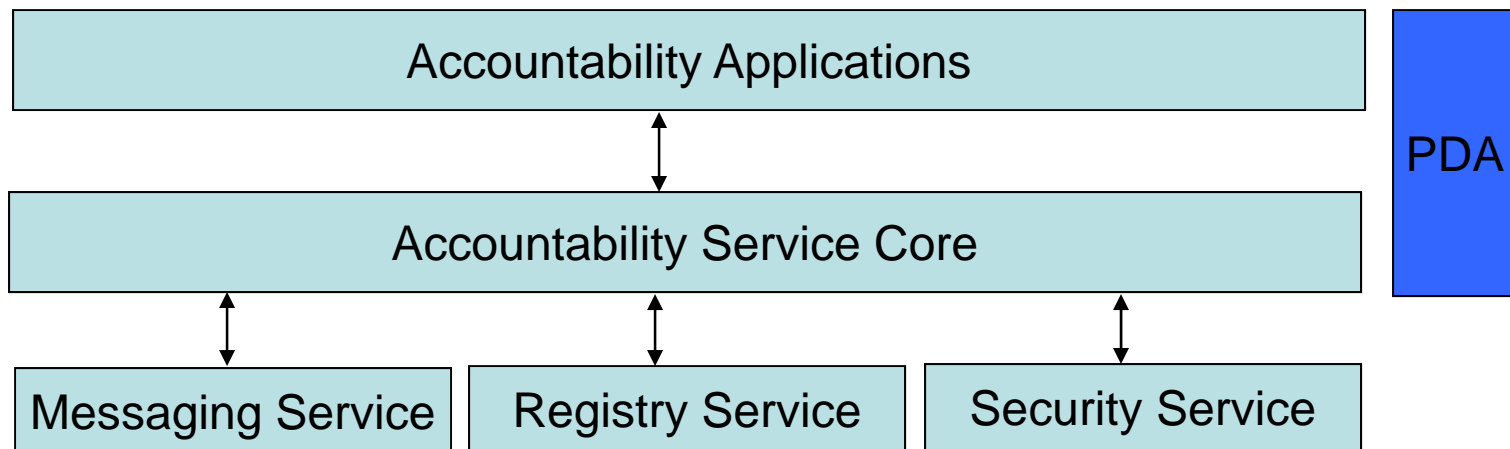


Common Infrastructure Services Framework

The Product Data Accountability subsystem utilizes common infrastructure services to handle messaging, registry, and security tasks.

The infrastructure services are usable by all components of the ground data system.

The Product Data Accountability subsystem provides an Accountability Service Core as a layer above the infrastructure services that facilitates the development of accountability applications.





Component Level Integration

Within the Product Data Accountability subsystem, each Accountability Status Point is a component that functions independently from other Accountability Status Points.

Accountability Status Points can be easily added, removed, and configured within the service core to support accountability applications for various mission classes

- For example, a relay assets accountability status point can be added to support an accountability application for a relay class mission

The Product Data Accountability subsystem itself can be integrated into the GDS as a component that produces and consumes messages on an enterprise service bus.



Inherited Architecture

The Product Data Accountability subsystem is a re-envisioning of the Tailorable Report Utility for Science product Tracking (TRUST) accountability subsystem developed specifically for the Mars Reconnaissance Orbiter project.

The TRUST subsystem is an automated, highly-available, web-based product tracking system that provides multi-level visibility into product status for science, instrument, and engineering teams.

The Product Data Accountability subsystem inherits elements and their relationships from the TRUST subsystem, and re-implements them in a multimission context using standards-based technologies. Use of a services oriented architecture allows the Product Data Accountability subsystem to be used in a platform independent, language neutral, and implementation agnostic manner.

The Product Data Accountability subsystem provides a reference architecture that can be used by orbiter class missions. This architecture can easily be adapted for other mission classes.



Summary

The Product Data Accountability subsystem represents JPL's effort to innovate the development and deployment of ground data systems through the use of a shared architecture modernization strategy.

The Product Data Accountability subsystem uses industry patterns, common infrastructure services, component integration, and inherited architecture to provide innovative multimission capabilities to JPL flight projects.