Planetary Data System

Report Service

Software Requirements and Design Document (SRD/SDD)

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CHANGE LOG

Revision	Date	Description	Author
0.1	2009-12-09	Initial draft.	S. Hardman
0.2	2010-03-08	Filled out the document with use cases, requirements and architecture.	S. Hardman
0.3	2010-03-15	Added level 4 requirements for static metrics.	S. Hardman

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1.0 INTRODUCTION

The PDS 2010 effort will overhaul the PDS data architecture (e.g., data model, data structures, data dictionary, etc) and deploy a software system (online data services, distributed data catalog, etc) that fully embraces the PDS federation as an integrated system while leveraging modern information technology.

This service provides functionality for capturing and reporting metrics. A Commercial Off-The-Shelf (COTS) product would most likely satisfy the requirements of this service.

1.1 Document Scope and Purpose

This document addresses the use cases, requirements and software design of the Report service within the PDS 2010 data system. This document is intended for the reviewer of the service as well as the developer and tester of the service.

1.2 Method

This combined Software Requirements and Software Design Document (SRD/SDD) represents the software by defining use cases and requirements and by using architecture diagrams, functional descriptions, context diagrams and data flow diagrams for the high-level design. UML diagrams will illustrate the detailed design.

1.3 Notation

The numbering of the requirements in this document will be formatted as **LX.RPT.AA.X**, where:

- **LX** represents the requirements level where X is a number.
- **RPT** is an abbreviation representing the security requirements section for the specified level.
- **AA** is a two-letter abbreviation representing the requirement sub-category (optional).
- **X** is a unique number within the section and optional sub-category for the requirement.

Following the text of a requirement may be a reference to the requirement or use case from which it was derived. The reference will be in parenthesis. A paragraph following a requirement, which is indented and has a reduced font size, represents a comment providing additional insight for the requirement that it follows. This comment is not part of the requirement for development or testing purposes.

1.4 Controlling Documents

[1] Planetary Data System (PDS) Level 1, 2 and 3 Requirements, August 2006.

[2] Planetary Data System (PDS) 2010 Project Plan, February 2010.

[3] Planetary Data System (PDS) 2010 System Architecture Specification, Version 1.0, February 28, 2010.

[4] Planetary Data System (PDS) 2010 Operations Concept, February 2010.

[5] Planetary Data System (PDS) Service Software Requirements Document (SRD), TBD.

1.5 Applicable Documents

[6] PDS User Metrics Collection and Reporting Requirements, PDS Mission Interface Working Group (MIWG), December 16, 2009.

1.6 Document Maintenance

The component design will evolve over time and this document should reflect that evolution. This document is limited to design content because the specification content will be captured in separate documentation (e.g., Installation Guide, Operation Guide, etc.). This document is under configuration control.

2.0 SERVICE DESCRIPTION

This service provides functionality for capturing and reporting metrics. Although each new service will have functional requirements to track metrics, those metrics should be submitted to this service via a common interface or captured in a common format so that they can be harvested this service. The service is not limited to metrics generated by PDS 2010 services, but should also include metrics from the FTP and web logs from each of the nodes as well as any other commonly generated metric. The following diagram details the context of the Report service within the system:

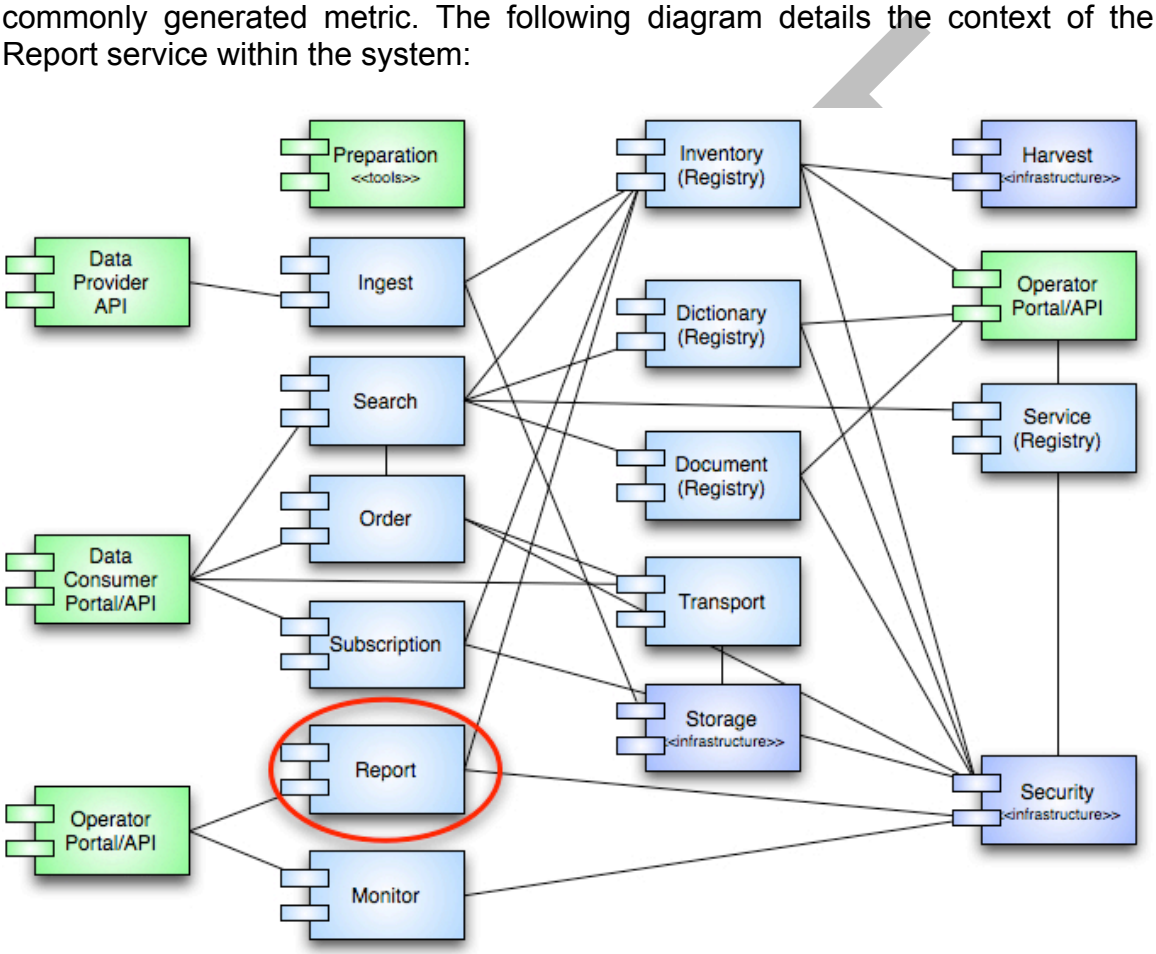

Figure 1: Report Service Context

Although the Report service is a service within the system, it will have very little direct interaction with the other services. This is mainly due to the desire to satisfy these requirements with a COTS package. Minimizing the direct interfaces with the service will make it easier in the future to replace it with another package if the need arises.

Although the current PDS system does not have a common Report service, every Node in the PDS has the responsibility to report their metrics. The service

defined in this document will provide the PDS 2010 system with a single service for capturing and reporting metrics within the system.

3.0 USE CASES

A use case represents a capability of the component and why the user (actor) interacts with the component. It should be at a high enough level so as not to reveal or imply the internal structure of the system. An actor is an object (e.g., person, application, etc.) outside the scope of the component but interacts with the component. This section captures the use cases for the Report service based on the description of the component from the previous section. These use cases will be used in the derivation of requirements for the component. The following diagram details the use cases:

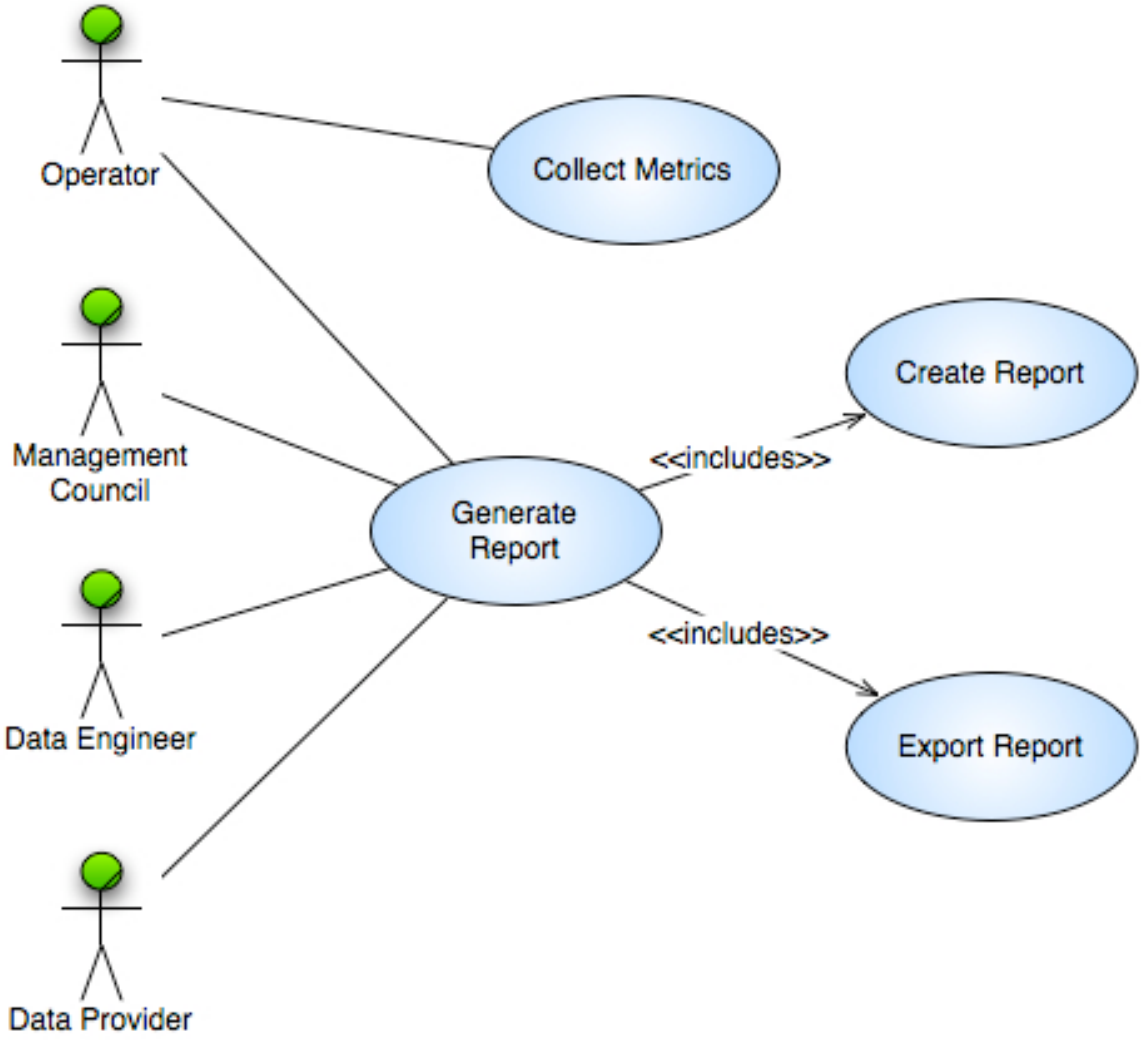

Figure 2: Report Service Use Cases

The above diagram identifies the following actors (represented as stick figures):

Data Engineer

This actor represents a portion of the PDS Technical group that curates the data before and after it enters the PDS system.

Data Provider
This actor represents the mission, instrument team and NASA-funded researcher who are involved with delivering data to the PDS.

Management Council
This actor represents the management level of the PDS.

Operator
This actor represents a portion of the PDS Technical group that is responsible for configuring and monitoring the system.

The following sections detail the use cases identified in the above diagram.

3.1 Collect Metrics

The service collects metrics from various sources across the Engineering and Discipline Nodes including FTP/web logs and service logs. This use case pertains to the Operator actor.

1. Operator configures the Report service to retrieve/receive one or more log files of a defined type.
2. Report Service periodically pulls the specified log files to the service staging area.
3. Report service processes the log file(s) and captures the metrics in the service data store.

Alternative: Report Service Receives Log File(s)
At step 2, the Operator pushes the log file(s) to the service.
a. Operator periodically pushes the log file(s) to the service staging area.
b. Return to scenario at step 3.

3.2 Generate Report

Users of the system may generate a metrics report according to their selected criteria. This use case pertains to all actors defined above referred to as “User” in the use case.

1. User authenticates for access to the Report service interface (include Security service Authenticate User use case).
2. User creates a metrics report (include Create Report use case).
3. Report service generates the specified report from the service data store.
4. User exports the generated report (include Export Report use case).

Alternative: User Selects Existing Report
At step 2, the User selects an existing report.

a. User selects a metrics report from their list of saved reports or the service-wide list of saved reports.
b. Return to scenario at step 3.

3.3 Create Report

Users may create a metrics report according to their own selected criteria. This use case is included as part of the Generate Report use case.

1. User specifies criteria for a metrics report including content, format and scope.
2. User saves the report for personal reuse or service-wide reuse.
3. Report service saves the specified metrics report criteria.

Alternative: Report Not Saved
At step 2, the user chooses not to save the report.

a. User does not save the report.

3.4 Export Report

Users may export a generated report in various formats including but not limited to a spreadsheet or PDF file. This use case is included as part of the Generate Report use case.

1. User specifies the export format for the report.
2. Report service transforms the report to the selected export format.

4.0 REQUIREMENTS

The architecture definition phase of the PDS 2010 project resulted in the decomposition of the system into several elements [3]. The Report service does not derive directly from any of those elements nor are there any related level 3 requirements associated with reporting. The PDS Mission Interface Working Group (MIWG) prepared a set of requirements for collection and reporting of metrics [6]. In addition, the PDS Program Manager also provided requirements for collection of metrics. In lieu of deriving the level 4 requirements from the level 3 requirements, the level 4 requirements derive from these inputs.

4.1 Level 4 Requirements

The level four requirements in PDS represent subsystem, component or tool requirements at a high level. The following requirements pertain to the Report service:

L4.RPT.1 - The system shall maintain a repository for storage of PDS-wide metrics. (MIWG)

L4.RPT.2 - The system shall allow report generation from stored metrics. (MIWG)

L4.RPT.3 - The system shall collect the following types of active metrics at each PDS Node: (MIWG)

a. Files uploaded (ingested)
b. Bytes uploaded (ingested)
c. Files downloaded
d. Bytes downloaded

Active metrics refer to transactions within the system related to ingestion and distribution of data.

L4.RPT.4 - The system shall collect and associate the following metadata with collected active metrics: (MIWG)

a. Time of event
b. User initiating event (e.g., IP address)
c. Investigation
d. Observing system
e. Collection
f. Product

L4.RPT.5 - The system shall collect the following types of static metrics at each PDS Node: (PM)

a. Number of bytes in the archive
b. Number of products in the archive
c. Number of collections in the archive

Static metrics refer to the inventory of data within the system. The Registry service contains this information.

L4.RPT.6 - The system shall collect and associate the following metadata with collected static metrics: (PM)

a. Archive state
b. Archive disposition (i.e., delivered to Deep Archive)
c. Investigation
d. Observing system
e. Collection

4.2 Level 5 Requirements

The level five requirements in PDS represent subsystem, component or tool requirements at a detailed level. The following requirements pertain to the Report service:

L5.RPT.1 - The service shall support periodic submission of metrics. (L4.RPT.1, UC 3.1)

L5.RPT.2 - The service shall allow the submission of metrics in the form of a log file. (L4.RPT.1, L4.RPT.3, L4.RPT.4, L4.RPT.5, L4.RPT.6, UC 3.1)

Log files associated with FTP and web servers have known, and consistent formats that allow for parsing and metric extraction.

L5.RPT.3 - The service shall be configurable to support varying log file formats. (L4.RPT.1, L4.RPT.3, L4.RPT.4, L4.RPT.5, L4.RPT.6, UC 3.1)

This provides support for log files from Node-specific and PDS 2010 services.

L5.RPT.4 - The service shall aggregate submitted metrics based on associated metadata. (L4.RPT.1, L4.RPT.3, L4.RPT.4, L4.RPT.5, L4.RPT.6, UC 3.1)

L5.RPT.5 - The service shall store aggregated metrics. (L4.RPT.1, UC 3.1)

L5.RPT.6 - The service shall restrict access to the user interface. (L4.RPT.1, UC 3.2)

L5.RPT.7 - The service shall allow users to tailor reports as follows: (L4.RPT.2, UC 3.2, UC 3.3)

a. Content (attribute selection based on desired metric)
b. Format (layout of the attributes)
c. Scope (date/time range)

L5.RPT.8 - The service shall allow users to save reports for reuse. (L4.RPT.2, UC 3.2, UC 3.3)

L5.RPT.9 - The service shall allow periodic generation of saved reports. (L4.RPT.2, UC 3.2, UC 3.3)

L5.RPT.10 - The service shall export reports in the following formats: (L4.RPT.2, UC 3.2, UC 3.4)

a. Spreadsheet
b. HTML
c. PDF

5.0 DESIGN PHILOSOPHY, ASSUMPTIONS, AND CONSTRAINTS

The intent of the Report service is to provide a PDS-wide capability to capture and report on metrics. There are several commercial packages on the market that will satisfy these requirements. The development team will evaluate a couple of these packages against the requirements with the selected package integrated into the PDS 2010 system.

6.0 ARCHITECTURAL DESIGN

The architectural design covers the component breakdown within the service, external/internal interfaces and the associated data model.

6.1 Service Architecture

The following diagram details the architecture of the Report service:

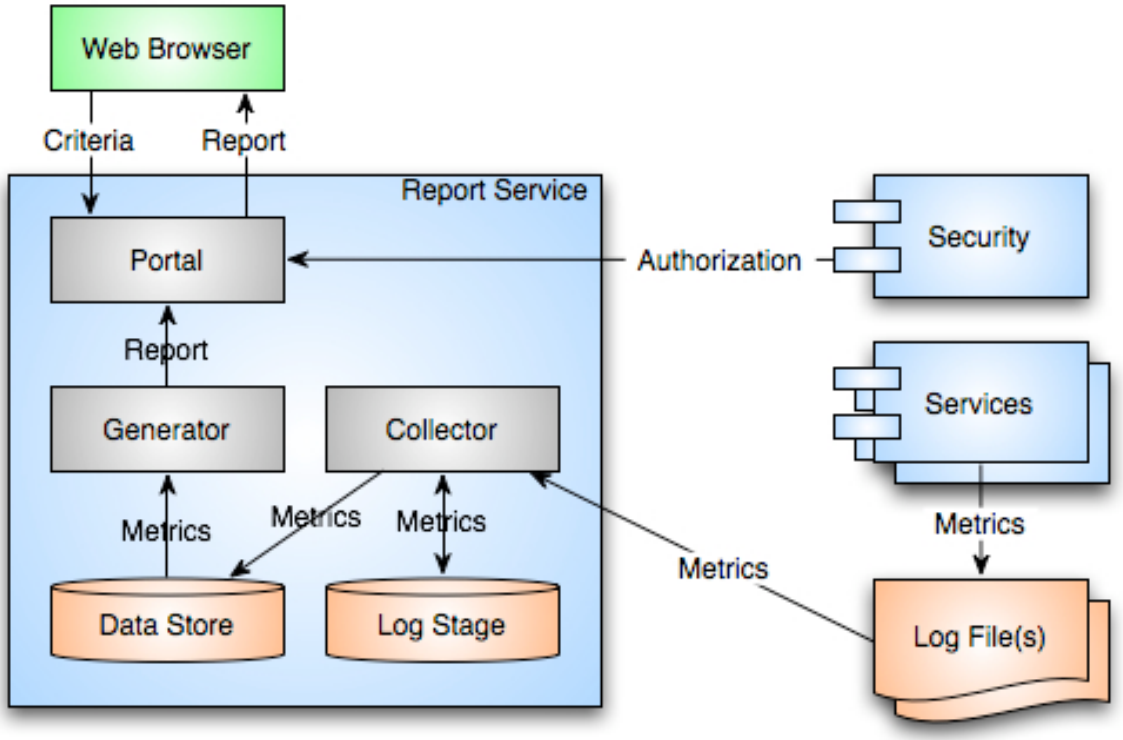

Figure 3: Report Service Architecture

The Report service provides two main functions. The first is to collect and aggregate metrics from multiple sources. The second is to provide an interface for tailoring and generating reports from the aggregated metrics. The external and internal interfaces are subject to the selected package.

6.2 Data Model

The Report service does not have an associated data model.

7.0 ANALYSIS

The decision to look strictly at commercial packages centers on previous experience by the Engineering Node staff with the Physical Oceanography Distributed Active Archive (PO.DAAC) project. The managing entity for that project, the Earth Observing System Data and Information System (EOSDIS), uses a commercial package for capturing and reporting on metrics from the multiple DAACs.

8.0 IMPLEMENTATION

The PDS 2010 system is a phased implementation with increasing capabilities delivered in three planned builds. The builds are as follows:

- **Build 1** – This build consists of the Ingestion subsystem including the Security, Harvest, Registry (Inventory, Dictionary, Document, Service) and Report components along with the Data Provider tool suite.
- **Build 2** – This build consists of the Distribution subsystem including the Search and Monitor components along with a revised web site and general portal applications.
- **Build 3** – This build consists of enhanced user capabilities include the Order and Subscription components along with integration of Discipline Node applications and science services.

The Report service is planned for delivery in Build 1. There is no planned phasing with regard to the implementation with all planned capabilities available in Build 1.

The scenario for deployment is to run a single instance of the Report service at the Engineering Node. This will allow each Node to submit their metrics to a centralized location. The following diagram depicts this deployment scenario:

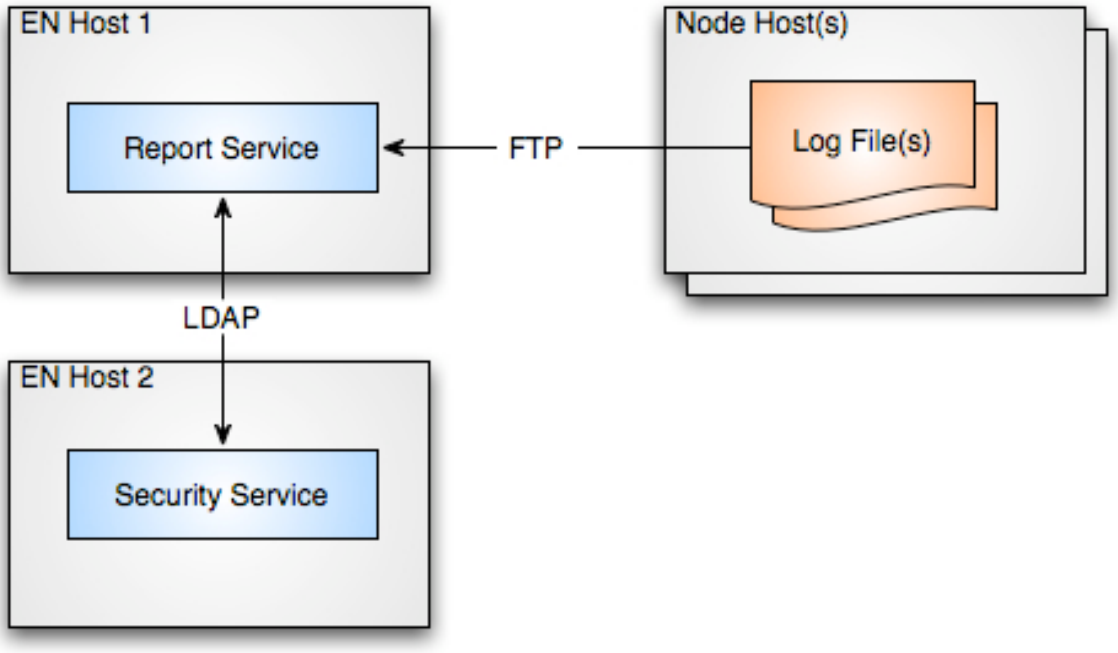

Figure 4: Report Service Deployment

Nodes will submit their log files via a File Transfer Protocol (FTP) interface. The Security service provides authentication via a Lightweight Directory Access Protocol (LDAP) interface for the portal portion of the Report service.

9.0 DETAILED DESIGN

More information on this topic will be forthcoming in a subsequent version of this document.

APPENDIX A ACRONYMS

The following acronyms pertain to this document:

API	Application Programming Interface
FTP	File Transfer Protocol
JPL	Jet Propulsion Laboratory
LDAP	Lightweight Directory Access Protocol
NASA	National Aeronautics and Space Administration
PDS	Planetary Data System
SDD	Software Design Document
SRD	Software Requirements Document
UC	Use Case