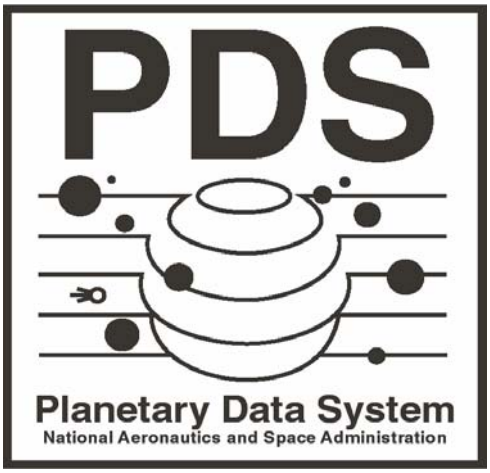
Planetary Data System

Label Template Design Tool
Level 4 and 5 Requirements

DRAFT

October 19, 2006

Version 1.0



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CHANGE LOG

Revision	Date	Description	Author
Version 1.0	Oct. 15, 2006	Gleaned from an initial set of requirements provided by S. Slavney and Use Cases provided by S. Hughes.	S. Hughes, R. Joyner
	Oct 15, 2006	Reorganized and added mapping to Use Cases	S. Hughes
	Oct 19, 2006	Updated from October 19 Telecon	S. Hughes

RFA LIENS

The following table details the RFA liens against this document. The RFAs were generated as a result of the Tool Requirements Review held on **xxx, 2006**, covering Version 1.0 of this document.

Status	Count	RFA Number(s)
Open	TBD	
Tabled	TBD	
Addressed	TBD	

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide level 4 and 5 requirements for the Planetary Data System (PDS) Label Template Design Tool (LTDT).

1.1.1 Background

The PDS Management Council identified the development of a Data Product Label Design Tool as a key Engineering Node task for 2007. A working group has written a Design Tool Use Case document to outline the scope of the tool and to be used to drive level 4 and 5 requirements. The use cases have been derived from PDS Level 3 requirements and early PDS node input, especially a straw-man set of design tool requirements written by the Geosciences Node.

1.2 Scope

The scope of this document is to identify requirements for a design tool that data providers can use to design a PDS label based on the latest PDS standards and data dictionary, without the user needing to be a PDS expert. The tool is envisioned as an interactive label editor that gets input from the user, the PDS data dictionary, and the PDS standards. This tool will help ensure a valid label design by interacting with the user and in real time indicate what parts of the label are non-compliant. The tool will also assist the user in adjusting the errant portions, or to generate a validation report listing what needs to be adjusted.

This tool is not intended to generate multiple labels in production mode. It is only for label design, not production. The label generated by this tool would ideally be used to manually create a label using an editor or as input to another tool that would mass-produce labels for actual data files.

1.3 Notation

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

- **LX** represents the requirements level where X is a number.
- **LD** is an acronym representing label template design requirements section for the specified level
- **AA** is a two letter acronym for the requirement subcategory. (Optional)

- **X** is a unique number for the type of requirement.

Following the text of a requirement may be a reference to the requirement 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 should not be considered part of the requirement for development or testing purposes.

1.4 Audience

This document is written primarily for those who will use the requirements to design, implement and test the tool. The expected audience includes:

- PDS EN Development Staff
- PDS Node Technical Staff

1.5 Controlling Documents

[1] Planetary Data System (PDS) Level 1, 2 and 3 Requirements, May 26, 2006.

1.6 Applicable Documents

[2] Planetary Data System (PDS) Standards Reference, March 20, 2006, Version 3.7, JPL D-7669, Part 2.

[3] Planetary Science Data Dictionary Document, August 28, 2002, Planetary Data System (PDS), JPL D-7116, Rev E.

[4] Planetary Data System (PDS) Data Product Design Tool Use Cases, Sept. 08, 2006, JPL D-xxxx.

1.7 Other References

[5] Requirements for a PDS Label Design Tool, S.Slavney, PDS Geosciences Node, Nov. 17, 2005.

1.8 Document Maintenance

It is anticipated that additional phases of development will be defined and approved by the Management Council resulting in modifications to this document. This document and the requirements specified herein will be kept under configuration control with any modifications submitted to the Management Council for approval.

2.0 LEVEL 4 REQUIREMENTS

This section details the level 4 requirements for the Label Template Design Tool. The functional requirements are derived directly from the PDS level 3 requirements and the higher level use cases documented in the Data Product Design Tool Use Cases [4]. The requirements in this section pertain to the general operations of using the tool to design a data product label template.

- **Label Template** – An ODL specification that represents a model for a data product label and that can be used for the creation of data product labels either manually or using an automated tool.

L4.LD.1 - The Tool shall assist the user in designing a label template without using an existing data product label or an existing data product as a reference for the design of the new label template. (UC 5.1, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

L4.LD.2 - The Tool shall assist the user in designing a label template by using an existing data product label as a reference for the design of the new label template. (UC 5.2, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

> The referenced data product label may be either an attached label (i.e., a data product), or a detached label (i.e., does not include the data object(s) referenced in the label).

L4.LD.3 - The Tool shall assist the user in designing a label template by using an existing data object as a reference for the design of the new label template. (UC 5.3, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

> The referenced data product may be either attached to a label (i.e., a data product), or detached from the label (i.e., does not include the data product label). The tool will analyze the data object to ascertain attributes appropriate to the label under construction.

L4.LD.4 - The Tool shall assist the user in designing a label template by analyzing an existing data object in conjunction with using a data product label as a reference for the design of the new label template. (UC 5.4, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

> The data object being analyzed by the tool need not be associated with the data product label (i.e., the data product label need not describe the data object -- but the data object must be similar to one of the data objects referenced by the data product label). The data object must be detached from the label. The data product label may be either an attached label or a detached label.

L4.LD.5 - The Tool shall allow the user to continue a label template design session. (UC 5.5, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

L4.LD.6 - The Tool shall be able to determine and indicate to users the label template components that are non-compliant with the PDS Standards Reference [2]. (UC 5.6, 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.4.1, 1.4.2, 1.4.3, 1.5.1, 1.5.2, 1.5.3)

3.0 LEVEL 5 REQUIREMENTS

The requirements in this section have been derived from the level 4 requirement above and use cases from the Data Product Design Tool Use Cases [4] document.

3.1 General Requirements

The requirements in this section pertain to the general operations of using the tool to design and edit a data product label template.

L5.LD.GR.1 - The Tool shall be able to accept the following as input for specifying the location of the PSDD to be used in designing the label template. (UC6.10, UC5.1, UC5.2, UC5.3, UC5.4, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4)

a) File Specification
b) Uniform Resource Locator (URL)

A URL allows access to the PSDD from a local disk or a remote machine.

L5.LD.GR.2 - The Tool shall be able to accept the following as input for specifying the location of any local data dictionaries relevant to designing the label template. (UC6.11, UC5.1, UC5.2, UC5.3, UC5.4, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4)

a) File Specification
b) Uniform Resource Locator (URL)

A URL allows access to local data dictionaries from a local disk or a remote machine.

L5.LD.GR.2.1 - The Tool shall be able to accept the following as input for specifying the location of the working data dictionaries relevant to designing the label template. (UC6.12, UC5.1, UC5.2, UC5.3, UC5.4, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4)

c) File Specification
d) Uniform Resource Locator (URL)

A URL allows access to local data dictionaries from a local disk or a remote machine.

L5.LD.GR.2.2 - The Tool shall use a configurable default location for the PSDD if no PSDD location is provided by the user. (UC6.10, UC5.1, UC5.2, UC5.3, UC5.4, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4)

e) File Specification
f) Uniform Resource Locator (URL)

A URL allows access to local data dictionaries from a local disk or a remote machine.

L5.LD.GR.2.3 - The Tool shall be able to display to the user the identifier, version, and location of all data dictionaries being used. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

g) File Specification
h) Uniform Resource Locator (URL)

A URL allows access to local data dictionaries from a local disk or a remote machine.

L5.LD.GR.3 - The Tool shall accept the following as input for specifying the location of the label template to be designed. (UC6.7, UC5.1, UC5.2, UC5.3, UC5.4, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4)

a) File Specification

L5.LD.GR.5 - The Tool shall accept the following as input for specifying the location of an existing data product label to be examined. (UC5.2 L4.LD.2)

b) File Specification
c) Uniform Resource Locator (URL)

A URL allows access to a data product from a local disk or a remote machine.

L5.LD.GR.6 - The Tool shall accept the following as input for specifying the location of a data product label with associated data object to be examined. (UC5.4, L4.LD.4)

d) File Specification
e) Uniform Resource Locator (URL)

A URL allows access to a data product from a local disk or a remote machine.
The tool uses the data object pointer in the label to set the location of the data object to be examined. The data object location can be overridden by the operation associated with L5.LD.GR.7.

L5.LD.GR.7 - The Tool shall accept the following as input for specifying the location of a data object to be examined. (UC5.3, L4.LD.3)

f) File Specification
g) Uniform Resource Locator (URL)

A URL allows access to a data product from a local disk or a remote machine.

L5.LD.GR.8 - The Tool shall be able to accept as input the type of data object that is to be described by the data product label and subsequently display a skeleton label template for edit. (UC5.1, UC5.3, L4.LD.1, L4.LD.3)

Chapter 4 of the Standards Reference lists the set of valid data object types. These include TABLE, SPECTRUM, SERIES, SPREADSHEET, IMAGE, and QUBE. The tool will also support any specific instance of the TABLE object (e.g., INDEX, GAZETTEER, MY_TABLE, etc).

Ln.LD.8_5 - The Tool shall accept as input the type of data object to described by the data product label and be able to update the pertinent keyword values in the label by referencing the data object. (UC6.4, UC5.3, L4.LD.3)

1. ASCII TABLE

(1) The tool should be able to determine the columns and rows.
(2) The tool will support any of the variants of the ASCII TABLE object (e.g., SERIES, etc). The tool will support any specific instance of the TABLE object (e.g., INDEX, GAZETTEER, etc).

Ln.LD.8_6 - The Tool shall be able to accept the following as input for specifying the location of spreadsheet that will provide the column information needed for a TABLE object. (UC5.1, UC5.3, L4.LD.1 L4.LD.3)

1. File Specification
2. Uniform Resource Locator (URL)

(1) A URL allows access to a data product from a local disk or a remote machine.
(2) The tool will support any of the variants of the ASCII TABLE object (e.g., SERIES, etc). The tool will support any specific instance of the TABLE object (e.g., INDEX, GAZETTEER, etc).

L5.LD.GR.9 - The Tool shall have the capability to save the information relevant to a label template in a Label Template File. (UC6.7, UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

The tool maintains and saves the ODL specification.

L5.LD.GR.10 - The Tool shall accept the following as input for specifying the location of the Project File for a label design session. (UC6.8, UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

a) File Specification

L5.LD.GR.11 - The Tool shall have the capability to save the information relevant to a label template design session in a Project File. (UC6.8, UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

The tool maintains and saves the state of the user's work so that it can be resumed in a later session. The state includes the locations of the label template, the Specific Label Object Definition, the referenced data product labels, and/or data objects, and/or data products, and data dictionaries in use, including local and working data dictionaries.

L5.LD.GR.12 - The Tool shall be able to resume a label template design session via the information stored in a Project File. (UC5.5, L5.LD.GR.5)

The tool retrieves the state of the user's work so that it can be resumed. The state includes the locations of the label template, the referenced data product labels, and/or data objects, and/or data products, and data dictionaries in use, including local and working data dictionaries.

L5.LD.GR.13 - The Tool shall be able to indicate to users in real-time the label template components that are non-compliant with the PDS Standards Reference [2]. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

The tool shall provide visual cues to the user indicating non-compliant components in the label template. For example keywords not found in a data dictionary might be highlighted in red and have a roll over message.

L5.LD.GR.14 - The Tool shall be able to generate a report providing a list of label template components that are non-compliant with the PDS Standards Reference [2]. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

The tool shall list non-compliant components along with explanatory messages. For example keywords not found in a data dictionary will be listed with an appropriate message.

L5.LD.GR.15 - The Tool shall ensure that the label template under construction is properly formatted as specified in Section 5.1.2 of the *PDS Standards Reference* [2]. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

The Standards recommend that the equal signs in the labels be aligned for ease of reading. Sub-objects and keywords will be indented within enclosing objects.

L5.LD.GR.16 - The Tool shall run on any PDS-supported platform.

The list of PDS-supported platforms will be specified in a higher-level requirement from which this requirement will be derived.

3.2 Data Dictionary Requirements

The requirements in this section pertain to the use of the PSDD and any local data dictionaries used in designing the label template.

L5.LD.DR.1 - The Tool shall preferentially reference object and element definitions in local data dictionaries before referencing definitions in the PSDD.

(UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

As object definitions cannot exist in local data dictionaries, there is no opportunity for a conflict to exist between the PSDD and the local data dictionaries. When the tool detects duplicate element definitions in more than one of the data dictionaries, the tool will resolve conflicts by preferentially operating against the local data dictionaries in the order in which they were specified, and then the tool will operate against the definitions in the PSDD.

L5.LD.DR.2 - The Tool shall maintain a "working data dictionary", with the same structure as a local data dictionary, that is created and managed for the purpose of collecting objects, keywords, and keyword-values that are not present in either the PSDD or a local data dictionary (e.g., working data dictionary). (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

3.3 Syntactic Validation Requirements

L5.LD.SR.1 - The Tool shall ensure the label template under construction, is syntactically compliant, as specified in Chapter 12 of the *PDS Standards Reference* [2]. (L5.LD.GR.13, L5.LD.GR.14)

As noted in chapter 12 [2], syntactic validation of PDS labels is limited to the PDS specific implementation of the ODL specification.

L5.LD.SR.2 - The Tool shall ensure all lines, in the label template under construction, are terminated with a carriage return character followed by a line feed character. (L5.LD.GR.13, L5.LD.GR.14)

This requirement is derived from section 5.1.2 [2].

L5.LD.SR.3 - The Tool shall ensure that date/time values, used in the label template under construction, are valid as specified in chapter 7 of the *PDS Standards Reference* [2]. (L5.LD.GR.13, L5.LD.GR.14)

L5.LD.SR.4 - The Tool shall constrain the user to entering a limited subset of the standard 7-bit ASCII character set as follows. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

a) All characters in the range of 32 through 126 (decimal).
b) The line feed character (10 decimal).
c) The carriage return character (13 decimal).

The remaining 7-bit ASCII characters (1-9, 11, 12, 14-31 and 127 decimal, which includes the horizontal and vertical tab and form feed characters) are not permitted in PDS labels. This requirement is derived from section 5.1.2 [2].

The future use of UNICODE encoded characters are currently under consideration for interoperability between NASA/PDS and other national space agency data archives.

L5.LD.SR.5 - The Tool shall ensure that double or single quotation marks around keyword values are used appropriately and are present where required, according to sections 12.3.3, 12.5.4.2, and 12.7.3 of the PDS Standards Reference [2]. (L5.LD.GR.13, L5.LD.GR.14)

3.4 Semantic Validation Requirements

The requirements in this section pertain to the validation of the label template. Semantic validation governs ensuring the structure of the label template is compliant (i.e., the structure of the objects, groups, keywords, and keyword-values, used in labels, conforms to the Planetary Science Data Dictionary (PSDD) specification or a local data dictionary). The PSDD is described in the *Planetary Science Data Dictionary Document* [3].

L5.LD.VR.1 - The Tool shall ensure the label template under construction is semantically compliant according to the constructs specified in one or more PDS compliant data dictionaries. (L5.LD.GR.13, L5.LD.GR.14)

> **L5.LD.VR.1.1** - The Tool shall verify that all objects, in the label template under construction, exist as specified in the PSDD.
>
> **L5.LD.VR.1.2** - The Tool shall verify that all keywords, in the label template under construction, exist as specified in one or more PDS compliant data dictionaries.
>
> **L5.LD.VR.1.3** - The Tool shall verify that all keyword-values, in the label template under construction, are valid as specified in one or more PDS compliant data dictionaries, including:
>
> a) That all element values are consistent with the specified keyword value type.
> b) That the length of all non-numeric keyword-values is within the specified length limit.
> c) That all keyword-values constrained by enumerated lists (STATIC and DYNAMIC) are allowed values.
> d) That all numeric keyword-values are within the specified range.

L5.LD.VR.2 - The Tool shall verify that a data object description exists, in the label template under construction, when referenced by a pointer in the PDS label. (L5.LD.GR.13, L5.LD.GR.14)

L5.LD.VR.3 - The Tool shall verify that the PDS_VERSION_ID element is either. (L5.LD.GR.13, L5.LD.GR.14)

a) The first line of the label template under construction, if an SFDU is not present in the label.
b) The second line of the label template under construction, if an SFDU is present in the label.

L5.LD.VR.4 - The Tool shall verify that the label template under construction contains the appropriate file characteristic elements as specified in section 5.3.2 of the *PDS Standards Reference* [2]. (L5.LD.GR.13, L5.LD.GR.14)

The file characteristic elements include RECORD_TYPE, RECORD_BYTES, FILE_RECORDS and LABEL_RECORDS.

L5.LD.VR.5 - The Tool shall verify that the label template under construction contains the appropriate data identification elements as specified in section 5.3.4 of the *PDS Standards Reference* [2]. (L5.LD.GR.13, L5.LD.GR.14)

Data identification elements are specified for each of the following data product types, Spacecraft Science Data Products, Earthbased Science Data Products, and Ancillary Data Products.

3.5 Object Requirements

The requirements in this section pertain to the operations involving Objects used in the label template under construction and are derived from the lower level use cases.

L5.LD.OR.1 - The Tool shall be able to provide the user with the capability to add generic and specific objects into the label template under construction. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The user will be able to add any object defined in the PSDD.

L5.LD.OR.2 - The Tool shall be able to provide the user with the capability to remove generic and specific objects from the label template under construction. (UC6.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.OR.3 - The Tool shall be able to provide the user with the capability to convert specific objects to generic objects, and to convert generic objects to specific objects in the label template under construction. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

For each type of data object, there are two variants – generic and specific. The tool will support both variants.

L5.LD.OR.4 - The Tool shall be able to provide the user with the capability to specify relative locations of objects (e.g., ^pointers) used in the label template under construction. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

Pointers are used to specify relative locations of objects used in the data product label and to reference files external to the label.

L5.LD.OR.5 - The Tool shall be able to provide the user with an indication of which objects, used in the label template under construction, are required and which are optional. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool will "mark" each object as either required or optional.

L5.LD.OR.6 - The Tool shall be able to provide the user with an indication of which objects, used in the label template under construction, have not been defined in the PSDD. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool will "mark" objects that are not defined in the PSDD. All specific objects created for a label will be defined in a local data dictionary or captured in the working data dictionary. For example, a specific Image object, created from a generic Image object, should be defined in a local data dictionary. Otherwise, it will be added to the working data dictionary.

Note that when saving the design session project file, the Specific Label Object Definition will include the definitions of all specific objects contained in the label template.

L5.LD.OR.7 - The Tool shall be able to provide the user with an indication of the following attributes associated with each object, used in the label template under construction. (UC6.1, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

a) object type -- GENERIC, SPECIFIC, etc.
b) object class – OBJECT, etc.
c) object classification type – SYSTEM, STRUCTURE, etc.
d) description
e) sub-objects (list)
f) keyword names (list)
g) alias – NONE, etc.
h) status type – APPROVED, etc.
i) status note
j) change date

3.6 Keyword Requirements

The requirements in this section pertain to the operations involving Keywords used in the label template under construction.

L5.LD.KR.1 - The Tool shall be able to provide the user with the capability to add keywords into the label template under construction. (UC6.2, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The user will be able to add any keyword defined in the PSDD, or defined in any local data dictionary, or not defined in either the PSDD or local data dictionary.

L5.LD.KR.2 - The Tool shall be able to provide the user with the capability to remove keywords from the label template under construction. (UC6.6, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.KR.3 - The Tool shall be able to provide the user with an indication of which keywords, used in the label template under construction, have not been defined in a data dictionary. (UC6.2, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool will "mark" keywords that are not defined in the PSDD and not defined in any of the local data dictionaries.

L5.LD.KR.4 - The Tool shall be able to provide the user with an indication of which keywords, used in the label template under construction, are referenced once or more than once in the data dictionaries. (UC6.2, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.KR.5 - The Tool shall be able to provide the user with an indication of which keyword definitions, used in the label template under construction, originate from which data dictionary. (UC6.2, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

As the tool preferentially references element definitions across multiple data dictionaries, this mechanism will provide the link to the source.

L5.LD.KR.6 - The Tool shall be able to provide the user with an indication of which keywords, used in the label template under construction, are required and which are optional, and which are neither required nor optional. UC6.2, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool will "mark" each keyword as either required or optional, or neither.

L5.LD.KR.7 - The Tool shall be able to provide the user with an indication of the "standard value type" referenced by each keyword, used in the label template under construction. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

a) N/A
b) DEFINITION
c) DYNAMIC
d) FORMATION
e) RANGE
f) STATIC
g) SUGGESTED
h) TEXT

The tool will "mark" each keyword-value as not having standard values, or as having a standard value set of type b thru g. The "standard value type" dictates varying levels of processing appropriate to incorporating additional values into the set of standard values currently defined for the keyword.

L5.LD.KR.8 - The Tool shall be able to provide the user with an indication of which keyword-values, used in the label template under construction, match one of the standard values defined for the keyword, and which keyword-values represent additions to the standard values currently defined for the keyword. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool will "mark" each keyword-value as matching a standard value or not matching a standard value.

L5.LD.KR.9 - The Tool shall be able to provide the user with an indication of the following attributes associated with each keyword, used in the label template under construction. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

a) general data type -- REAL, INTEGER, etc.
b) minimum column value – 0, 1, etc.
c) maximum column value – 1, 100, etc.
d) minimum length – 0, 100, etc.
e) maximum length – 0, 100, etc.
f) unit id – none, km, etc.
g) description
h) standard value description
i) standard values (list)
j) general classification – BIBLIO, GEOMETRY, etc.
k) system classification – COMMON, PDS-ATMOS, etc.
l) object names – CATALOG, DATA_SET, etc.
m) formation rule – N/A, etc.
n) alias – NONE, etc.
o) status type – APPROVED, etc.
p) change date

L5.LD.KR.10 - The Tool shall be able to provide the user with the capability to specify a "unit id" as an attribute of an keyword-value, used in the label template under construction. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The user will be able to associate any unit defined in the PSDD with any keyword-value used in the label. This includes associating units with a set or sequence of keyword-values.

L5.LD.KR.11 - The Tool shall be able to provide the user with the capability to remove a "unit id" as an attribute of an keyword, used in the label template under construction. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.KR.12 - The Tool shall be able to provide the user with an indication of which "unit id's", used in the label template under construction, are identical to or

differ from the “unit id” attribute of the keyword defined in the PSDD or any of the local data dictionaries. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.KR.13 - The Tool shall be able to provide the user with the capability to specify a single value, a sequence of values, or a set of values as attributes of an keyword, used in the label template under construction. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

> The user will be able to define one value, or a sequence-array, or a set-array, with any keyword used in the label. A sequence-array is either a one or two dimensioned array of ordered values. A set-array is a one dimensioned array of unordered values.

L5.LD.KR.14 - The Tool shall be able to provide the user with the capability to specify if a keyword-value is either static or dynamic. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

> An example of a keyword-value, that will remain static across all the data product labels that will be constructed using the label template, is: MISSION_NAME = ODYSSEY. An example of a dynamic keyword that will vary across the data product labels is: LATITUDE = 90.0

L5.LD.KR.15 - The Tool shall be able to provide the user with the capability to create a specification that describes the dynamics of the keyword-values in the data product labels to be constructed. (UC6.3, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

> The ODL specification describes the dynamics of how the keyword-values will vary across all the data product labels that will be constructed using the label template. An example would be to constrain LATITUDE, from the original range of -90 to +90, to a range more appropriate to the expected measurements of -45 to +45.

3.7 Group Requirements

The requirements in this section pertain to the operations involving Groups used in the label template under construction.

L5.LD.GP.1 - The Tool shall be able to provide the user with the capability to add generic and specific groups into the label template under construction. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

> The user will be able to add any group defined in the PSDD.

L5.LD.GP.2 - The Tool shall be able to provide the user with the capability to remove generic and specific groups from the label template under construction. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

L5.LD.GP.3 - The Tool shall be able to provide the user with the capability to convert specific groups to generic groups, and to convert generic groups to

specific groups, in the label template under construction. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

> For each type of data object, there are two variants – generic and specific. The tool will support both variants.

L5.LD.GP.4 - The Tool shall be able to provide the user with an indication of the following attributes associated with each group, used in the label template under construction. (L4.VAL.FR.1)

a) object type -- GENERIC, SPECIFIC, etc.
b) object class – GROUP, etc.
c) object classification type – SYSTEM, STRUCTURE, etc.
d) description
e) alias – NONE, etc.
f) status type – APPROVED, etc.
g) status note
h) change date

L5.LD.GP.5 - The Tool shall ensure that group statements comply with the restrictions in Section 13.2.1. (L4.VAL.FR.1)

> Group statements have a number of restrictions most of which are not dictated by rules designed into the PSDD.

3.8 Partial Label Requirements

L5.VAL.PR.1 - The Tool shall be capable of designing a PDS label fragment template as it would a PDS label template with the following exceptions. (UC5.1, UC5.2, UC5.3, UC5.4, UC5.5, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L5.LD.GR.5)

a) An SFDU label must not be contained in the label fragment.
b) A PDS_VERSION_ID statement must not be contained in the label fragment.
c) An END statement must not be contained in the label fragment.

3.9 SFDU Requirements

L5.VAL.UR.1 - The Tool shall recognize the existence of a Standard Formatted Data Unit (SFDU), if encountered in an existing PDS label. (UC5.2, UC5.4, L4.LD.2, L4.LD.4)

L5.VAL.UR.2 - The Tool shall allow the addition and the deletion of a Standard Formatted Data Unit (SFDU) to a label template. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The SFDU, if present, must be the first line in the label template.

3.10 POINTER Requirements

L5.LD.PR.1 - The Tool shall ensure that the Data Location Pointer statements, used in the label template under construction, adhere to Section 14.1.1 of the *PDS Standards Reference* [2]. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

Data Location pointers are most commonly used to link object descriptions to the actual data. The syntax is dependent on whether the label is attached or detached from the data being described.

L5.LD.PR.2 - The Tool shall ensure that the Include Pointer statements, used in the label template under construction, adhere to Section 14.1.2 of the *PDS Standards Reference* [2]. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

Include pointers reference ODL files that are external to the label. The only Include pointer that the tool will support is the ^STRUCTURE pointer.

L5.LD.PR.3 - The Tool shall ensure that the Related Information Pointer statements, used in the label template under construction, adhere to Section 14.1.3 of the *PDS Standards Reference* [2]. (L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

Related Information pointers reference documentation files that are external to the label. The only Related Information pointer that the tool will support is the ^DESCRIPTION pointer.

L5.LD.PR.4 - The Tool shall assist the user in designing a label template for either an attached label or a detached label. (UC6.9, L4.LD.1, L4.LD.2, L4.LD.3, L4.LD.4, L4.LD.5)

The tool does not support designing combined detached labels.

APPENDIX A ACRONYMS

Acronyms pertaining to this document:

API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
EN	Engineering Node (PDS)
JPL	Jet Propulsion Laboratory
NASA	National Aeronautics and Space Administration
ODL	Object Description Language
PDS	Planetary Data System
PSDD	Planetary Science Data Dictionary
SFDU	Standard Formatted Data Unit
URL	Uniform Resource Locator
XML	Extensible Markup Language

APPENDIX B DEFINITIONS

- **Data Element** – A term that has been defined for use in PDS data product labels or catalog templates and that has been defined in a PDS data dictionary. Also known in the PDS as a keyword.
- **Data File** – A storage entity containing one or more data objects; for example, an image or an image plus a header.
- **Data Object** – A contiguous sequence of bits, e.g., an image.
- **Data Object Description** – An ODL description of a data object.
- **Data Product** – A data product label and one or more data objects.
- **Data Product Label** – One or more data object descriptions. Also known as a PDS Label.
- **Keyword** – A term that has been defined for use in PDS data product labels or catalog templates and that has been defined in a PDS data dictionary. Also known as a data element.
- **Label Template** – An ODL specification that represents a model for a data product label and that can be used for the creation of data product labels either manually or using an automated tool.
- **PDS Node** – Any PDS node including science discipline nodes, support nodes, or data nodes.
- **Project File** – A file in which the design tool saves the state of the user's work so that it can be resumed in a later session. The state includes the locations of label templates and data dictionaries in use, including local and working data dictionaries.
- **Specific Label Object Definition** – A PSDD definition template to be used for label validation that defines a product label as a specific object with no optional sub-objects or keywords allowed.
- **Working Data Dictionary** - A data dictionary with the same structure as a local data dictionary that is created and managed by the design tool for the purpose of collecting objects, keywords, and keyword values that are not present in either the PSDD or a local data dictionary.

• Miscellaneous Requirements

The following requirements are available for consideration.

- **Documentation Requirements**

Documentation requirements address the documentation needed to support tool interfacing and execution.

Ln.LD.AA.n - The Tool shall provide documentation for the use of the tool.

Ln.LD.AA.n - The Tool shall provide documentation detailing its installation and use. (1.5.4)

- **Miscellaneous Requirements**

Ln.LD.AA.n - The Tool shall assist the user in designing a PDS compliant label template as the result of a single tool execution. (L4.VAL.FR.1)

- **Interface Requirements**

Interface requirements address the interaction between the tools and users of the tools.

Ln.LD.AA.n - The Tool shall have the capability to be executed from a command-line interface.

Ln.LD.AA.n - The Tool shall provide configurable parameters for controlling functional behavior, which can be supplied to the tool in the following methods:

a) Supplied as command-line options.
b) Supplied in the form of a configuration file.