

Science Services Survey						
PDS4 Science Services (to be implemented by DNs or EN)						
	Suggested PDS4 Service (presented / discussed at Dec 09 MC F2F)	Definition	Is definition appropriate & sufficient? (Yes or No)	If No, please suggest better definition (including description of what this service provides and includes)	Node initial comment	Please comment on the summary. Please suggest better wordings if the suggested requirement is not sufficient.
Summary	1 Suggested User Service Requirement: PDS shall support search for (and optionally retrieve) PDS-wide holdings at granularities as fine as data products, documents, software, and catalog files. Search criteria can include one or more of the following: mission, agency sponsor of mission, instrument, instrument host, archiving organization (e.g., PDS, PSA), discipline node (including data nodes), data provider, time of observation (spacecraft, detector, or other time at user discretion), 3-D space observed (in user-specified coordinates), target, date/time of product creation, base data structure, processing level, product type, data type, product ID, data set (if applicable), and data_set collection (if applicable). This is PDS-wide, it needs both a 'simple' and complex interface. The latter shall include major 'use cases' for searching for data, and these will vary by target, discipline, etc. User shall be able to 'save' common search criteria for future usage. Map based searches shall be implemented where practical.					
GEO	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to	No		It is not clear if this is a PDS-wide services or a discipline node specific capability. Probably best to be discipline specific.	
Radio Science	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to receive a meaningful high granularity search result at the product level.	No	Search for (and optionally retrieve) PDS holdings at granularities as fine as data products, documents, software, and catalog files. Search criteria can include one or more of the following: mission, agency sponsor of mission, instrument, instrument host, archiving organization (e.g., PDS, PSA), discipline node (including data nodes), data provider, time of observation (spacecraft, detector, or other time at user discretion), 3-D space observed (in user-specified coordinates), target, date/time of product creation, base data structure, processing level, product type, data type, product ID, data set (if applicable), and data_set collection (if applicable).	Criteria are based loosely on Dublin core elements. Document and software search may require slightly different criteria. Time and space may need on-the-fly conversion. Both single values and ranges should be supported. Current holdings will need upgrades to support 'space' search (and possibly others).	Suggested User Service Requirement: PDS shall support search of (and optional retrieval from) PDS-wide holdings at granularities as fine as data products, documents, software, and catalog files. Search criteria can include one or more of the following: mission, agency sponsor of mission, instrument, instrument host, archiving organization (e.g., PDS, PSA), discipline node (including data nodes), data provider, time of observation (spacecraft, detector, or other time at user discretion), 3-D space observed (in user-
Rings	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to	yes			
NAIF	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to receive a meaningful high granularity			OK, but just a note: for SPICE data the strong default recommendation is for the user to either get the full data set, or to use the custom subsetting service now newly offered by NAIF. Getting just a single kernel (or a couple kernels) without allied documentation and FURNISH kernels is usually a bad idea.	
ATMOS	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to	Yes			
PPI	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to receive a meaningful high granularity search result at the product level.	No	Provide capability for search to be done to the product level at the DN. A search may include a set of discipline specific criteria.	This should be implemented by the DN in compliance with a specification by the EN. Any multi-discipline search should be federated (see #3). Retrieval is a separate service.	
Imaging	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to receive a meaningful high granularity search result at the product level.	~Yes		If this is PDS-wide, then it needs both a 'simple' and complex interface. The latter should include major 'use cases' for searching for data, and these will vary by target, discipline, etc. User should be able to 'save' common search criteria for future usage. Map based searches should be implemented where practical.	
Small Bodies	1 Product Level (Search/Retrieval)	Provide capability for search and retrieval to be done to the product level. Allow use of more precise criteria in addition to mission, instrument, target or time in order to receive a meaningful high granularity search result at the product level.	unknown	insufficient information	Being able to find and retrieve products is a basic service unrelated to science applications. It's not clear what specific science service is being requested.	
Summary	2 Suggested User Service Requirement: PDS shall support search for (and optionally retrieve) PDS holdings based on criteria specified by DNs including (but not limited to): frequency/wavelength (or equivalent), integration/exposure time, observation type, and quantities derived from these criteria. 'Discipline-based' criteria may vary widely among DNs.					
GEO	2 Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow	no		It is not clear if this is a PDS-wide services or a discipline node specific capability. Probably best to be discipline specific.	

Radio Science	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located.	No	Search for (and optionally retrieve) PDS holdings based on criteria above PLUS other criteria specified by DNs including (but not limited to): frequency/wavelength (or equivalent), integration/exposure time, observation type, and quantities derived from these criteria.	Discipline-based' criteria may vary widely among DNs.	Suggested User Service Requirement: PDS shall support search of (and optional retrieval from) PDS holdings based on criteria specified by DNs including (but not limited to):
Rings	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located	yes			
NAIF	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located			Probably ok; should also address ancillary data. Need a clear and appropriate means (maybe multiple means) to get ancillary data. (See also my comment above.)	
ATMOS	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located	No	I like the PPI comment.		
PPI	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located	no	Node specific searches should be left to the Nodes to develop and support.		
Imaging	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located	no	I like the RS definition above better.	Although highly sophisticated searching may be needed by a small % of users, there will likely be a 'most commonly used' set of criteria that all DNs should use as a starting point.	
Small Bodies	2	Discipline Based Search/Retrieval	Provide capability for finding product(s) based on a set of discipline specific criteria; and allow the product to be downloaded once it's located	unknown	insufficient information	It is not clear how this would be different from standard search/retrieval. Anything that is truly "discipline specific" wouldn't be a general science service in any event.	
Summary	3 Suggested User Service Requirement: None. Covered by #1 above.						
GEO	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-	yes		For a useful PDS-wide search, probably would be limited to high level attributes, like mission, instrument, etc.	
Radio Science	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow the product to be downloaded once it's located	No	It is difficult to see how this differs from #1 once keyword equivalences are established. However, the PDS4 User Support White Paper lists a few user scenarios which might be developed into service definitions. What other instruments (of any type, any where) were operating when my important observation was made? Find all other observations of this phenomenon (e.g., aurora) so that I can compare mine with those. Find all other observations which include this named feature. Let me conduct a search over a class of targets (e.g., satellites or comets) rather than individually named targets.	Requires manual discovery and installation of all the cross-referencing links (e.g., similarly, but not identically, used keywords). Would require adding keyword-value pairs to show phenomena, feature names, taret class, etc.	I suggest this user service requirement not be pursued; the underlying needs should be met if #1 and #2 are met satisfactorily.
Rings	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow	yes			
NAIF	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow	Yes		It's not clear what is meant by "cross referencing multi-missions and multi-disciplines in the archive". There aren't going to be a whole lot of opportunities to search in this manner except for geometry-type	
ATMOS	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow	No	Provide capability for searches at multiple nodes to be federated.	See GEO comments	
PPI	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow the product to be downloaded once it's located	Yes		There will likely be a basic functionality here that makes sense across disciplines.	
Imaging	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow	unknown	insufficient information	How this differs from the previous two items is unclear, although a specific list of search criteria considered "science criteria" would be extremely useful input to the DDWG.	
Small Bodies	3	Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	Provide PDS-wide capability for finding product(s) by cross referencing multi-missions and multi-disciplines in the archive; and allow the product to be downloaded once it's located				
Summary	4 This capability needs to be limited to explicitly identified data sets and/or products for specific Nodes. If primarily for SBN, SBN is best to develop/suggest " User Service Requirement" for this function. Also, PDS and providers will have to define 'subsets'.						

GEO	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow	no		might want to deliver just the subset, packaged into a special product		
Radio Science	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow the product to be downloaded once it's located	No	See additional comments	Records: SBN is in the best position to define and prototype 'record-level' searches; hold others unless there is demand. Subsets: PDS and providers will have to define 'subsets' in current and future holdings, respectively. Both: This capability may need to be limited to explicitly identified data sets and/or products.	PDS shall provide the ability to search for (and optionally retrieve) subsets and records from selected data sets and files according to TBD criteria recommended by Discipline Nodes and/or users. (3.1, 3.2)	
Rings	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow	no	change "within a discipline" to "within a product"			
NAIF	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow			Not sure what this would mean as relates to SPICE-style ancillary data. In any case, see my comment above regarding "product level search."		
ATMOS	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow			This could be useful for some ATM data sets but is primarily an SBN issue. Let them lead the discussion.		
PPI	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow the product to be downloaded once it's located	No	Not necessary	Not clear how this would differ from a product search. Subsetting would be a different service that may be used in conjunction with a retrieval service. Also a "user interface" is not a "service" in the true meaning of the word.		
Imaging	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow	No		I agree that this is more likely a product-level search, and a packaged 'special product' might be desired by some.		
Small Bodies	4	Record Level and Subset Search/Retrieval	Provide search engine and user interface for finding subset(s) and records within a discipline; and allow the product to be downloaded once it's located	Probably not	insufficient information	Record level search and product subsetting (if that is what is meant by "subset" cannot be done without intimate knowledge of the specific product structure. It is hard to imagine how this could be provided at any level higher than a mission collection, and even then only with difficulty or much prior planning.		
Summary	5	Suggested User Service Requirement: PDS shall identify user related and ancillary products for a given data product or set of data products and allow the user to select and retrieve a subset of those related and ancillary products. PDS should have a first-order understanding of what ancillary data products are from the APG and PAG; and 'related' data products need to be defined.						
GEO-Guinness	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and	Yes				
Radio Science	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and retrieve a subset of those related and ancillary products	Yes	Definition of the service is OK, but 'related' needs to be defined (see additional comments)	For each data product or set of data products, this service requires a manifest of (1) related products and (2) ancillary products. PDS should have a first-order understanding of what ancillary data products are from the APG and PAG; but 'related' data products, though mentioned in PDS documents occasionally, have never been defined. Constructing such manifests (if they are to be useful) is a huge amount of work.	Suggested User Service Requirement: PDS shall identify related and ancillary products for a given data product or set of data products and allow the user to select and retrieve a subset of those related and ancillary products. PDS shall ensure that relationships among products are defined within its inventory of (1.4 or 4.2.1, but the	
Rings	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and	yes		wording is a bit awkward but I have no particular suggestions.		
NAIF	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and retrieve a subset of those related and ancillary products			Current text needs work. But exactly what to say needs some discussion before being written down. (Discussion based on my comments above re the new custom subsetting service offered for PDS-archived SPICE data, and the likely problem of retrieving just one or a few individual kernels. See http://naif.jpl.nasa.gov/naif/data_archived.html and http://naif.jpl.nasa.gov/cgi-bin/subsetds.pl?dataset=co-s_j_e_v-spice-6-v1.0/cosp_1000		
ATMOS	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and	Yes		This was a major point of discussion at the DDWG.		
PPI	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and retrieve a subset of those related and ancillary products	No	Identify for the user related and ancillary products for a given data product or set of data products.	Retrieval would be a separate service.		
Imaging	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and retrieve a subset of those related and ancillary products	~yes		This may need constant updating for active missions.		

Small Bodies	5	Ancillary products identification/Retrieval	Identify for the user related and ancillary products for a given data product or set of data products and to allow the user to select and retrieve a subset of those related and ancillary products	unknown	insufficient information	As far as PDS4 is concerned, a product is a product and all are treated equally. Why would you search for and retrieve a so-called ancillary product in a different way from any other product?	
Summary	6	Suggested User Service Requirement: PDS shall provide processing to convert PDS4 data format in the archive to approved user-specific data format. The list of the specific formats to be supported is currently being worked, and the list should be added into this requirement once decided.					
GEO-Guinness	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user	Yes			
Radio Science	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user	Yes	Suggest inserting "approved" before "user data format"	Some conversions have higher priority; for example, JPEG to CSV is not likely to be popular.	Suggested User Service Requirement: PDS shall provide processing to convert PDS4 data formats in the
Rings	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user	almost	change "user data format" to "user-specified data format"		
NAIF	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user data format			In general, this could be too vague to be useful/achievable. In any case, what would this imply relative to ancillary data? Too open.	
ATMOS	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user data format	No		Because I'm ornery and I expect the user to know how to convert the data to a form that he/she wants.	
PPI	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user data format	yes		Set of output formats must be limited and well defined	
Imaging	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user data format	Yes		I agree that some conversions will be much more popular than others, and this will likely change over time.	
Small Bodies	6	Data Format Conversion	Provide processing to convert PDS4 data format in the archive to a user data format	yes and no	What is needed is a list of the specific formats to be supported.	Support for format conversion is one of the design goals of the DDWG and a major existing milestone for implementation. What's missing is a specific list of formats to be supported for baseline implementation and subsequent development.	
Summary	7	Suggested User Service Requirement: PDS shall provide processing to convert some specific data products from a coordinate system in the archive to a user requested coordinate system. The list of some specific data products should be added into this requirement once identified.					
GEO	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested	No		Which systems? Maps, rings, F&P?	
Radio Science	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested coordinate system	Yes		How to do this is not clear. First, the conversion routine must be able to find the quantities to be converted [finding scattered bytes in a binary file may not be easy]. Second, the conversion may not be linear [converting a table of position and velocity vectors should be straightforward; converting an oblique image of a planetary limb to cylindrical (lat,lon) coordinates may not].	Suggested User Service Requirement: PDS shall provide processing to convert selected data products from a coordinate system in the archive to an approved user-selected coordinate system. (3.3.4)
Rings	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested	yes			
NAIF	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested			Nonsense as written. Also too wide open, I think.	
ATMOS	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested	No		The user should be expected to do this.	
PPI	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested coordinate system	No	Coordinate system names do not clearly define the systems and often mean different things to different people.	Both input and output coordinate systems must be defined mathematically in order for transformation to be possible	
Imaging	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested coordinate system	~yes		This will make most sense for some products (e.g., framing cameras, surface imagers) and not others. Best to agree on a single 'best' system where it makes sense and use that?	
Small Bodies	7	Coordinate System Transformation	Provide processing to convert a data product from a coordinate system in the archive to a user requested coordinate system	unknown	insufficient information	It is not clear that this even makes sense in the restricted realm of data products, although it certainly is relevant in some sense to some types of data products. We suspect this is ultimately node-specific.	
Summary	8	Suggested User Service Requirement: PDS shall create one or a series of 2-D images from a data product allowing the user to define image plane(s) when the product has more than two dimensions.					
GEO	8	Product Visualization	Provide processing to make a specific product into a visual image	yes			
Radio Science	8	Product Visualization	Provide processing to make a specific product into a visual image	No	Create a 2-D image (or series of images) from a data product, allowing the user to define image plane(s) when the product has more than two dimensions.	Creating a line plot from a 2-column ASCII table should be easy. Deciding what to display in an ISIS cube will be challenging for the user (the service must provide guidance/tutorials). The mechanics of generating the display may be less difficult.	Suggested User Service Requirement: PDS shall provide processing to create one or a series of 2-D images from any numerical data product. For data products of more than two dimensions, PDS shall allow the user to define the image plane(s). (3.3.5)

Rings	8	Product Visualization	Provide processing to make a specific product into a visual image	almost	"...into an image or diagram." ("visual image" is redundant) Or "...into a viewable image."			
NAIF	8	Product Visualization	Provide processing to make a specific product into a visual image			Too vague.		
ATMOS	8	Product Visualization	Provide processing to make a specific product into a visual image	No.		Unclear how to do it for many products.		
PPI	8	Product Visualization	Provide processing to make a specific product into a visual image	maybe		Too broad. The generation of time series plots is quite distinct from images.		
Imaging	8	Product Visualization	Provide processing to make a specific product into a visual image	No	I like the RS definition above better.	This is too vague---we will likely want to limit the possibilities here.		
	8	Product Visualization	Provide processing to make a specific product into a visual image	unknown	insufficient information	We couldn't figure out what this means. If it's on-the-fly generation of thumbnails for all data types, that's probably not a good idea to begin with, unless it is VERY carefully implemented. If that's not it, then what would a visual image of 4-D array or a binary table be?		
Small Bodies								
Summary	9	Suggested User Service Requirement: PDS shall provide selected information about the origin and processing history of a data product or data set to a user. Original definition "Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive" should be input to DDWG.						
	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	yes		The data design work is working on this.		
GEO	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	No	Provide selected information about the origin and processing history of a data product or data set to a user.	As originally defined, this is a tool for ingestion. Adding origins and processing history (especially in a form that will be intelligible to users) will not be easy.	PDS shall provide the user with selected information about the origin and processing history of a data product or data set. (1.4 or 4.2.1, but	
Radio Science	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	yes				
Rings	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive					
NAIF	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	maybe		Depends on what is really going to be included here.		
ATMOS	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	No	Too broad. Includes data modeling, a data/metadata generation tool, and search and retrieve services			
PPI	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	~No		Not sure what this is aiming at. If it's an attempt to capture processing history, couldn't this be accomplished by capturing this info in a label?		
Imaging	9	Preservation of Product Processing History	Add data provenance and processing history information into data model, provide tool/service to enter this type of metadata and data into the archive	unknown	insufficient information	As stated this is not a service, science or otherwise. It's input to the DDWG.		
Small Bodies								
Summary	10	Suggested User Service Requirement: PDS shall allow users to carry out their own data calibration, and to generate their own calibrated products. Users should be able to calibrate using latest, validated as well as superseded calibration tables and algorithms (for comparison with the currently favored versions); also allowing users to apply THEIR OWN calibration tables and algorithms. To meet this requirement, it will require that PDS ingest and maintain calibration software and calibration files.						
	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	yes				
GEO	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	No	Allow users to carry out their own data calibration.	Requires that PDS ingest and <i>maintain</i> calibration software <i>and</i> calibration files. Users should be able to modify both software and calibration files (to customize calibration, maximizing utility). The scope of 'calibration' varies widely depending on the type of observation and the data products to be calibrated.	Suggested User Service Requirement: PDS shall allow users to carry out their own data calibrations and to generate their own calibrated products. Users should be able to calibrate using currently recommended, previously recommended, and/or user-provided	
Radio Science	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	almost	remove "algorithm"			
Rings	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data					
NAIF	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data					
ATMOS	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	No		Don't users have to do anything any more?		

PPI	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	No		There are many different calibration algorithms. This is too ill defined to for an improved definition. It should be possible for service to have well defined interfaces and to be coordinated by a workflow processor. This would be true whether its a calibration service or other special task.	
Imaging	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	No	Provide data calibration services available for users to generate their own calibrated products using the latest, validated algorithms.	This is vague. Some data providers have requested that PDS consider supporting on the fly processing b/c it means that derived products (such as calibrated data) don't need to be stored and can be generated as needed. BUT, someone needs to maintain the s/w, and that's a big job.	
Small Bodies	10	Calibration on the Fly	Make calibration algorithm software a service available for users to generate their own calibration data	Probably		This would represent a fundamental change in the way PDS operates and require a relatively huge fraction of the PDS budget to implement and support.	
Summary	11 Suggested User Service Requirement: PDS shall overlay and register one or more 2-D products onto another, including generating one or more of the 2-D products from original files, including overlaying image/map data onto shape models or digital elevation models. PDS should make use of and/or support existing tools (e.g., GIS, JMARS, Ames Stereo Pipeline, ISIS3, etc.) whenever applicable.						
GEO	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	yes			
Radio Science	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	No	Overlay and register one or more 2-D products onto another, including generating one or more of the 2-D products from original files.	This is a big deal in the real world and may not be something PDS wants to invent from scratch. See Google and other services; see also JMARS in the planetary community.	Suggested User Service Requirement: PDS shall provide processing to overlay and register one or more 2-D products onto another, including
Rings	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	yes			
NAIF	11	Map Overlaps	Provide a tool or service for map coregistration and overlay				
ATMOS	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	Yes		If feasible.	
PPI	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	n/a			
Imaging	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	~yes		This is indeed a huge area of research in image processing, and PDS should make use of and/or support existing tools (e.g., GIS, JMARS, Ames Stereo Pipeline, ISIS3, etc.).	
Small Bodies	11	Map Overlaps	Provide a tool or service for map coregistration and overlay	yes and no	Please specify whether this includes overlaying image/map data onto shape models or digital elevation models		
Summary	12 Suggested User Service Requirement: PDS shall provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments. This can be a major commitment of node resources to monitor activity and prevent abuse.						
GEO	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	yes			
Radio Science	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	Yes		GEO already has a 'forum'. See also amazon.com customer reviews.	Suggested User Service Requirement: PDS shall provide the capability for users to comment on data sets and/or products, including a capability for node staff and data providers to moderate and rebut those comments. Comments and rebuttals shall be made public in a timely manner. (4.2.2, but traceability is weak)
Rings	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	yes			
NAIF	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments				
ATMOS	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	Yes			
PPI	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	yes		Not clear that this is a service	
Imaging	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	yes			

Small Bodies	12	Forum & User Comments Moderation/Rebut	Provide a forum for users to enter comments including a capability for node staff and data providers to moderate and rebut those comments	Probably	Would this be administered for all nodes on a central system? Or do you propose to require each node to install and maintain the requisite software and website(s)?	This could represent a major commitment of node resources to monitor activity and prevent abuse.	
		Additional PDS4 Service suggested by the Nodes (insert additional rows if needed)	Definition	Is the definition appropriate and sufficient? (Yes or No)	If No, please suggestion better definition (including description of what this service provides and includes)	Node Initial comment	Please enter any additional comment
Summary	13	Suggested User Service Requirement: PDS shall calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions including all potential targets (including 250,000+ small bodies), all spacecraft and all data sets.					
GEO	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	No		It is not clear if the definition was intened to be the only types of geometry calculation for such a service, or if other types of geometry calculation should also be included.	
Radio Science	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	Yes		This will take time ... NAIF needs funding increment.	PDS shall calculate viewing conditions for past, present, and future observations of all types. (4.2.1, but
Rings	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	yes			
NAIF	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).			Needs work (more specificity as to what is wanted and how achieved).	
ATMOS	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	Yes			
PPI	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	yes			
Imaging	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	~yes		This is potentially huge in scope, and is perhaps already being done by other NASA-funded groups.	
Small Bodies	13	All-purpose geometry engine	Calculate viewing conditions for past, present, and future observations of all types (includes trajectory/orbit predictions).	yes and no	Please indicate whether this includes all potential targets (including 250,000+ small bodies), all spacecraft and all data sets.		
Summary	14	Suggested User Service Requirement: PDS shall allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by knowledgeable, responsible referees.					
GEO	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by	yes			
Radio Science	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by	Yes			Suggested User Service Requirement: PDS shall allow ingestion of searchable, updated and/or supplemental metadata for products and data sets. PDS shall provide
Rings	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by	yes			
NAIF	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by				
ATMOS	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by				
PPI	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by knowledgeable, responsible referees	yes		Only if the updates are part of the permanent archive and the documentation clearly points users to the updates. Note: Todd does not feel that this could be allowed, and that the metadata should be updated if the changes are critical	
Imaging	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by knowledgeable, responsible referees	yes			

Small Bodies	14	Updatable index	Allow ingestion of updated and or supplemental metadata for products, data sets that can then be searched; provides configuration control so that updates are moderated by knowledgeable, responsible referees	Probably		This is not a science service, it's an existing requirement on the data architecture design.	
Summary							
15 Suggested User Service Requirement: PDS shall be monitored in a meaningful way so that use patterns can be tracked and services improved in areas where users have not articulated needs.							
Radio Science	15	Monitor usage	Monitor PDS in a meaningful way so that use patterns can be tracked and services improved in areas where users have not articulated needs.			Very open-ended; but if we could spy on users (without infringing on privacy) and figure out what they really do, we might be able to help them do it better -- either through education or service improvement.	Suggested User Service Requirement: PDS shall monitor usage so that use patterns can be tracked and services improved in areas where users have not articulated needs. (4.2.2)
Imaging		Monitor usage				I agree that there is valuable information that could be mined to help us help our users.	
Summary							
16 Suggested User Service Requirement: PDS shall provide direct links into the NVO database for targets and (RA,Dec) listed in PDS product labels.							
Small Bodies		PDS/NVO interface	Provide direct links into the NVO database for targets and (RA,Dec) listed in PDS product labels				Suggested User Service Requirement: PDS shall provide links into the NVO database for targets and pointings (e.g., RA, Dec, time) listed in PDS product labels. (2.8.5)
Summary							
17 Suggested User Service Requirement: PDS shall provide a web "Small Data Set Ingest Interface" tool to walk data providers through the process of providing enough information to label product files and provide the context information for small datasets not associated with large mission pipelines.							
Small Bodies		Small Data Set Ingest Interface	Provide a web tool to walk data providers through the process of providing enough information to label product files and provide the context information for small datasets not associated with large mission pipelines. (The OLAF system does this now for ground-based and small DAP/mission data sets in PDS3.)				This is an ingestion tool, not a user (science) service requirement.
Summary							
18 Suggested User Service Requirement: PDS shall provide a command-line "ASCII Tabular Data Formatter" tool to take the output of, for example, a spreadsheet dump and reformat it to fix column widths, align decimal points, swap columns, left- or right-align text columns, etc., to fit PDS4 table format requirements.							
Small Bodies		ASCII Tabular Data Formatter	A command-line tool to take the output of, for example, a spreadsheet dump and reformat it to fix column widths, align decimal points, swap columns, left- or right-align text columns, etc., to fit PDS4 table format requirements.				This is either an ingestion tool (not a user science service requirement) or a special case of #6.
Summary							
19 Suggested User Service Requirement: PDS shall provide a "On-the-fly Table Searcher" tool (command line or web-based) to allow a user to search for specific records in a table based on values in the columns. This would be useful for, e.g., searching supplementary index files or searching within an ASCII table product.							
Small Bodies		On-the-fly table searcher	A tool (command line or web-based) to allow a user to search for specific records in a table based on values in the columns. This would be useful for, e.g., searching supplementary index files or searching within an ASCII table product.				This is a special case of #4
Summary							
List of Specific Services currently exist at your Node (Insert additional rows if needed)							
Please provide definition of the services (including description of what the service provides and includes)							
Most of the nodes have yet to provide the list of science services currently provided.							
NAIF		Observation geometry calculations	Ability for user to compute (or recompute) a large suite of observation geometry parameters using SPICE data files and SPICE Toolkit software. As described on the NAIF webpages: http://naif.jpl.nasa.gov				
Rings		Product Level (Search/Retrieval)	see definition above.			"OPUS"	
Rings		Discipline Based Search/Retrieval	see definition above.			"OPUS"	
Rings		Cross-Mission and Cross-Discipline Science Criteria Based Search/Retrieval	see definition above.			"OPUS"	
Rings		Product Visualization	see definition above.			On-line preview images	

Rings	All-purpose geometry engine	see definition above.	On-line ephemeris tools			
Small Bodies	OLAF	Ingestion of small data sets (SBN specific)				
Small Bodies	Ferret	Searching by parameters in records				
Small Bodies	Cross-ID tool	Find other IDs for small bodies				
	List of existing PDS-Wide services (to be provided by EN) (insert additional rows if needed)	Definition of the PDS-Wide services To be provided by EN (including description of what the service provides and includes)				
	Catalog Level (Search)	Provide PDS-wide capability for discovering catalog-level resources (e.g., mission, instrument, data set, etc.) and direct the user to Node-specific search tools associated with those resources.				
	Product Visualization (NASAView)	A simple display tool for data contained in the PDS archive with a requirement that it run on multiple hardware platforms and convert between machine specific data formats as necessary.				