PDS 4 Drivers for the PDS System Architecture

Major Driver / Theme	Roadmap Reference	Implication on the Architecture	Other Related Drivers
1. Data Volume Increases	R6.1	1.1 Implement more automation in the system (R23.2.5) 1.2 Deploy high capacity storage capabilities including mechanisms for managing large data sets that exceed physical storage limits (PDS 2.7.2, R9.4.1) 1.3 Implement high capacity data distribution capabilities for online distribution of large data products (PDS 3.2.1, R9.3.1) 1.4 Implement mechanisms for data availability across the PDS federation (R22.2, "All data products will be at a minimum of two different geographically separated locations", PDS 4.1.4) 1.5 Implement high capacity data movement capabilities across the PDS federation including delivery from data providers (R9.3.2)	Collaborate with other NASA entities to better assess and utilize existing and emerging storage technologies (R22.5, PDS 4.2.3) Support scalability of the system to handle the PDS archive growth (R9.4) Aging and obsolete technology must be refreshed to ensure long term usability of the data and the system (R9.5)
2. PDS Architecture will be entirely distributed working as a federation	R13.1 R22.1	2.1 Ensure tools can be adapted to plug into local environments within the federation (R6.3.2, R9.1.1, R14.1.1, PDS 1.5) 2.2 Provide distributed and shared services across the federation (R22.1, PDS 2.8.3) 2.3 Manage a federated architecture which allows for autonomous, but interrelated operation including access to data (PDS 2.8.1, R14.1.3) 2.4 Adopt and manage technology standard selections for the federation including standards for sharing data products (2.8, NEW) Note: This can partially be tied to the PDS requirement 2.10.2 which requires PDS to use "best practices in system and software engineering"	PDS will upgrade its network connections regularly to provide fast delivery of data to users (R22.4)

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		2.5 Provide common infrastructure services where it makes sense (e.g., Physical Media production, security services, etc) (NEW) Note: PDS has done this in certain areas, but we do not have an enumerated list at this point	
3. Mission, Instruments, and Data are all becoming more complex	R6.2 R9.4.1 R10.2	3.1 Provide an information model for archiving of very diverse data products (R9.4.2, PDS 1.4) 3.2 Provide a modern, online data dictionary with name space management and access control (PDS 1.4.2, NEW) 3.3 Provide model(s) based on the PDS information model for discovery/access to very diverse data products including in situ, geographical, astronomical, etc (R20.1.2, NEW)	
4. Increasing Number of Missions; Greater number and diversity of data providers; Smaller, focused missions	R6.3	4.1 Provide tools to data providers for design, generation, validation and delivery to PDS that can run on a wide variety of platforms (R6.3.2, R9.1.1, PDS 1.5) 4.2 Provide automated data set and product cataloging tools to handle increases in number of missions (R23.2.4) Note: This, in particular, is an architectural driver for larger number of data sets as well as larger number of diverse data sets 4.3 Provide a core set of data formats for data products (R6.3.2, R23.2.1, PDS 1.4.4) 4.4 Deliver tools to the teams for generating the necessary metadata relevant to their discipline based on a core set of object types (R21.1.2, PDS 1.5) 4.5 Deliver tools to validate the metadata against PDS standards (R21.1.3, PDS 1.5.3, PDS 2.3.2)	Work with data providers as early as possible to ensure use of PDS tools (R6.3.2) Must provide training to educate data providers (R10.5, PDS 1.2.4)

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5. Online Search and Access to Data User Tools	R7.1 R7.2 R7.3 R9.2	5.1 Provide online mechanisms to search for data (e.g., rapid and easy access) based on discipline-specific data model(s) (R7.1.2, R7.1.5, R7.3, PDS 3.1.2) Note: This is intended to specifically identify product level searching at the nodes 5.2 Provide online mechanisms to navigate the PDS archive based on a common data model (e.g., faceted navigation and search) (R7.1.2, PDS 3.1.1) Note: This is intended to specifically identify searching PDS from the highest level and navigating to the appropriate nodes 5.3 Provide ability to support cross-node/cross-discipline queries of catalogs (R20.1.2, R22.1, PDS 2.8.2, PDS 2.8.3) 5.4 Ensure data consistency/integrity across the system (PDS 2.2.2, PDS 2.6.3) 5.5 Provide direct download of data products and sets of varying sizes (R9.3.1, PDS 3.2.1) 5.6 Provide links to allow access to international data sets (R8.2, PDS 2.8.4) 5.7 Provide product-specific tools for working with the data including basic visualization tools that can be integrated into the search (R7.1.3, R20.3, PDS 3.3.5) 5.8 Provide simple, on-the-fly processing of products including transformation of formats (R20.5, R23.2.5, PDS 3.3.3, PDS 3.3.4) 5.9 Provide tools for tracking the usage and flow of data across PDS and notifying users based on events (R19.1, PDS 2.2.2, PDS 3.3.6) 5.10 Support standards for linking to non-PDS data systems (R23.2.6) 5.11 Support standards for plugging in non-PDS tools (NEW) 5.12 Provide a high level portal as a gateway to PDS data and information (NEW)	Tools and holdings are available to everyone, but primary customers are scientists and their upper division and graduate students and associates (R16.1) PDS evaluates and accepts requests for product generation and delivery for EPO Projects (R16.4)

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6. Mission funding challenges often lead to elimination of higher order products and missions not finishing the job	R18.1	6.1 Provide generation and submission tools to data analysis programs to simplify the PDS delivery process (R19.3, PDS 1.5.3)	AOs need to require all instrument/mission teams to deliver fully calibrated, geometrically corrected data throughout the mission and to resubmit the data when they are improved (R21.2.1) AOs need to collaborate with the PDS on all data calibration /processing/retrieval systems designed for their team members. Data systems used by team members must transition seamlessly over to the PDS as the team's data sets become publicly available. (R21.2.2)

7. PDS needs to collaborate with and share data across international archives	R8.1	7.1 Develop standards with the international community to ensure data sharing and interoperability among planetary science archives (R8.3, PDS 2.8.4) 7.2 Develop an international core data model for archiving (R8.2.2, R8.2.3, NEW) 7.3 Develop an international data model for querying remote archives (R8.2.2, NEW)	Coordination and development and application of standards for archive production across international partners substantially increases workload due to increasing number of interfaces and standards training(R8.4) ITAR issues that may preclude fully open discussion among international collaborators (R8.5)

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