



# InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

## Areas That Should Be Covered Validated

### Case Study 08: Mars Global Surveyor Data Records in the Planetary Data System

Geneviève Sheppard, UBC  
Version 1, January 2006

<b>Creator of the Fonds</b>		
<b>TOPIC</b>	<b>SPECIFICS</b>	<b>SOURCE</b>
<b>Name</b>	NASA (National Aeronautics and Space Administration)	FR p. 7
<b>Location</b>	The United States; NASA headquarters are located in Washington, DC	FR p. 7; NASA Web site
<b>Origins</b>	<ul style="list-style-type: none"><li>Established by the National Aeronautics and Space Act of 1958 to carry out aeronautical and space activities of the United States</li><li>Grew out of the National Advisory Committee on Aeronautics which had been researching flight technology for over forty years</li></ul>	FR p. 9 NASA Web site
<b>Legal Status</b>	Government agency established in 1958	FR p. 9
<b>Legislation</b>	<ul style="list-style-type: none"><li>National Aeronautics and Space Act (1958)</li><li>NASA regulations published under the United States Code of Federal Regulations, Title 14 – Aeronautics and Space, Chapter V, NAA, Parts 1200-1299</li></ul>	FR p. 9
<b>Norms</b>	Information not available in the final report	
<b>Funding</b>	Government funded	NASA Web site
<b>Resources</b>	Information not available in the final report	

<b>Governance</b>	<p>NASA:</p> <ul style="list-style-type: none"> <li>• Headquarters in Washington, D.C.</li> <li>• 8 field centers, and a variety of installations conducting work in laboratories, on air fields, in wind tunnels and in control rooms</li> </ul> <p>Organization:</p> <ul style="list-style-type: none"> <li>• Administrator</li> <li>• Deputy Administrator (Chief Operating officer)</li> <li>• Staff (e.g., officers, scientists, engineers, etc.) working in a variety of offices under Mission and Mission Support</li> </ul> <p>Mars Exploration Program:</p> <ul style="list-style-type: none"> <li>• Director</li> <li>• 2 main offices: <ul style="list-style-type: none"> <li>○ Technology and Applications Directorate</li> <li>○ Mars Exploration Program Office</li> </ul> </li> </ul>	<p>NASA Web site;</p> <p>FR p. 9</p> <p>FR p. 9</p>
<b>Mandate</b>	To carry out aeronautical and space activities of the United States	FR p. 9
<b>Philosophy</b>	Conduct and fund research in the areas of: Aeronautics, science, space exploration	NASA Web site
<b>Mission</b>	Conduct research for the solutions of problems of flight within and outside the earth's atmosphere; develop, construct, test and operate aeronautical and space vehicles for research purposes; operate a space transportation system; perform activities required for the exploration of space	FR p. 9
<b>Functions</b>	<p>Aeronautics:</p> <ul style="list-style-type: none"> <li>• pioneer new flight technologies</li> </ul> <p>Exploration Systems:</p> <ul style="list-style-type: none"> <li>• research affordable and sustainable human and robotic exploration</li> </ul> <p>Science:</p> <ul style="list-style-type: none"> <li>• exploration of the Earth, moon, Mars and beyond</li> </ul> <p>Space Operations:</p> <ul style="list-style-type: none"> <li>• space shuttle, international space station, flight support</li> </ul>	NASA Web site
<b>Recognitions</b>	Information not available in the final report	
<b>Activities Resulting in Document Creation</b>		
<b><i>Administrative &amp; Managerial Framework</i></b>		
<b>TOPIC</b>	<b>SPECIFICS</b>	<b>SOURCE</b>
<b>General Description</b>	The creator must support the operation of the Mars Global Surveyor Mission and the Planetary Data System	Inferred from final report

<b>Type of activities</b>	<ul style="list-style-type: none"> <li>• Generating standard data products, documentation and index tables by the Mars Global Surveyor and Mars Orbital Camera team</li> <li>• Generating archive volumes</li> <li>• Validating archive volumes by the Science Data Validation Team and Planetary Data System</li> <li>• Transferring archive volumes to the Planetary Data System</li> <li>• Enabling access to the Planetary Data System by the planetary science community</li> <li>• Transferring archive volumes to the NSSDC deep archives</li> </ul>	FR p. 12
<b>Documents resulting from activities</b>	Mars Global Surveyor data records and Planetary Data System data sets <ul style="list-style-type: none"> <li>• Standard data products</li> <li>• Documentation</li> <li>• Index tables</li> <li>• Archive volumes</li> </ul>	FR p. 12
<b>Existence of a RM and/or archives program</b>	The Planetary Data System <ul style="list-style-type: none"> <li>• Each data product is assigned a permanent, unique identifier</li> </ul>	FR p. 18, 26, 27
<b>Individuals responsible for preservation</b>	<ul style="list-style-type: none"> <li>• Radio Science Team Leaders and Principal Investigators are responsible for getting data products to team members and to interdisciplinary and participating scientists</li> <li>• NASA is responsible for the Planetary Data System archive (to ensure long-term usability of NASA data)</li> </ul>	FR p. 4,5
<b>Existence of Preservation Strategies</b>	The Planetary Data System may be considered a long-term preservation strategy in that it was designed to be an archive for the long-term preservation of planetary science data records (the data sets have already been arranged and described once transferred to the Planetary Data System and the peer review process which determines what records are incorporated into the Planetary Data System can be likened to an appraisal process	FR p. 27
<b>Legal Requirements and Constraints</b>	Information not available in the final report	

<b>Normative Requirements and Constraints</b>	<ul style="list-style-type: none"> <li>• Planetary Data System Reference</li> <li>• Planetary Data System Data Preparation Workbook (guide for the organization and preparation of data sets to be submitted to the Planetary Data System)</li> <li>• Archiving plans must be drawn up with end-to-end data flow and a Project Data Management Plan is required for all new projects</li> <li>• Archive Policy and Data Transfer Plan describes production and delivery plans for archive products for a project</li> </ul> <p>All data entered into the Planetary Data System must undergo peer review</p>	FR p. 22
<b>Technological Requirements and Constraints</b>	The Planetary Data System model determines the way in which data objects are organized	FR p. 19
<b><i>Digital entity being studied</i></b>		
<b>General Description</b>	Mars Global Surveyor mission data records and Planetary Data System records <ul style="list-style-type: none"> <li>• Data set: accumulation of data products, supplemental data, software, documentation</li> </ul>	FR p. 6, 5
<b>Type of activities</b>	<ul style="list-style-type: none"> <li>• The Mars Global Surveyor Mission activities generate digital scientific data records</li> </ul>	FR p. 19
<b>Documents resulting from activities</b>	Planetary Data System structure objects <ul style="list-style-type: none"> <li>• Outline the format in which the science data appear in the Planetary Data System labels</li> <li>• For each object there exists text that describes the object, outlines its uses and illustrates one or more examples</li> </ul>	FR p. 12, 13
<b>Existence of Preservation Strategies</b>	Persistent object preservation (POP) <ul style="list-style-type: none"> <li>• Technique to ensure electronic records remain accessible by making them self-describing in such a way that is independent of specific hardware and software</li> <li>• The Planetary Data System is considered a persistent archive in that the data it holds remains accessible over time and through technological obsolescence</li> <li>• The System encodes the context and description of file structure in Planetary Data System labels using Object Description Language</li> <li>• The data descriptions are interpreted using Label Library Light (L3) and Object Access library</li> <li>• The data objects are displayed using NASAView</li> </ul>	FR p. 32

<b>Legal Requirements and Constraints</b>	Information not available in the final report	
<b>Normative Requirements and Constraints</b>	<ul style="list-style-type: none"> <li>• Planetary Data System Reference</li> <li>• Planetary Data System Data Preparation Workbook (guide for the organization and preparation of data sets to be submitted to the Planetary Data System)</li> <li>• Archiving plans must be drawn up with end-to-end data flow and a Project Data Management Plan is required for all new projects</li> <li>• Archive Policy and Data Transfer Plan describes production and delivery plans for archive products for a project</li> <li>• All data entered into the Planetary Data System must undergo peer review</li> </ul>	<p>FR p. 22</p> <p>FR p. 23</p>
<b>Technological Requirements and Constraints</b>	<p>Architecture:</p> <ul style="list-style-type: none"> <li>• Telecommunication network (Deep space network)</li> <li>• Project database (receives data from spacecraft instruments)</li> <li>• Science Operations Planning Computers at various locations process the data</li> </ul> <p>Creation tools:</p> <ul style="list-style-type: none"> <li>• Cameras</li> <li>• Science Operations Planning Computers</li> </ul> <p>Processing tools:</p> <ul style="list-style-type: none"> <li>• Label Library Light (L3), Object Access library (OAL), NASAView, Volume Verifier software</li> <li>• Additional computers (e.g., Goddard Space Flight Center) used to process and analyze science data</li> </ul> <p>Media:</p> <ul style="list-style-type: none"> <li>• Text, image</li> </ul> <p>Formats:</p> <ul style="list-style-type: none"> <li>• SPICE (Spacecraft, Planet, Instrument, C-Matrix, Events) files</li> </ul> <p>Data Product Software Interface Specification describes the format and size of individual data products</p> <p>Access to the Planetary Data System is controlled through user authentication</p>	<p>FR p. 4, 11, 19</p> <p>FR p. 22</p> <p>FR p. 23</p>