

Domain 1 Research Questions

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

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1.1 What types of documents are traditionally made or received and set aside (that is, created) in the course of artistic, scientific, and governmental activities that are expected to be delivered online? For what purposes? What types of electronic documents are currently being created to accomplish those same activities? Have the purposes for which these documents are created changed?

- The focus of CS08 was the examination of data documents created during the Mars Global Surveyor mission; the case study is confined exclusively to the electronic environment.
- Electronically-created documents include Mars Global Surveyor mission data reports, Planetary Data System reports, Engineering Data Records, SPICE kernels, Standard Data Products, and Special Data Products (science data products created during analysis). Data records are stored as digital images on CD or hard disk.
 - Digital scientific data records originate from the MGS spacecraft as instrument measurements of a target. These are transmitted in real-time through the Deep Space Network to Mission Ground Control, where they are accumulated in a Project Data Base (PDB).
- The electronic documents are created for three specific purposes:
 - To obtain global, synoptic views of the Martian surface and atmosphere to study meteorological, climatological and related surface changes during the course of the mission.
 - To examine and monitor surface and atmospheric features at moderate resolutions to permit discrimination of the details of their morphological character.
 - To systematically examine local areas at high resolution to quantify surface/atmosphere interactions and geological processes.

• More generally, these documents are created to capture scientific data for further analysis and experimentation, and for the dissemination of research information to the scientific community.

1.2 What are the nature and the characteristics of the traditional process of document creation in each activity? Have they been altered by the use of digital technology and, if yes, how?

- Documents are created through the activities of the Mars Global Surveyor Mission. These include:
 - The generation of standard data products, documentation, index tables and archive volumes
 - The validation of archive volumes
 - The transfer or archive volumes to the Project Database
- Technology has affected document creation in the sense that NASA is limited by the current capabilities of the technology and instruments used.

1.3 What are the formal elements and attributes of the documents generated by these processes in both a traditional and a digital environment? What is the function of each element and the significance of each attribute? Specifically, what is the manifestation of authorship in the records of each activity and its implications for the exercise of intellectual property rights and the attribution of responsibilities?

- Digital entities take the form of structure objects within the PDB, which outline the format in which the scientific data appears in PDB labels; a detailed description of each is provided in the "PDS Standards Reference" document (see the case study's final report).
- A "Planetary Science Data Dictionary" provides definitions for all attribute names used in resource descriptions; PDS data adhere to nomenclature standards, which define rules for constructing Data Element and Data Object names.
- An Object Description Language is used to create labels for data files and other objects; labels contain key attributes of the digital objects.
- Classes of objects defined include record, file, object, image, image histogram, ancillary table, spacecraft, target and instrument.
- Object behaviours consist of the various operations that can be performed, and the processing and analytic tools.
- Digital images are grayscale, of 464 lines and 416 samples per line; each sample is represented by 8 bits.
- NASA is the author of the documents created in the Mars Global Surveyor Mission.

1.4 Does the definition of a record adopted by InterPARES 1 apply to all or part of the documents generated by these processes? If yes, given the different manifestations of the record's nature in such documents, how do we recognize and demonstrate the necessary components that the definition identifies? If not, is it possible to change the definition maintaining theoretical consistency in the identification of documents as records across the spectrum of human activities? In other words, should we be looking at other factors that make of a document a record than those that diplomatics and archival science have considered so far?

- A diplomatic analysis of CS08 has not yet been completed according to the current diplomatic analysis template.
- The creator, however, considers the documents to be records, as the data products are considered to be complete and reliable; furthermore, the person competent to create it is indicated in the text, which the creator feels makes it authentic.

1.5 As government and businesses deliver services electronically and enter into transactions based on more dynamic web-based presentations and exchanges of information, are they neglecting to capture adequate documentary evidence of the occurrence of these transactions?

• Although an agency of the American government, the focus of NASA's work is scientific endeavour; since no transaction occurs, this question does not apply.

1.6 Is the move to more dynamic and open-ended exchanges of information blurring the responsibilities and altering the legal liabilities of the participants in electronic transactions?

- NASA is an agency of the American government, and as such, must adhere to the following legislation:
 - National Aeronautics and Space Act (1958), mandating and authorizing NASA to undertake aeronautical and space activities
 - NASA regulations published in the United States Code of Federal Regulations, Title 14 – Aeronautics and Space, Chapter V, NASA, Parts 1200 – 1299.2
- The persons involved in the creation of documents are also bound by professional ethics in the planetary sciences and institutional ethics of NASA; these call for trust-worthiness and competence.

1.7 How do record creators traditionally determine the retention of their records and implement this determination in the context of each activity? How do record retention decisions and practices differ for individual and institutional creators? How has the use of digital technology affected their decisions and practices?

- Data products are currently retained in the Planetary Data System, which is referred to as an "active archive," and serves as a type of recordkeeping system.
- The Planetary Data System was designed for long-term preservation and usability of data, and it routinely captures all digital entities within the scope of the activities covered.