Obtaining and Using Planetary Spatial Data into the Future: The Role of MAPSIT (Mapping And Planetary Spatial Infrastructure Team)

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(A) MAPSIT Origin

- The Planetary Science Subcommittee of the NASA Advisory Council (NAC) endorsed formation of a group to coordinate strategic planning needs for planetary spatial data infrastructure
- NASA and USGS worked together to establish MAPSIT: the Mapping and Planetary Spatial Infrastructure Team
- MAPSIT's mission is to *ensure that planetary spatial data are readily available for any investigation, now or in the future*

(B) MAPSIT Goals

- Provide community findings concerning the scientific rationale, objectives, technology, and long-range strategic priorities for spatial data manipulation, software development [e.g., *Becker et al.*, 2017], and geologic mapping [*Skinner*, 2017]
- Help define community needs for critical research and planetary mission infrastructure, particularly software tools and content archival and delivery systems
- Provide findings on the accuracy and precision required for spatial technologies and products
- Coordinate and promote the registration of data sets from international missions with those from US missions to optimize their combined utility
- For present and future planetary missions, encourage the development of standards for coordinate systems, geologic mapping, cartographic methods, and nomenclature
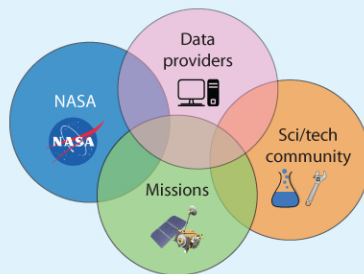

MAPSIT town hall meeting at LPSC (24 March, 2016).

2nd Planetary Data Users Workshop (8–11 June, 2015).

(C) Motivating questions

- How should the current, unprecedented influx of high-volume, planetary mission data (e.g., Mars Reconnaissance Orbiter, Lunar Reconnaissance Orbiter, MESSENGER) be geodetically controlled and integrated to enable science and operation of current and future missions?
- How should global, regional, and local topographic models be created from multiple data sets?
- What requirements should be developed for missions to follow during the formulation and definition stages to mitigate subsequent growth of costs?
- How can research and analysis programs support strategic development of mapping procedures for new and complex products?
- How can planetary spatial data products be used to enable and facilitate future human exploration and in-situ resource utilization? [e.g., *Wargo et al.*, 2013]

(D) Immediate actions

- Develop **roadmap** to identify long-range strategic priorities. Solicit input from steering committee, community surveys, and townhall meetings.
- Promote creation of and access to **foundational data sets**, including geodetic control or reference frames, topography, and orthoimages [*Laura et al.*, 2017].

Example "foundational" data set: MESSENGER global topography of Mercury

Enabling Planetary Exploration in 2050

How does MAPSIT help:

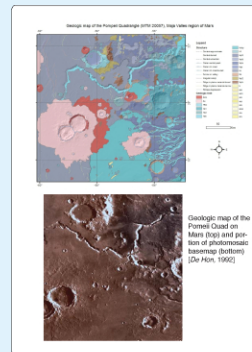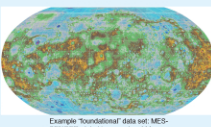|	
NASA	• Provide findings upon request • Help identify and prioritize current and future spatial data infrastructure needs • Provide input to R&A calls (e.g., geo mapping guidance, PDART)
Sci/tech community	• Provide feedback mechanism • Provide avenue for targeted advocacy • Enable future missions by maintaining past data archives, promote data access
Data providers	• Promote concept that data archiving ≠ data access • Help identify priorities based on demand/need
Missions	• Primary producers of new data • Use existing spatial data to develop more targeted or new science questions • Need to start planning with data management in mind from onset

Geologic mapping: Key to past and future success

Geologic map of the lunar crater Copernicus [*Shoemaker and Hackman*, 1960]

- Geologic maps establish frameworks for (1) promoting comparability and (2) ensuring objective tools for making "land-use" decisions of natural assets
- Geologic mapping is a type example of PSDI needs. Geoscience maps must use diverse data to create derived products that both illuminate and serve as foundation for other basic and applied research
- Terrestrial geologic mapping efforts have adapted to creating, storing, displaying, disseminating, querying, and analyzing geo map data; Planetary geologic mapping efforts have not
- Broad-scale accessibility and use of planetary geoscience maps relies on PSDI (access, policy, and standards)
- Planetary geologic maps should follow cues from National Geologic Mapping Act 1992, which serves as model for planning, management, and dissemination of topical and standardized geoscience maps (e.g., National Geologic Map Database)

Geologic map of the Pomeii Quad on Mars (top) and portion of photomosaic basemap (bottom) [*De Hon*, 1992]

MAPSIT Steering Committee

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