CONSIDERATIONS OF SPATIAL DATA AND RELATED TECHNOLOGIES WHEN DISCUSSING SHORT- AND LONG-TERM EXPLORATION STRATEGIES OF MARS. J. A. Skinner, Jr. and T. M. Hare, Astrogeology Science Center, U.S. Geological Survey, 2255 N. Gemini Dr., Flagstaff, AZ 86001 (jskinner@usgs.gov).

Introduction: Planetary exploration cannot be efficiently planned for or executed without a coordinated mechanism that regularizes and promotes the acquisition, processing, distribution, use, maintenance, and preservation of spatial data. In short, successful exploration strategies cannot be developed without addressing data and access needs. Terrestrial spatial data is federally recognized as a national capital asset that includes coordinated management for reliable and easy access by scientists, policy-makers, and the general public [1]. Planetary spatial data is no different; it needs to be planned for and coordinated in order to efficiently achieve scientific and exploration goals. With respect to Mars, any consideration of current and future research and exploration is either implicitly or explicitly linked to the availability, co-registration, and interoperability of data. There is an abundance and diversity of data for Mars, which is an obvious boon for research and planning. However, there is potential for inefficiency in data use when there is a lack of coordination between how these data are acquired, processed, and disseminated. As a community, we need to ascertain if the requisite data products not only exist, but if they are also sufficiently coordinated to achieve the stated short- and long-term goals of MEPAG. Advisory groups should work closely together to make this determination.

MAPSIT is a community-based advisory group that is designed to help identify – and advocate the specific steps for closing – knowledge gaps with respect to spatial data products and (or) processes. MAPSIT advocates not only for foundational (*i.e.*, geodetic control, ortho imagery, elevation) and framework data products (*e.g.*, geology, composition, feature inventories), but also the technical capabilities and requirements that enable the creation, dissemination, use, interoperability, and preservation of that data [2]. Here, we aim to highlight considerations as well as start a dialogue regarding data-related knowledge gaps for Mars, which should be critically assessed in tandem with discussion on short- and long-term exploration strategies for Mars.

Data Coordination: Existing community advisory groups, like MEPAG, are best-suited to identify knowledge gaps for their particular body, region, or topic, including foundational data products that are required, priorities for the creation of framework products, and (or) the needed spatial accuracies and precisions to achieve the desired goals. MAPSIT compiles and advocates for the creation of the derived data products and any technical capabilities and requirements that support the use of this data. As such, MAPSIT will leverage existing strategic documents, to the extent possible. However, we identify a critical gap in the MEPAG Goals Document in that the objectives and investigations documented therein are not clearly linked to data and technologies that fundamentally enable these objectives and investigations to be addressed. For example, MEPAG states that co-analysis of data is valuable but does not report the data that needs to be co-analyzed or the relevant infrastructural details that enable co-analysis such as precision of registration (or the degree to which precision is analysis-dependent), cross-compatibility, error reporting, or preferred data formats. A spatial data infrastructure is more far-reaching than specific data products or the mode whereby such products can be accessed. A fully developed data infrastructure consists of coordinated access mechanisms, policies, standards, and users. For example, a body-specific infrastructure would include not only spatial data but also the mechanism for accessing data, the standards that support interoperability between datasets, the policies that define the data standards, and the community who use the data [2]. The MarsGIS initiative is an example of a body-specific spatial data infrastructure that is being developed to support both landing site analysis and eventual human operation on Mars [3].

Recommendation: When preparing for the next Planetary Science Decadal Survey, the community should not only identify specific objectives, goals, and investigations but also consider what data products are required to address these objectives, goals, and investigations as well as the details that surround the creation, dissemination, use, and preservation of these data. Consideration of high-level science objectives, specific types of observations/measurements/analyses, and science and technology strategies all fundamentally rely on data products and the pipelines that create and disseminate those products. We advise MEPAG to create a traceability matrix (or similar) that clearly links goals to current and (or) future data products, spatial accuracy and resolution of those products, and the means by which those data products should be accessed and integrated.

References: [1] OMB Circular A-16, 2002. [2] Laura et al. (2017) ISPRS Int. J. Geo-Inf, 6 (6), 181. [3] Hare et al. (2018) *LPSC XLIX*, #1699.