

Mars Concurrent Exploration (MCE)-SAG Charter
Mars Exploration Program Analysis Group (MEPAG)
Science Analysis Group Charter

Purpose

The Mars Sample Return (MSR) program represents the execution of the consensus highest priority science goal for the Mars science community as noted in the *Visions and Voyages* Decadal Survey (DS), and reaffirmed by the present Decadal Survey, *Origins, Worlds, and Life (OWL)*. However, as noted in *Visions and Voyages* and outlined in *OWL* and in the MEPAG Goals, while MSR will be a major step forward, the Mars Exploration Program (MEP) has additional important priorities that cannot be addressed by MSR alone. Major new science questions have emerged in the last decade beyond MSR, as revealed in recent findings from the Mars Architecture Strategy Working Group (MASWG), the Ice and Climate Evolution Science Analysis Group (ICE-SAG), the *OWL* report, the Low-Cost Science Mission Concepts for Mars Exploration Workshop, MEPAG's recent update to the MEPAG Goals document, as well as community input through MEPAG meetings over the last three years. These fundamental questions can be broadly categorized as: diversity of ancient habitable environments, Amazonian climate change, the Martian ice budget over time, and the dynamic nature of present-day Mars. Recognition of this breadth of new, and addressable, science questions at Mars is seen in *OWL* through the recommendation that NASA should maintain the MEP to develop and implement a comprehensive exploration architecture concurrently with the MSR program. *OWL* also affirmed that low-cost exploration can be part of the MEP strategy to advance scientific and human exploration goals.

The Mars Concurrent Exploration Science Analysis Group (MCE-SAG) is tasked to collate and synthesize a broad range of inputs to express community consensus on the highest priority science that should be executed in parallel with MSR, with a focus on those that can be addressed under a low-cost mission model (e.g., budget classes between and including SIMPLEX and Discovery). The ultimate goal is to develop a program architecture to begin regularly flying competed low-cost Mars missions addressing high priority science within the next ten years.

The SAG will focus on low-cost missions, as these will constitute the backbone of the MEP during the MSR era. The SAG will leave to future SAGs the task to further develop mid-level missions discussed in *OWL*, including the I-MIM mission, which is currently under study by a dedicated Measurement Definition Team, and the Mars Life Explorer mission concept, which requires further focused study. However, the SAG may consider how these missions or mission types could integrate into and be supported by a low-cost mission program.

Statement of Task

With this charter, the MEPAG Steering Committee forms the **MCE**-SAG to identify and prioritize scientific objectives and/or investigations that could be executed within the next ten years, in parallel with the MSR effort and in conjunction with *OWL* guidance for the Mars Exploration Program (MEP). The **MCE**-SAG shall:

- Identify high-priority science objectives that could be achieved in parallel with MSR to address fundamental planetary science questions traceable to the MEPAG goals document and the *OWL*, as well as recent SAG report findings and recommendations
- Assay these objectives to identify constituent parts that are executable as standalone investigations that contribute to a broader program of Mars science; and
- Determine how such investigations might be addressed within a low cost mission program (Discovery budget class and smaller missions) within the next decade.
- Determine what technology development and Mars infrastructure will be needed to support these low cost Mars missions.

Approach

The SAG shall take into account the following:

- The current MEPAG Goals document as well as recent high-impact results from all fields of Mars science that may not be fully incorporated in the 2020 version of that document.
- The report of the Mars Architecture Strategy Working Group (MASWG) dated November, 2020.
- The KISS workshop report on Revolutionizing Access to the Martian Surface (Culbert et al., 2022).
- The report of the Ice and Climate Evolution Science Analysis Group (ICE-SAG), with consideration for the possibility that the International Mars Ice Mapper (I-MIM), with or without additional science activities presented by the I-MIM MDT, may address some ICE-SAG findings.
- The report of the Low-Cost Science Mission Concepts for Mars Exploration Workshop held in March.
- Recent direction by the *OWL* discussing recommendations for Mars exploration activities aside from MSR-related ones.
- Official findings, community contributions, and discussion outputs from MEPAG virtual and face-to-face meetings that are pertinent to this charter.
- The SAG is also empowered to request from the community any other pertinent information necessary to complete their tasks.

Methods

- MCE-SAG will consist of 2 Chairs and ~15-20 members selected from the Mars Community.
- In an effort to broaden participation within the Mars community, this selection will be an open call and an evaluative rubric has been designed for the Steering Committee to evaluate the applicants in an equitable way.
- SAG Member Selection
 - The MEPAG SC will announce an open call for self-nomination to the MCE-SAG
 - Applicants will be asked to provide their CV of no more than 2 pages and a Cover letter of no more than 2 pages to the SC. The cover letter should include:

- A discussion of the nominee’s knowledge and expertise as they match one or more areas of expertise listed in the call, and how these would contribute to the goals of the MCE-SAG
- A discussion of their mission experience, including active missions, mission proposals, and mission concept exercises.
- A discussion of any large-scale program experience and or budgeting experience
- A discussion of their understanding and support of MEPAG and the MEPAG community
- A description of availability for SAG meetings and tasks as noted in the call
- The individual members of the MEPAG SC will use selection rubric to evaluate the qualifications of each candidate and how they align with SAG needs.
- Each member of the SC will then rank the candidates and submit their ranking to the selection coordinator (the past Chair of MEPAG).
- The selection coordinator will collate the rankings and provide them to the SC; the SC will discuss the candidates and select 15-20 to be members of the MCE-SAG.
- MCE-SAG will be formed and begin its deliberations following the MEPAG 39 meeting.
- MCE-SAG will conduct its business primarily via telecons, e-mail, and/or web-based processes. If circumstances permit, a face-to-face meeting may be accommodated, if needed.
- When added expertise is needed, MCE-SAG will request a briefing from recognized subject matter experts.
- The Lunar and Planetary Institute (LPI) will provide logistical support.

Schedule and Deliverables

- A preliminary report (in ppt format) is requested to be presented to the Steering Committee by 1 August 2022.
- A draft report will be reviewed by the MEPAG Steering Committee and, if approved, will be presented for input from the MEPAG community at a subsequent MEPAG meeting.
- A final report is requested by 15 September 2022.
 - The report must not contain any material that is ITAR-sensitive.
 - The SAG members may opt to have their report reviewed externally.

References

Culbert, C. J., B. L. Ehlmann, and A. A. Fraeman (2022), Keck Institute for Space Studies (KISS), 2022, Revolutionizing Access to the Mars Surface, paper presented at Final Workshop Report for the W.M. Keck Institute for Space Studies, Pasadena, CA.