MEPAG VM 14

Discussion, Day 2

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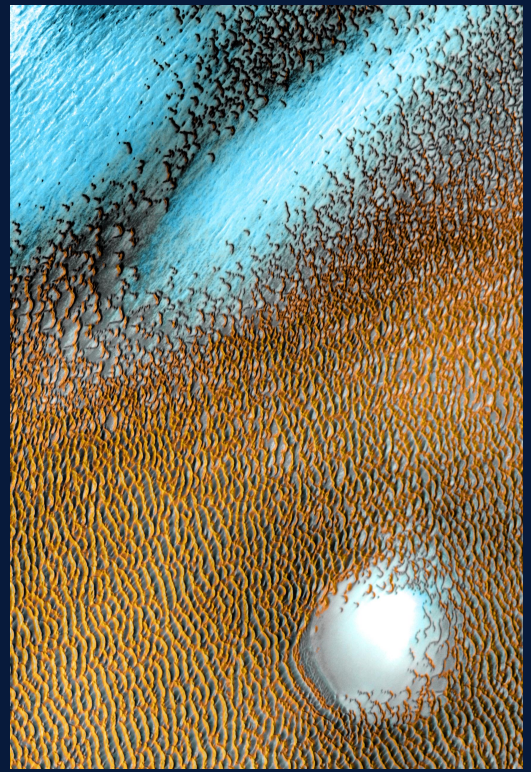
2-3 February 2022



Congratulations to Odyssey on its 20th anniversary this year!

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MEPAG Input for Day 2 Discussion

- With Mars Sample Return dominating activities for the next decade, what can we do to introduce a parallel line of Mars exploration?

Goal: To fly a competed mission before the end of the decade

- Synthesize a broad range of inputs to formulate community consensus on next steps in parallel with MSR.

This Meeting

- We are beginning this discussion to continue through the May meeting and beyond.

- Questions:
  - Is there something missing from existing discussions/reports?
  - What science theme brought forward by the community is most important, and what step(s) are necessary to best advance the science?
  - Are there additional mission ‘arcs’ to add to the examples in the MASWG report?
  - Is there a vision of next steps you would like to communicate?

- THINK BIG! We should not be advocating instrument concepts, or even mission concepts here; rather, the community’s vision of key science goals/themes.

Reminder: Decadal Survey White paper

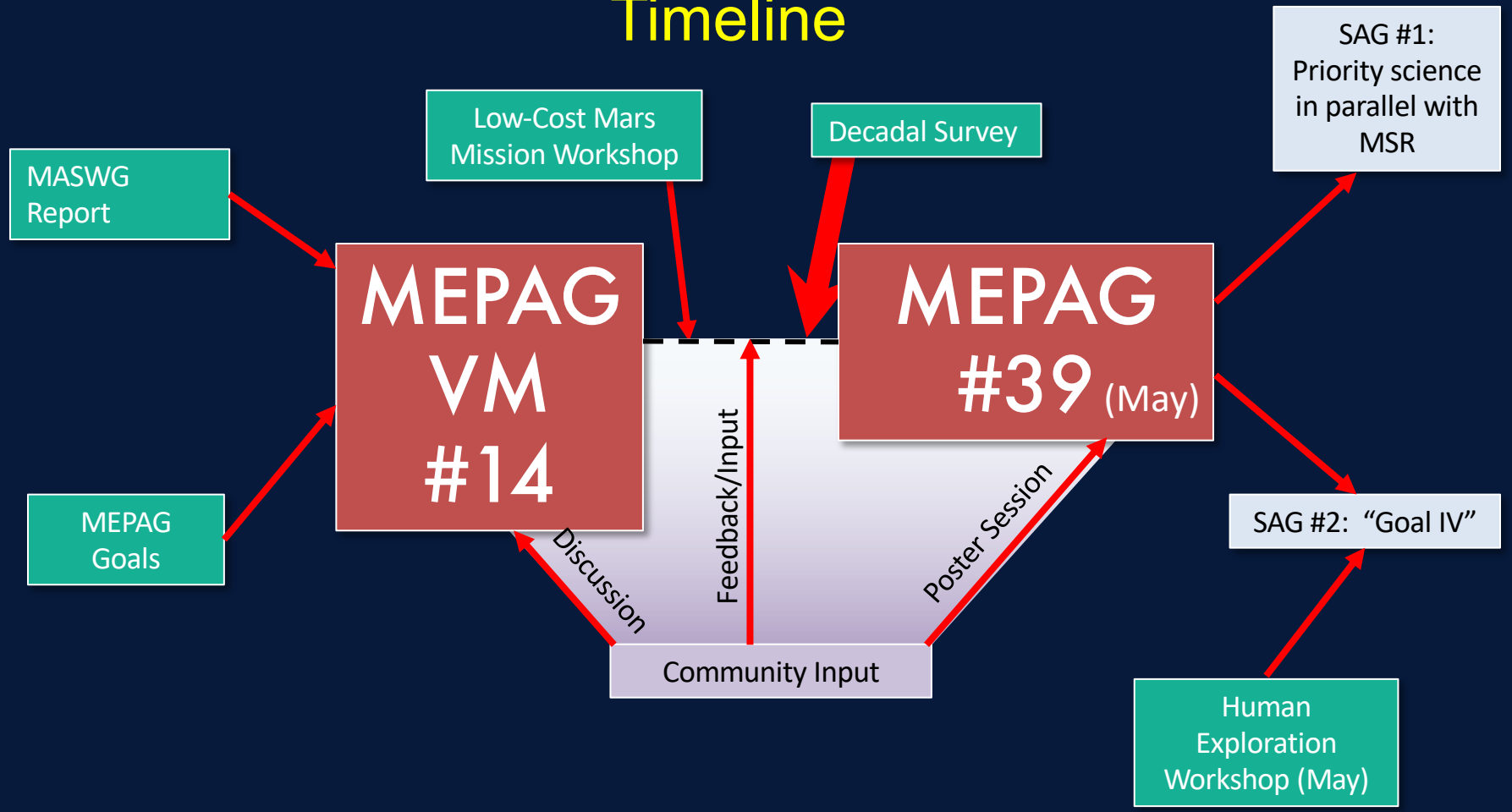
- Mars as a compelling target for Solar System-wide science questions
  - Mars is an ideal proving ground to address (and answer?) what pathways can lead to habitable environments, and ultimately life.
  - Mars is a unique place to explore how climates and atmospheres form, evolve and change through time.
  - Mars is a distinctive and key data point for exploring the internal structure, origin and evolution of terrestrial planets.
  - Mars provides a laboratory for characterizing how the solar system is representative of planetary systems in general, specifically in terms of habitable zones.
  - Mars is a long-term strategic goal for human exploration.
- All environments on early Earth also existed on early Mars, and this record is essentially preserved, making Mars the most accessible extraterrestrial planet where habitability coexisted with the potential for life to arise.

Reminder: some pertinent MASWG findings

- A Mars program can most effectively address the full range of key science objectives by appropriately utilizing missions in all size classes, in addition to MSR. The key is to match the mission class to the science objective.
  - Rapidly evolving small-spacecraft technologies and procedures could address many key science objectives. This class of missions could revolutionize robotic exploration of Mars. The most critical need is for affordable access to multiple places on the Martian surface with adequate payload/mobility.
  - Purely commercial or commercial-government partnerships for exploring or supporting the exploration of Mars, where the private entity bears a reasonable fraction of the investment risk are in their formative stages but do not currently exist for Mars. A Mars-focused CLPS-like program could allow technology development for future exploration as well as delivery of science payloads.
  - There is tremendous value in developing collaborations between the many different governments and entities interested in Mars exploration.
  - The scientific and the human explorations of Mars are inextricably intertwined. Addressing science objectives will be an integral part of upcoming human exploration, and preparing for future human exploration provides one of the rationales behind having a vigorous robotic Mars scientific exploration program today.

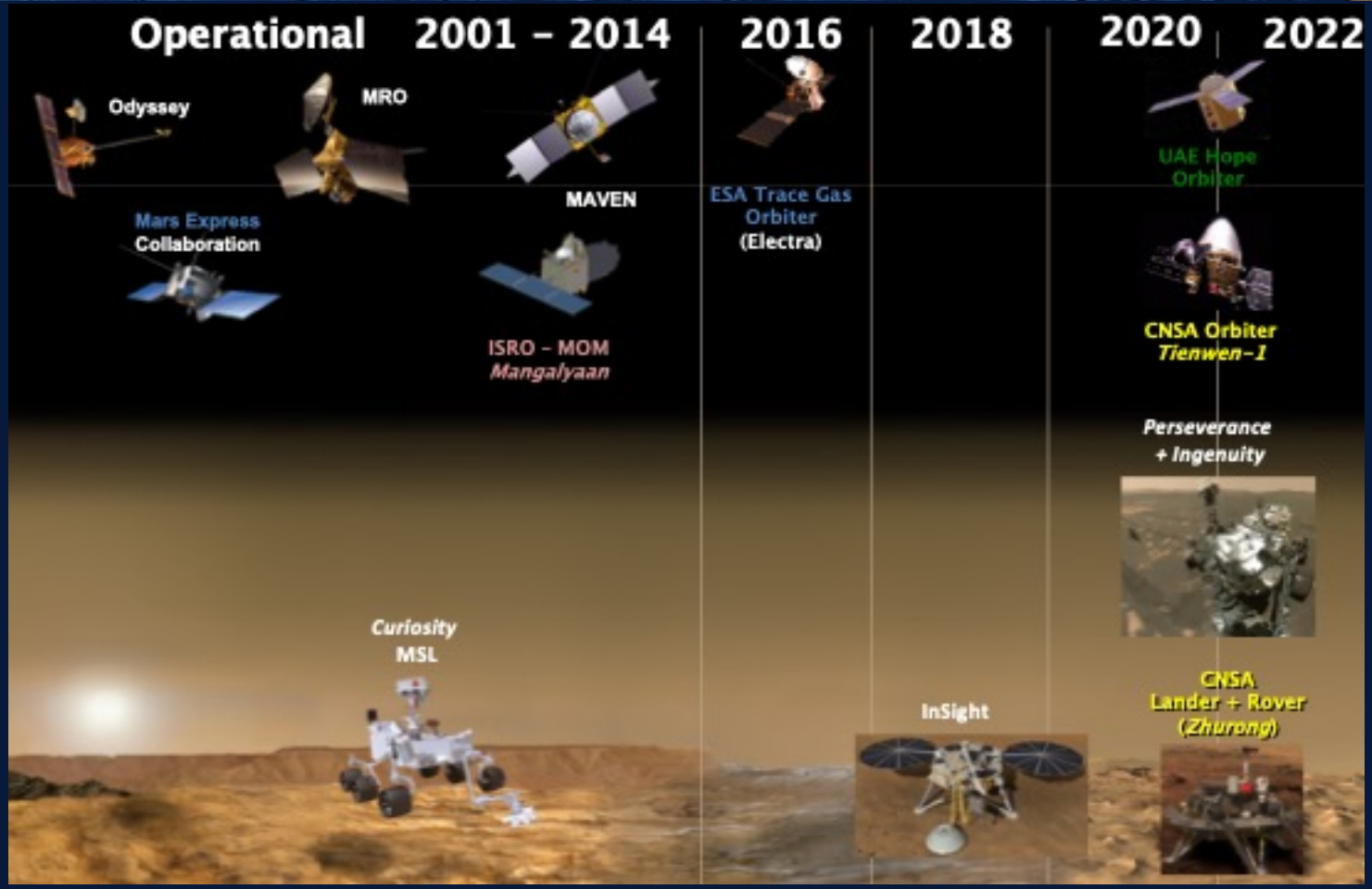
- Recommendation 2: NASA should support missions that address fundamental science objectives at Mars in addition to MSR, using the full range of technically viable mission classes. During the MSR era, the emphasis should be on achieving other high-priority science objectives, while developing the needed technologies for going forward.

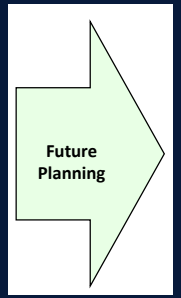
Timeline


MASWG Report
Low-Cost Mars Mission Workshop
Decadal Survey
SAG #1: Priority science in parallel with MSR
MEPAG VM #14
MEPAG #39 (May)
MEPAG Goals
Discussion
Feedback/Input
Poster Session
SAG #2: "Goal IV"
Community Input
Human Exploration Workshop (May)

Backup slides

Mars Exploration Program Analysis Group (MEPAG)





ExoMars
Lander + Rover
in 2023

MEPAG Active Findings

Mars Exploration Program – Int'l Mars Ice Mapper (IMIM)

- The MEPAG community continues to request a more comprehensive rationale for iMIM, and from this follows a number of concerns.
  - Accepting that this is an agency initiative, what part of the agency sets the mission agenda and negotiates it with OMB? (It is not HEO/ESD.)
- MEPAG applauds the recent selection of a Measurement Definition Team (MDT).
- Before it can get behind this mission, the Mars community is waiting to see: (1) whether the MDT is given full support to exercise its charter and (2) whether and how the agency responds to the MDT recommendations. . The recent announcement of the MDT membership was a good first step. MEPAG hopes to hear from the group at one of its future meetings.
- Open engagement with the Mars community is needed to strategically plan and execute Mars exploration most efficiently.

MEPAG Active Findings

Mars Exploration Program – Mission Arcs

- Since the community is not clear how iMIM emerged, there are concerns that future Mars missions during a budget-constrained period may be defined as was iMIM, with Agency programmatic objectives (resources, telecommunications) as core and science objectives as possible add-ons.

- The community believes this is not the only path to achieve compelling science by NASA; other options should be considered (e.g., low-cost, dedicated missions; commercial partnerships)?
  - There is compelling science to be done at Mars in addition to completing MSR, and MASWG identified possible mission arcs that could be initiated with low/lower cost missions. Such missions could take advantage of rapidly developing small spacecraft capabilities, both by commercial and non-commercial entities, and do compelling science while avoiding unreasonable risks.
  - Activities like the upcoming Low-Cost Mars Science Mission Concepts Workshop can help highlight possibilities.
  - Building on the Decadal Survey results, MEPAG could assist discussion of which arc might be the pilot project within the context that more can be done in the future as the MSR flight developments are completed.
- *Again:* Open engagement with the Mars community is needed to strategically plan and execute Mars exploration most efficiently.

MEPAG Active Findings: How to Assist Human Exploration

- The Moon to Mars program has its hands full with that first step, on a tight schedule and a tighter budget
- MEPAG proposes to assist SMD/MEP make the best use of science mission data most likely to aid ESD when they are able to turn their attention to specific needs for exploration by humans on Mars
  - Ice Mapper *could* be one of those missions; MEPAG awaits the MDT recommendations
  - MEPAG will continue to update its Goal IV (Preparations for Humans) developed with HEO planners, in light of new discoveries or needs
  - MEPAG will also work within SMD and support its interactions with ESD by studying what human explorers on Mars *should* do with regard to science once they are there
- This is taking a longer view, but recognizes the main ESD/SO focus must be on the first steps away from Earth