

Summary of the presentations, discussion, and main outcomes of the 32nd MEPAG meeting **October 6, 2016; virtual attendance only**

Posted agenda and presentation files: <http://mepag.nasa.gov/meetings.cfm?expand=m32>

Notes present an overview of discussion as well as presentation materials.

Key MEPAG Announcements

- Please respond to all requests for feedback via the email MEPAGmeetingQs@jpl.nasa.gov.
- **Goals Committee** positions have been filled:
 - Goal I (*Life*): Sarah Stewart Johnson, Georgetown University (replacing Tori Hoehler)
 - Goal II (*Climate*): Robin Wordsworth, Harvard University (replacing Scot Rafkin)
 - Goal IV (*Human Exploration*): Jacob Bleacher, Goddard Space Flight Center (replacing Darlene Lim)
- Two new members have been added to the **MEPAG Executive Committee**:
 - Scott Hubbard, Stanford University (as successor to the late Noel Hinners)
 - Ben Bussey, HEOMD, NASA HQ (as Ex Officio member)
- **MEPAG, in conjunction with NASA Headquarters, will convene a study to analyze and make recommendations regarding science team organization and operational models for the next Mars Orbiter.** The results of this effort will be provided to the upcoming *Objectives and Requirements Definition Team* (ORDT) that will be convened in early 2017.
- The **next MEPAG “face to face” meeting** will occur at a date to be determined February-April, 2017. Agenda suggestions are welcome.
- **MEPAG Terms of Reference** have been updated: <http://mepag.nasa.gov/about.cfm>
- **Newsletter/communications survey** was completed: <http://mepag.nasa.gov/announcements.cfm>

Overview of MEPAG and Mars science community activities

- In addition to the announcements listed above, [MEPAG Chair Jeff Johnson presented](#) an abbreviated version of the presentation he gave to the National Academies Space Studies Board review panel on the Planetary Science Division’s (PDS) Restructured Research and Analysis Programs; a brief summary of the Mars Water In-Situ Resource Utilization Planning Study (M-WIP) study jointly sponsored by SMD/HEOMD (a more detailed presentation will occur at the next MEPAG meeting); and some of the Mars-related findings from the Planetary Science Subcommittee (PSS) during recent PSS meetings, including the responses from NASA Headquarters (HQ). The latter included items related to Mars Sample Return, U.S. Participation in Foreign Missions, Deep Space Network (DSN) concerns, communications about Mars Sample Return architectures and trade studies, and Special Regions. The HQ response for the latter item included formation of a new *a Planetary Protection Technology Definition Team* that was described in Michael Meyer’s presentation (below).
- Lindsay Hays presented [an overview](#) of the organization of, participation in, and results of the [Biosignature Preservation and Detection in Mars Analog Environments Conference](#), which was held May 16-18, 2016 in Nevada, US. In addition to a short conference report, a longer review paper is in preparation that supplements the discussions/topics raised at the workshop with details from published literature; these will be submitted to *Astrobiology*. It is hoped that this report will be a resource to the community, e.g., for use within analysis and discussions with regards to the biosignature potential of proposed Mars 2020 rover landing sites.
- Isaac Smith presented a [preliminary report](#) on the organization of, participation in, and results of the [Sixth International Conference on Mars Polar Science and Exploration](#), which was held September 5-9, 2016 in Reykjavik, Iceland. A listing of the current high-priority Mars Polar science objectives is

currently in-development, as part of the conference summary. This listing will be used as an input to discussions with the MEPAG Goals Committee, who will check that the Goals Document adequately includes and discussed these objectives.

- Louise Prockter presented on an ongoing Planetary Science-broad study of the impact and value of Participating Scientist (PS) programs. The full study results will be presented at DPS (Session 332, poster 02) and within a white paper that will be shared with the AGs and PSS. Results so far show that many values to NASA and PSs are recognized, but that inconsistencies between programs in e.g., who reviews the proposals and how PSs are integrated (or not) into the existing science teams, lead to a wide range of results.

Overviews of the US and other Mars Program Accomplishments and Plans

- Jim Watzin, NASA MEP Director, presented on the [state of the MEP](#).
 - Our current and in-development missions are progressing well. All six ongoing missions did well in their Senior review and have begun their new 2-year extended missions. The 2020 Mars rover (M2020) project started Phase C in June 2016. Partnerships with ESA (TGO and ExoMars) are progressing, and there's strong international interest in participating in potential future missions. Five potential international partners -- including but not limited to traditional partners -- have expressed interest in working with NASA on the next Mars orbiter. Potential interests cover both spacecraft and payload elements. As the spacecraft concept matures, MEP will work with those partners over the coming months to identify specific contributed elements. In addition, five industry studies are ongoing to explore orbiter spacecraft options. Johnson requested that Watzin summarize the results of these industry studies at the next MEPAG meeting, and Watzin agreed.
 - Watzin pointed out that we need to deal with the reality that: (1) no missions have been budgeted or approved after M2020; (2) our existing spacecraft are aging – so if we want, for example, to refresh relay and reconnaissance in the 2020s (which is the logical next step), development of an orbiter needs to begin now; (3) and MEP has thus far been unable to get approval for an such an orbiter, leading to deferral of an Objectives and Requirements Definition Team (ORDT). Watzin thinks that a 2022 launch could still be feasible, although funding and project planning would have to begin in the near-future. But without a 2022 launch, it is feared that an orbital data and relay capability gap will emerge affecting any potential M2020 extended mission.
 - Funding has been provided for concept studies (FY16-17), but not yet for a project. And the funding guidelines (for out years) provided for use within for the study do not support a significant remote sensing payload unless contributed instruments can be added. In addition to communications and relay, MEP wants to make progress on the Planetary Science Decadal priority of Mars sample return (MSR). Additional remote sensing capabilities would pursue additional high-priority science objectives and investigate candidate landing sites for future exploration by humans on Mars This poses some new challenges and generated much discussion with the community – outlined in [Exploring A New Science Team Model](#), below.
 - *Beyond the potential next Mars orbiter*, studies relevant to a Mars Ascent Vehicle (MAV) are also being supported, to look at different approaches with some emphasis on more incremental and less risky ways of achieving the basic objective; only a modest capability is needed to launch a bowling ball-sized sample container into Mars orbit.
- Michael Meyer, NASA Mars Exploration Program (MEP) Lead Scientist, presented an overview of [MEP accomplishments and plans](#). He described science highlights from ongoing Mars missions and discussed the Senior Review process and results (all have been extended through FY18). Additionally, he discussed a Citizen Science workshop that occurred in September, current numbers

within Mars Research Programs (i.e., Mars Data Analysis Program (MDAP) and NASA Earth and Space Science Fellowship (NESSF)). Two groups have also been convened for Planetary Protection discussions: a *Contamination Control and Planetary Protection Working group* to provide MEP with expert insight into the plans, designs, and operational elements of the sample collection system on Mars 2020, and a *Planetary Protection Technology Definition Team* to assess technical and engineering challenges to applying available microbial reduction methods to spacecraft hardware and instruments and to explore for addressing those challenges.

- Bruce Banerdt, InSight mission PI, gave a [status report on the InSight Mission](#). This mission is now planned to launch in May-June 2018, and would land on Mars on November 26, 2018. Rebuild of the seismometer package, whose issues previously delayed launch, is making good progress. In addition to the existing payload, the project is considering a new experiment (a passive retroreflector contribution from Italy). This new instrument has little impact on accommodation, but its Mars science contribution would come with future flight of an orbital ranging device.
- Ben Bussey, HEOMD Chief Exploration Scientist, presented a [brief overview of Mars-related HEO studies and working groups](#). In particular, he discussed efforts to update our understanding on progress made within and high-priority investigations needed to advance within Strategic Knowledge Gaps. In response to a question about whether human exploration goals would affect the choice of landing site for M2020, it was noted that MOXIE (an HEO ISRU-motivated instrument, selected when the science instruments were selected) can work anywhere within the M2020 site limits and so does not affect landing site selection (which is driven by the mission's science objectives).

Exploring A New Science Team Model

- As shown by Jim Watzin within his presentation on the [state of the MEP](#), the Mars Exploration Program may need to deal with a fiscally-constrained reality by engaging with and collaborating with institutional, commercial, and/or international partners. The question arises of how to maintain US scientist involvement and capabilities in such an environment. This may require a new paradigm in how MEP missions may be organized in order to bring together partner interests, especially with respect to its science team. The central question is "If the majority of instruments are contributed, how do we integrate these into common theme while meeting high-priority science objectives and ensuring US science participation?"
 - Watzin emphasized that this was not an effort to address any problem with how past or current missions have been developed and operated; MEP missions have been highly successful with AO competition. This request for a new model is to address a change in the resources available for future mission and thus situations where a mission could require that a large number of stakeholders integrate their resources and interests together. Within that type of situation, the standard ways may not be adequate and/or applicable. The desire is to broaden participation in the mission, rather than putting the onus on individual instrument PIs to try to handle all the stakeholders.
- Beyond the potential next Mars Orbiter, such a paradigm may be needed as we understand how commercial entities could collaborate within NASA missions. This is new territory for MEP and needs development. This also was apparent in the questions as by the community – at a broad scale and with respect to specific policies and practices. For example, it was asked if SpaceX and other commercial ventures are obligated to follow planetary protection policies. (Answer: In general, the US government is obligated to make sure its partners do follow this policy, but still to be resolved is the question of who enforces the policy. SpaceX has been in discussions with the Planetary Protection Office.)

- Watzin requested that MEPAG explore options for embracing new stakeholders and new types of collaborative relationships with those stakeholders. For example, for a potential future mission, should we expand participating scientist programs? Or operate a future orbiter mission more openly (i.e., as a *facility*)?
 - Under one optional scenario, a *facility* would imply that the payload providers and users are not necessarily the same entities, unlike the current case with PI-led mission or instrument teams. For instance, MEP (or another funding entity) would review proposals and make awards for “observing time” and resources (including funding) based on merit. The full mission would be led by a “Facility Science Team” selected via competition (potentially with term limitations), and with membership open to all mission partners. While not typical of MEP missions, structures of this sort are used within Astrophysics and Earth Science (although at a different scale).
 - There were many questions raised about how (and how much) research support would be available to the US Mars scientists. While Watzin proposed that within the *facility* model, the majority of the proposals (in scope, review process, and award) would be being similar to those within the current structure (as is done for astronomical observatories), just via a different venue, more work is needed to really see how research support could work – within the *facility* model or otherwise.
- The MEPAG Executive Committee has agreed to undertake the requested study, and efforts will begin shortly for negotiating a charter with MEP.

Future MEPAG Activities

- Rich Zurek led a [discussion regarding future MEPAG Studies](#), concentrating on the next Mars orbiter science team organization described by Jim Watzin.
 - The study *Exploring A New Science Team Model* (see above) will consider how to construct an orbiter science team with international and commercial partnership for provision of additional payload elements that augment mission capabilities without significant cost to NASA. The significant challenges in this notion include: (1) assuring that high-priority science is conducted to advance the goals of NASA, SMD, PSD, and the Decadal Survey; (2) how to craft opportunities for U.S. scientists while forming collaborations with international and commercial partners; (3) how to select an effective science team that optimizes mission operations; (4) how to select and organize such a team.
 - This study’s results would be presented to the ORDT (after the ORDT is commissioned).
 - *This study is not the ORDT!* The ORDT would define what NASA will call for when issuing an AO, by looking at and refining the mission’s science objectives. This study will instead be focused on determining the way to organize a diverse science team around a suite of possibilities (with regards to the objectives, payload, range of providers; these will be guided by e.g., the [NEX-SAG report](#)) within the discussed environment with many partners, each with major goals and shares. *This study is also different from the NEX-SAG study.* The [NEX-SAG report](#) defined the science that could be done by an orbiter and how it could achieve that technically, with respect to the payload and measurements. This study will focus on how a team could work with that payload – given the possibility that many of the instruments are contributed.
- Zurek also described studies that MEPAG could consider in preparation for the next Decadal Survey (e.g., polar/ice science, astrobiology, network science, or other mission studies). Additional topics included coordinated HEO studies, small satellite concepts, Mars Ascent Vehicle ancillary science, and planetary protection considerations. Dave Beaty noted that this list was representative, but that MEPAG also was limited in the number of activities it could engage, such that prioritization will be necessary. This was proposed as a major discussion topic for the next MEPAG meeting.

- To [conclude the meeting](#), Johnson described date constraints for the next MEPAG meeting (#33) and requested suggestions for possible agenda items. Additionally, feedback on any topics discussed during this meeting or how the meeting itself went are welcome. Please send all feedback to MEPAGmeetingQs@jpl.nasa.gov.

MEPAG Comments

- I. MEPAG recognizes the immediate need for, and agrees to support establishment of, a study of New Science Team Model(s) to provide inputs to the upcoming ORDT in early 2017 and subsequent AO. Such input would incorporate results of the Next Orbiter Science Analysis Group (NEX-SAG) to analyze and make recommendations regarding science team organization and operational models. MEPAG perceives that there are important issues to be addressed related to this activity, such as:
 - 1) How the selection and proportion of U.S., international, and/or commercial engineering and science components would be decided in order to meet the strategic science objectives of multiple stakeholders whose needs may evolve during the course of the orbiter mission, and whether that would permit sufficient funding/support of US participants, including potential Guest, Interdisciplinary, and/or Participating Scientists.
 - 2) How the *facility* instrument/observatory option for the orbiter and its instruments could function, given the significant development/support funding required for a new, centralized operations model.
 - 3) How the results from the ongoing “industry studies” and other trade studies regarding the next orbiter (as well as Mars sample return) will be communicated. MEPAG was pleased to see that these studies were being conducted, but wants to see that the results are communicated to the Mars/planetary science community.
- II. MEPAG looks forward to a successful landing of the ExoMars EDL Demonstration Module (Schiaparelli) and operation of its payload during its battery-powered mission on the Mars surface and to a successful Mars orbit insertion of the ExoMars Trace Gas Orbiter, all on October 19.
- III. MEPAG congratulates the MEP ongoing missions on their successfully proposed extended missions and looks for to new discoveries and progress on high-priority science objectives.
- IV. MEPAG appreciates that the Mars 2020 rover development continues to proceed nominally to enable emplacement of cached samples on Mars for eventual return to Earth, thereby addressing the highest priority of the Decadal Survey for flagship missions.
- V. MEPAG fully supports NASA’s plan for launch of the InSight mission at the next opportunity and looks forward to a successful landing and start of mission in late 2018.
- VI. Preliminary results from the study of the value of Participating Scientists programs resonated with the meeting participants and MEPAG looks forward to the final report.