

**Summary of the presentations, discussion, and main outcomes of the VM1 MEPAG meeting**  
**February 20th, 2018; virtual attendance only, 10:00AM-12:00PM PDT**

Posted agenda and presentation files: <https://mepag.jpl.nasa.gov/meetings.cfm?expand=mVM1>

Notes present an overview of discussion as well as presentation materials

**General MEPAG Announcements**

- *Please respond to all requests for feedback via the email [MEPAGmeetingQs@jpl.nasa.gov](mailto:MEPAGmeetingQs@jpl.nasa.gov).*
- Virtual Meetings are now being numbered separately, with the meeting February 20, 2018 denoted as Virtual Meeting (VM) #1. This provides flexibility when scheduling these meetings between face-to-face MEPAG meetings and a means of responding to issues quickly as needed.
- The **next MEPAG “face-to-face”** meeting will occur at the Crystal City Marriott near Reagan National Airport in Arlington, VA on April 3-5<sup>th</sup>, 2018. Meeting topics are generally expected to include:
  - April 3<sup>rd</sup>:
    - NASA Planetary Science Division/Mars Exploration Program Reports
    - Potential MEPAG Goals revision: Polar Science
    - Forum: Mission Concepts for the 2020s and beyond
  - April 4<sup>th</sup>:
    - Decadal Survey preparations
    - Summary of Mars Mission Concepts Forum
    - Reports from Mars missions ongoing or in development
  - April 5<sup>th</sup>:
    - Updates from Mars missions (continued)
    - Human exploration & commercial space updates
    - Conference & workshop reports
    - Future MEPAG plans

Information about this meeting (MEPAG Meeting 36) can be found at

<https://mepag.jpl.nasa.gov/meetings.cfm?expand=m36>.

**Past and Ongoing MEPAG Activities:**

- MEPAG Chair Jeff Johnson presented [an introduction](#), including the history of MEPAG virtual meetings, an agenda for the current virtual meeting (VM #1), and an overview of recent MEPAG activities since [MEPAG Meeting #35](#)
- The idea for more frequent, shorter, focused virtual MEPAG meetings was originally [proposed](#) by Serina Diniega at the MEPAG #33 face-to-face meeting in February 2017 and was subsequently followed up by virtual meetings in July and September 2017. These were the [MEPAG #34](#) meeting and [MEPAG #35](#). The face-to-face meetings will continue with this numbering scheme, and the virtual meetings going forward will now be numbered separately as “Virtual Meeting #X,” with the current meeting being denoted as Virtual Meeting #1 (VM #1).
- The topics for the current meeting (VM #1) include NASA Mars Exploration Program (MEP) and MEPAG Updates, Mars Sample Return (MSR) Technology Studies, preparation and discussion for [MEPAG Meeting #36](#)
- MEPAG activities & updates since MEPAG Meeting #35 include:
  - The MEPAG #35 virtual meeting was attended by ~165 members. Feedback was positive for Jim Watzin’s presentation of Thomas Zurbuchen’s Mars talk (previously given to the Mid-

- Term Decadal Survey Review Panel in August 2017). The Planetary Science Deep Space SmallSat Studies (PSDS3) program selectee presentations relevant to Mars were also well received. There will be a [Planetary Science Deep Space SmallSat Mission Concepts](#) meeting immediately preceding LPSC on March 18<sup>th</sup>, 2018. One item to be presented there is a Mars Micro Orbiter (MMO) mission (PI: Mike Malin) which was selected originally under the SIMPLEX competition and for which NASA is supporting technical maturation with a goal of possible flight on the 2020 Mars rover launch vehicle or a later opportunity. This study is ongoing, with a decision about flight still in the future (see below).
- The MEPAG Goals Committee is currently revisiting the mapping of polar science questions to the MEPAG Goals Document. Don Banfield, the Goals Committee Chair, and the Goals Committee are working with Isaac Smith et al., who are following up on recommendations from a 2016 Polar Science Conference. Recommended changes to the Goals Document were submitted to the Goals Committee in February and discussions are proceeding. A status report will be given at the April face-to-face MEPAG meeting.
  - In October, 2017 the MEPAG Executive Committee sent a request to the community for indications of interest or MEPAG service activities and over 30 indications of interest were received. Subsequently, Drs. Phil Christensen (Arizona State University) and Gian Ori (IRSPP) rotated off the Executive Committee after ~10 years of service. Drs. Wendy Calvin (Univ. Nevada Reno) and Jen Eignebrode (GSFC) have joined the Executive Committee. Dr. Jen Stern (GSFC) has replaced Dr. Jen Eigenbrode as a Goal I (Life) Committee Representative.
  - MEPAG Executive Committee member, and Past Chair, Lisa Pratt has been named as the new NASA Planetary Protection officer.
  - [New Mars discoveries portal](#) has been added to the MEPAG web page. Input was received from Mars missions, the Goals Committee, “science nuggets” and was compiled by James Ashley. This portal will be updated regularly.
  - Past and upcoming conferences and workshops:
    - Dec 8, 2017: Architecting Mars V attended by David Beaty and Michael Meyer. This workshop was meant to evaluate the achievability & sustainability of architectures for human exploration of Mars in the 2030s. A report from this workshop will be given at the April face-to-face MEPAG meeting.
    - Feb 23, 2018: MEPAG Chair Jeff Johnson will give a MEPAG presentation to the new Planetary Science Advisory Council (PAC) at NASA Headquarters at 10:20 EST.
    - Mar 22, 2018 (12:00-1:15pm): MEPAG “meet & greet” at LPSC. This is meant to be an informal opportunity to meet MEPAG members, ask questions, and provide feedback, and will be accompanied by a poster presented Tuesday night (Abstract #2403).
    - July 2017: COSPAR meeting: There will be a MEPAG abstract & presentation on “Forward planning for Mars scientific exploration” and MEPAG will participate in a panel discussion on “International Coordination of Space Exploration Activities.”

#### **Presentation: Update from NASA HQ & FY2019 Budget First Look**

Mars Exploration Program Director Jim Watzin gave a [presentation](#) on the current status of the Mars Exploration Program.

- This presentation summarized the current status of the ongoing and planned Mars missions and mission related activities including:
  - All currently operating missions are operating well and are supported in the FY19 President’s budget

- All development missions (Discovery's InSight and MEP's 2020 Mars rover) and systems are progressing
- Progress is being made in the technology maturation program for key Mars Sample Return technologies
- Ongoing support of other Mars mission activities (e.g., MOMA for flight on the ExoMars rover) and technology developments, including Mars Micro Orbiter (MMO) "CubeSat" and the Mars Helicopter technology demonstration; decisions on whether to proceed to flight will be made in the coming months.
- The President's FY2019 budget points towards the continuation of all ongoing Mars Exploration Program Missions, continued development of Mars 2020, and planning for a potential Mars Sample Return missions, which has been a decadal survey priority, potentially leveraging international and commercial partnerships.
- In response to questions Jim Watzin confirmed that the MMO "CubeSat" and Mars helicopter are currently being funded for technology development up to PDR (Preliminary Design Review) readiness and have not been selected for flight. It is possible that the Mars helicopter could fly on Mars 2020, but how likely this is remains to be seen. If the Mars helicopter were to deploy from the Mars 2020 rover, steps would be taken to prevent dust from being kicked up and interfering with the other instruments.

#### **Discussion of MEPAG #36 Meeting and Forum**

- MEPAG Chair Jeff Johnson and Meeting Coordinator Serina Diniega gave a presentation on [Preparations for MEPAG Meeting #36](#)
  - MEPAG Meeting #36 is scheduled to take place on April 3<sup>rd</sup>-5<sup>th</sup>, 2018 at the Crystal City Marriott near Reagan National Airport in Arlington, VA
  - The topical agenda for the meeting was given above.
- A focus of that meeting will be on preparations for the next Planetary Decadal Survey. These preparations will build on discoveries of past/ongoing missions and new technologies:
  - The return of samples prepared by NASA's Mars 2020 rover continues to be a priority
  - The open question is: During the Mars Sample Return (MSR) era (~2023-2032) what are the additional high-priority science questions that could be addressed via mission concepts in all classes?
  - The Forum on Day 1 of the MEPAG meeting will provide the community with opportunities to discuss:
    - High-level science objectives of questions
    - Importance of specific types of observations/measurements/analyses
    - Science or technology strategies such as multiple small rovers or subsurface access
    - Mission concepts in all classes:
      - Small satellite missions/secondary payloads enabled by strategic mission launch capabilities
      - Competed missions (Discovery, New Frontiers, large strategic missions)
      - Follow-on flagship capabilities
  - The overall goal of the Day 1 Forum will be to identify concepts and collaboration opportunities for serious consideration by the next Planetary Science Decadal Survey, including thinking about which would most benefit from studies or workshops organized by MEPAG or the Mars Exploration Program (MEP) to facilitate maturation of concepts and/or technological areas

- Those who want to present at the MEPAG meeting forum were asked to submit a 1-page abstract outlining their concepts by Thursday, February 22<sup>nd</sup>. Accepted abstracts will be posted on the MEPAG website before the meeting, along with the meeting agenda.
- NASA Planetary Science Division and Mars Exploration Program updates will precede the forum to help set the context for forward-looking discussions.
- The forum presentation will consist primarily of posters, with ample time to discuss and share concepts with colleagues across multiple disciplines. After the poster session there will be a facilitated discussion and the key results will be summarized during the Day 2 discussion about future MEPAG planning activities.

### **Progress on Mars Sample Return Technologies Development**

- A [presentation](#) was given by Chad Edwards (JPL) on Mars Sample Return Capability Development: Mars Ascent Vehicle and Mars On-Orbit Rendezvous.
  - This presentation summarized the current state of technology development for the Mars Ascent Vehicle (MAV) and the Orbiting Sample (OS) overview, as well as the rendezvous concept in Mars orbit.
  - Overall conclusion was that key MSR technologies are on track to support launch of the Surface Return Lander (SRL) and/or Sample Return Orbiter (SRO) as early as 2026.
  - MEP is formulating plans for the \$50M in the President's Budget for FY19 designated for studies to prepare for potential sample return. Testing of the MAV rocket motors and techniques for breaking the chain of possible back contamination when capturing the Orbiting Sample cache will continue. Discussions with potential international partners for the SRO and components of the SRL (e.g., fetch rover) will continue and be supported with detailed studies. The goals are to understand more detail of the sample return architecture, to retire technical risks and to establish the overall cost envelope for the "lean" sample return campaign approach.

### **SpaceX and Mars Exploration**

- A walk-on presentation was given by Paul Wooster of SpaceX which highlighted the recent successful test of the Falcon Heavy launch vehicle with its potentially very large payload capacity (100 metric tons). Using the Falcon Heavy and development of an even larger Big Falcon Rocket (BFR) launcher are the basis of their ambitious plans for the future exploration and colonization of Mars, potentially launching missions to Mars within the early 2020s. SpaceX's current landing site candidates for Mars were shown, having been chosen to provide access to near-surface ice, few landing site hazards (such as large rocks), and enough space for potentially growing a sizeable outpost. The ice sites are in high mid-latitudes and the search for lower latitude candidates, which are preferred, continues. Previously, MEPAG had been told that SpaceX could transport for-fee payloads to the Mars surface. In response to questions, Paul iterated that there is likely to be capacity for secondary payloads on either the Falcon Heavy or BFR launchers, although details remain to be negotiated once the launcher capabilities are firmly established.