

Optimizing Science and Exploration Working Group

Background

The Science Mission Directorate (SMD) and the Exploration Systems Mission Directorate (ESMD) jointly created the Outpost Science and Exploration Working Group (OSEWG) on March 2007. This revision to the original charter incorporates the previously identified information and provides greater definition. The word "Outpost" has been changed to "Optimizing" as part of clarifying the scope to include Sortie as well as Outpost missions. This document serves as a replacement in full.

Scope

The mission of the OSEWG is to engage in mission concept planning and science requirements definition to help inform the development of systems that will optimize exploration and science investigations. The initial focus will be on human and robotic exploration on the moon. This collaborative leadership and integration body is charged with

- identifying and communicating science interests/requirements for incorporation into the Constellation architecture and mission planning, and
- prioritizing science requirements and facilitating the assessment and disposition of them for becoming architecture development requirements.

Materials, physical and life sciences, which were previously not within the scope of the OSEWG, are now included.

Additional objectives that NASA management identifies for the OSEWG will be reflected in the annual OSEWG implementation plan.

Objectives

Several initial objectives have been identified for the OSEWG. These joint science and exploration objectives can be captured into 3 interrelated categories - science requirements, surface science scenarios and analogues. The level of OSEWG effort, strategy, approach and level of participation external to NASA is different for each of these objectives.

The OSEWG Science Requirements Team will explore the envelope of support for science investigations available within the current outpost architecture and continue that activity as subsequent architectures and sortie opportunities become available. Since many science investigations will also address exploration requirements as contained in the Exploration Systems Mission Directorate Architecture Requirements Document (EARD), the OSEWG Science Requirements Team will examine the EARD, the Constellation Architecture Requirements Document (CARD), and the Surface Architecture Reference Document (SARD) to identify such possibilities and also to determine how these potential synergies can be maximized. These documents will be reviewed in the context of the exploration investigations and desired results. Current constraints on science will be evaluated with respect to envelope payload

masses available, mass for earth return where required, realistic commitments of astronaut time, extra-vehicular activity requirements, desired and available mobility, likely capabilities within Lunar Sortie missions and the Outpost (work space and laboratory equipment in the shirt sleeve environment), and fruitful implementations of teamed biological (humans) and artificial (robotic) intelligence. In addition to the review of existing requirements documents, the Science Requirements Team will begin to develop new science requirements that will flow down into the future lunar architecture design process.

The OSEWG Surface Science Scenario Working Subgroup (SSSWG) will provide lunar science scenarios of expected typical surface operations, which will inform and iteratively refine the expected baseline use of the architecture and systems. The SSSWG will also provide scenarios that will bind assumptions and unknowns. It is expected that this scenario development can significantly aid in definition of baseline and bounding concepts of operations, which will inform requirements development. This effort will build upon current inputs from the science community, such as the recommendations from the NAC Workshop on Science Associated with the Lunar Exploration Architecture and the NRC Scientific Context for Exploration of the Moon. The SSSWG will also assist the OSEWG in identifying new science technology needs, particularly those with long development lead times.

The OSEWG will also focus efforts on coordination and collaboration on analogues, which includes identifying desired science and exploration surface scenarios that would benefit from analogue field tests. The ESMD and SMD leads for analogues will identify and communicate both the opportunities and results of the ESMD/SMD/SOMD field tests for purposes of improving science and architecture requirements and surface scenario definition.

Specific details on the goals, objectives, scope, and milestones of each OSEWG working subgroup will be defined in their respective implementation plans. The OSEWG may create or disband its working subgroups, teams and focus areas to remain aligned with the exigencies of NASA's science and exploration mission. The OSEWG and its subgroups will engage the external science and exploration communities, as appropriate and concurred to by the OSEWG Co-Chairs.

Strategy

The OSEWG utilizes the expertise of members of the NASA organization and the broader science community for the achievement of its science and exploration objectives. The OSEWG will create working subgroups and teams within NASA to perform specific objectives. The OSEWG will also seek input and/or analysis from people external to NASA through approaches such as - workshops, conferences and tasking groups such as the Lunar Exploration Analysis Working Group.

Membership

The OSEWG is co-chaired by an individual(s) appointed by the Associate Administrators of ESMD and SMD, respectively. The OSEWG Co-Chairs report to the Deputy Associate Administrators (DAA) of ESMD and SMD. These DAAs will inform their respective directorates of the activities of the OSEWG and provide support, as needed.

The OSEWG is comprised of individuals from NASA Headquarters, the Co-Chairs of the OSEWG working subgroups, and program representation, as needed, for coordination with architecture definition. Participation from Headquarters will be predominately from ESMD and SMD, but may also include personnel from Space Operations Mission Directorate and Aeronautics Research Mission Directorate.

Membership in the OSEWG Subgroups will be comprised predominately of individuals with the requisite experience and/or expertise from the NASA Centers. Subgroup membership is limited to NASA personnel (e.g., NASA civil servants, IPAs, and JPL employees).

Key Interfaces and Responsibilities

The OSEWG has broad interaction and integration responsibilities across and within SMD, ESMD, and SOMD. Specific areas of high interdependency in these organizations include SMD's Planetary Sciences Division and ESMD's Constellation Program (including its Orion, Ares, Surface Systems, Lander projects and architecture development team), Exploration Technology Development Program and Directorate Integration Office.

Additionally, the OSEWG has been identified to the NASA Advisory Council as the Agency's focus for ensuring appropriate consideration is made to incorporate science requirements into the lunar architecture capabilities. As such, and in coordination with the NASA ESMD and SMD executive secretaries to the NAC, the OSEWG will provide status updates to the NAC as requested.

Similarly, the OSEWG has been identified by the ESMD and SMD to be their liaison to the Lunar Exploration and Analysis Group (LEAG). All NASA tasking of the LEAG by either ESMD or SMD will be coordinated through the OSEWG Co-Chairs.

Approach

The OSEWG focus is on enabling high quality science investigations at the Moon and Mars using a case approach. Through its working groups, in its meetings, and through the studies and workshops it convenes, the group will analyze and develop design reference science investigations (DRSIs) that could be supported at a lunar outpost, on a sortie mission, or in other exploration scenarios.

After the working group has developed an initial set of DSRIs, SMD may offer an opportunity for the science community to expand on this initial set or elaborate initial DRSIs through a competitive or collaborative process. The results of these studies could then be used in the future by OSEWG to improve and expand the set of DRSIs.

It is possible that the DSRI approach may also prove useful to ESMD for examining the implementation of EARD driven activities, and both directorates may agree to use the OSEWG and the DRSI approach for other appropriate purposes.

Deliverables

The OSEWG will provide surface science scenarios to ESMD's architecture and surface systems development teams, and provide science requirements input and feedback to ESMD. The OSEWG Co-Chairs will provide a status update to ESMD and SMD management on a quarterly basis. Additionally, if/as requested by external bodies such as the NASA Advisory Council, National Academy of Sciences, National Research Council or others, the OSEWG will provide responses to requests, make presentations, etc.

More specific OSEWG deliverables will be defined in its implementation plan and the implementation plan of its working subgroups.

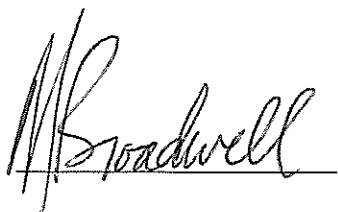
Schedule

The OSEWG leadership meets on a weekly basis and the OSEWG meets on a biweekly basis, unless needs dictate otherwise. An integrated milestone schedule will be provided in the OSEWG implementation plan and include the key milestones of its working subgroups.

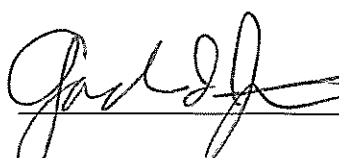
Resources

ESMD and SMD will jointly fund the activities of the working group. In most cases, funding required to support scientist and SMD civil servants will be funded by SMD; funding required to support engineers and ESMD staff will be funded by ESMD.

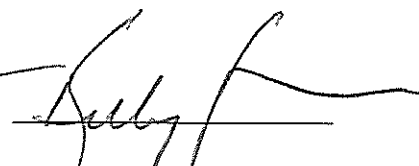
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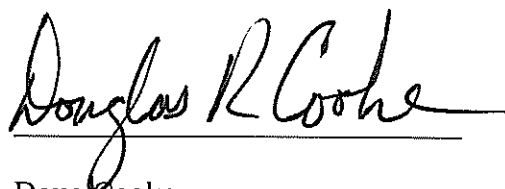
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