



Optimizing Science & Exploration Working Group (OSEWG)

**Presentation at the
LEAG/ILEWG Annual Meeting
October 28, 2008**

**Marguerite Broadwell,
OSEWG Co-Chair, ESMD**

Outline



- **OSEWG past and future - 14 months of action ahead!**
- **Goals and strategy for collaborating with the science community**
- **Recent accomplishments**



Optimizing Science & Exploration Working Group – Chartered to Achieve...



OSEWG chartered by ESMD and SMD in 2007; updated in 2008.

OSEWG leadership reports to ESMD and SMD Deputy AAs

Scope:

- Coordinate and guide science and exploration planning
- Identify and provide science objectives (in requirements terms) for consideration of inclusion into the development of the Constellation architecture.
 - Includes *all* science
 - Scope includes not only the outpost, but also sortie, orbiters...
 - Science objectives input provided by NAC, NRC SCEM, LEAG...
- Engage the science and exploration communities (includes LEAG, CAPTEM, MEPAG, and other fora)
- Serve as liaison to LEAG for SMD and ESMD



OSEWG Approach

OSEWG Approach:

1. Focus on defining science and exploration objectives through a surface science scenarios team (SSST)
2. Focus ESMD-SMD coordination and communications in 3 areas:
 1. Analogue Missions
 2. Science Objectives
 3. Lunar Data Integration
3. Engage industry & academia for input, peer review and participation in planning, prioritizing and development of products.

OSEWG Work Plan *(Draft)*



- **Landing Site Selection**
- **Science Architecture & Con Ops**
 - Robotic Support
 - ISRU
 - Navigation & Positioning
 - Comm/Data
- **Definition of Integrated Science Payloads**
 - Comm/Data
 - Science Productivity Metrics
- **Sample Acquisition & Curation**
- **Reduced Gravity and Life Sciences**





OSEWG Membership

Exploration Systems Mission Directorate

- Marguerite Broadwell, ESMD Co-Chair
- Jitendra Joshi
- Mike Wargo
- Doug Craig
- Wendell Mendell, CxP
- Andy Thomas, JSC

Space Operations Mission Directorate

- Michele Gates
- John Allen

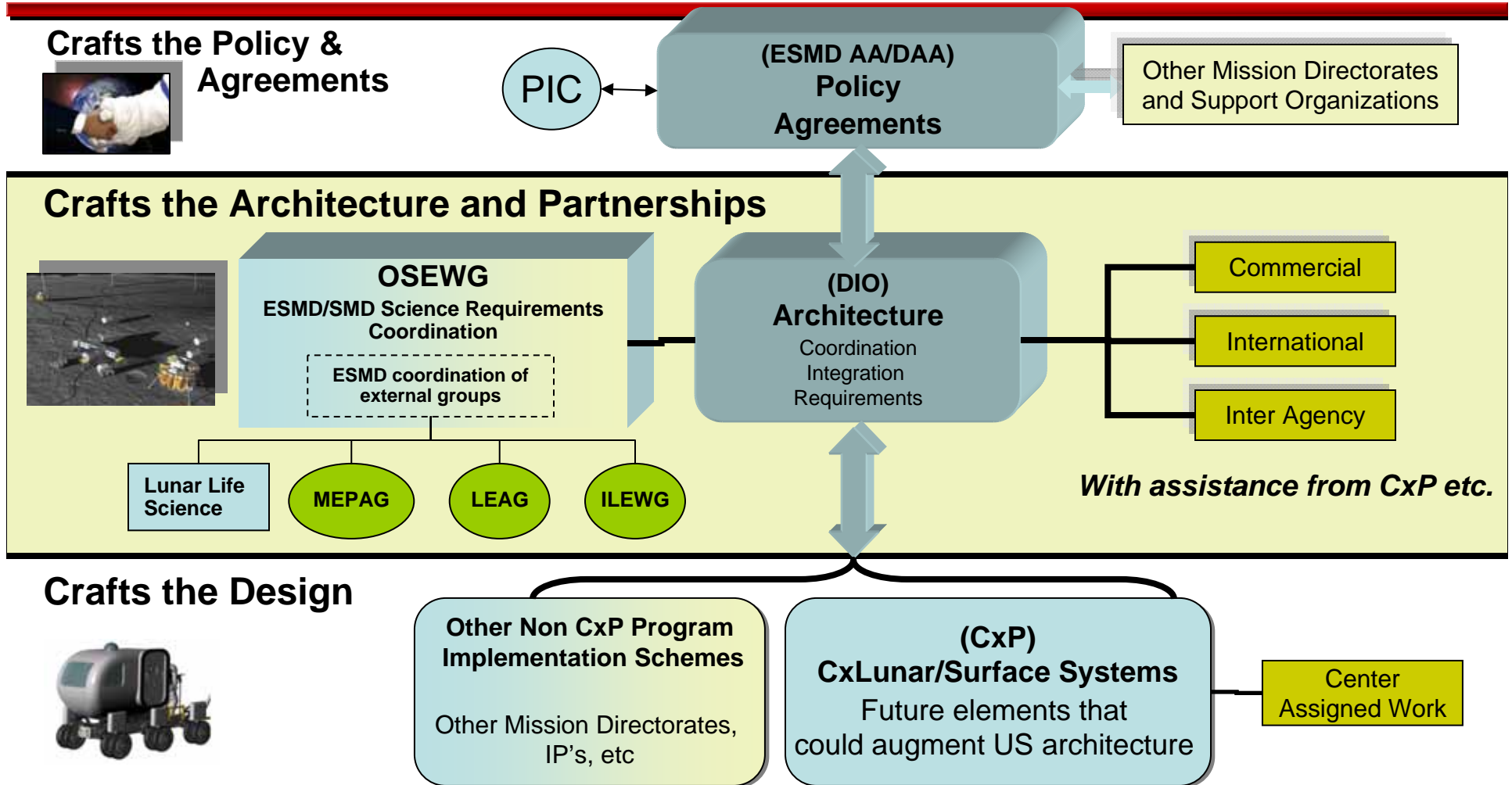
Lead OSEWG Support

- Ruthan Lewis, GSFC
- Jim Lynch, Executive Secretariat

Science Mission Directorate

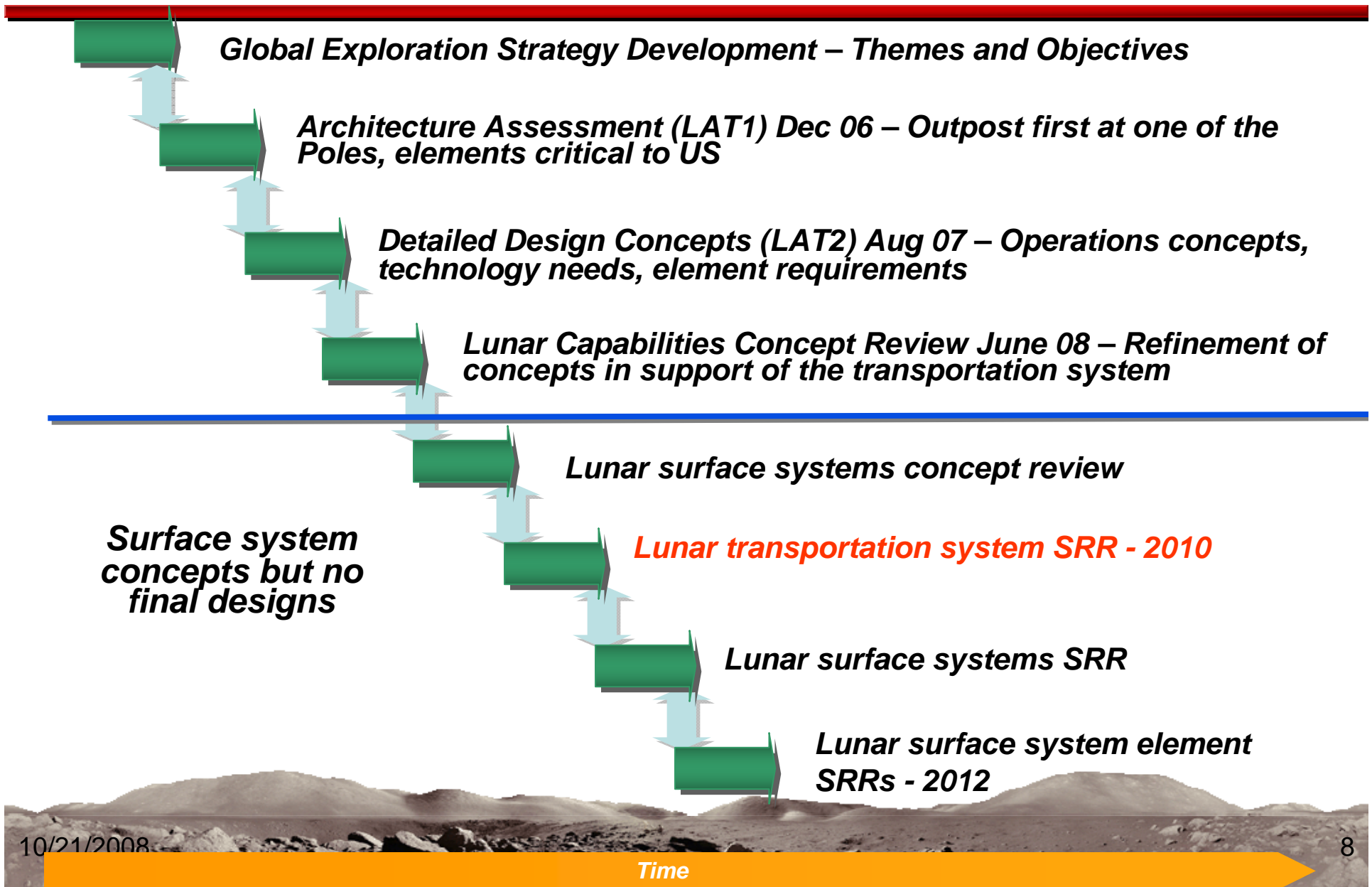
- Gordon Johnston, SMD Co-Chair
- Lauri Leshin
- Marilyn Lindstrom
- Bobby Fogel
- Sarah Noble
- Mike Salamon
- Barbara Giles
- John Labrecque
- Cassie Conley
- Jennifer Heldmann
- Tom Morgan
- Jonathan Rall

OSEWG Coordinates Science Requirements for Inclusion into Constellation Architecture



DIO – Directorate Integration Office, ISECG – International Space Exploration Coordinating Group, IP – International Partners, LEAG – Lunar Exploration Analysis Group, ILEWG – International Lunar Exploration Working Group, MEPAG – Mars Exploration Program Advisory Group, OER – Office of External Relations, OSEWG – Optimizing Science Exploration Working Group, PIC – Partnership Integration Committee

Architecture Driven By A Strategy Where We Have Been and Next Steps





OSEWG Goals and Strategy for Collaborating with the Science Community



10/21/2008

OSEWG Goals for Collaborating with the Science Community



Goals:

- Engage the NASA and non-NASA science community in the process and production of lunar science priorities, objectives and requirements definition.
- Continue to make the community aware of ESMD's progress in the development of the lunar architecture and the science information needed.
- Leverage existing fora and entities to achieve OSEWG goals and needs
- Build community enthusiasm and increase stakeholder advocacy through involvement





Strategy:

- Conduct at least 2 workshops per year with the science community targeted at key OSEWG objectives.
- Leverage LEAG, NLSI and LPI to engage the science and academic community, align and integrate efforts
- Collaborate with lunar and planetary conference sponsors to focus the community on high priority objectives
- Participate in at least 3 lunar science and exploration 'conferences' per year – LPSC, NLSI, Space 2008
- Participate in the LEAG and ILEWG annual meetings
- Provide the appropriate NAC committees with OSEWG progress and plans at least twice per year

OSEWG Strategy for Engagement (Cont'd)



Strategy:

- Develop a publicly accessible OSEWG website and develop means for soliciting community input and participation through this site
- Form an executive level team of OSEWG, NLSI, LEAG, CAPTEM and LPI leadership to assess progress against objectives, propose approaches and facilitate implementation of plans.
 - *Conduct telecons quarterly w/F2F meetings every 6 months?*
- Leverage existing SMD solicitation/AO processes to address key OSEWG/lunar science & exploration priorities
- Utilize surface science scenarios to define viable science requirements and analog missions to validate them.

OSEWG Near-Term Goals: Oct 2008 - Jan 2009



Goals - 30 day (by Nov 15, 2008)

- Provide public access to OSEWG website (hosted by LPI).
- Complete assessment & recommendation of OSEWG IT solution.
- Complete comprehensive draft of plans to meet science needs and objectives.
- Complete & publicly release the report of the OSEWG/LEAG Workshop from June 2007.

Goals – 90 days (by Jan 15, 2009)

- Complete OSEWG implementation plan to include community engagement approach and milestones.
- Have determined how to incorporate LEAG roadmap into OSEWG plans.
- Conducted ESMD, SMD, NLSI, LEAG & CAPTEM leadership meeting on how to effectively focus, leverage, align and integrate the science community to meet our January 2010 objectives.

OSEWG Mid-Term Goals: Jan 2009 - Jan 2010



Goals – 6 months (by April 15, 2009)

- Have integrated LEAG roadmap into OSEWG plans through concurrence with NAC, NRC, and CxP-LSS, if/as appropriate
- Conducted workshop with science community
- Focused part of the LPSC on addressing OSEWG identified needs and objectives

Goals – 1 year (by Oct 15, 2009)

- Have completed 2 workshops with the science community (including one joint OSEWG/LEAG workshop) soliciting inputs and endorsement of defined requirements
- Focused part of the NLSI lunar conference on addressing OSEWG identified needs and objectives.

• Goals – 1 year + 3 months (by Jan 15, 2010)

[Driver is June 2010 lunar surface systems capabilities review.]

- Provide all science requirements impacting capabilities needed from lunar surface systems, including inputs from NLSI, LEAG and CAPTEM





Accomplishments

Recent OSEWG Accomplishments



- Developed and approved terms of reference for a Surface Science Scenarios Team (SSST), April 2008
- Revised OSEWG Charter – expanded and clarified scope, May 2008
- Conducted first surface science scenario (SSS) workshop, June 2008
- Completed science review of Exploration Architecture Requirements Document (EARD) and Constellation Architecture Requirements Document (CARD), June 2008
- Participated in the NLSI Lunar Conference – briefed results of SSS workshop, July 2008
- Modified EARD to include an return mass objective of 250kg (the threshold requirement remains 100kg), August 2008

Recent OSEWG Accomplishments

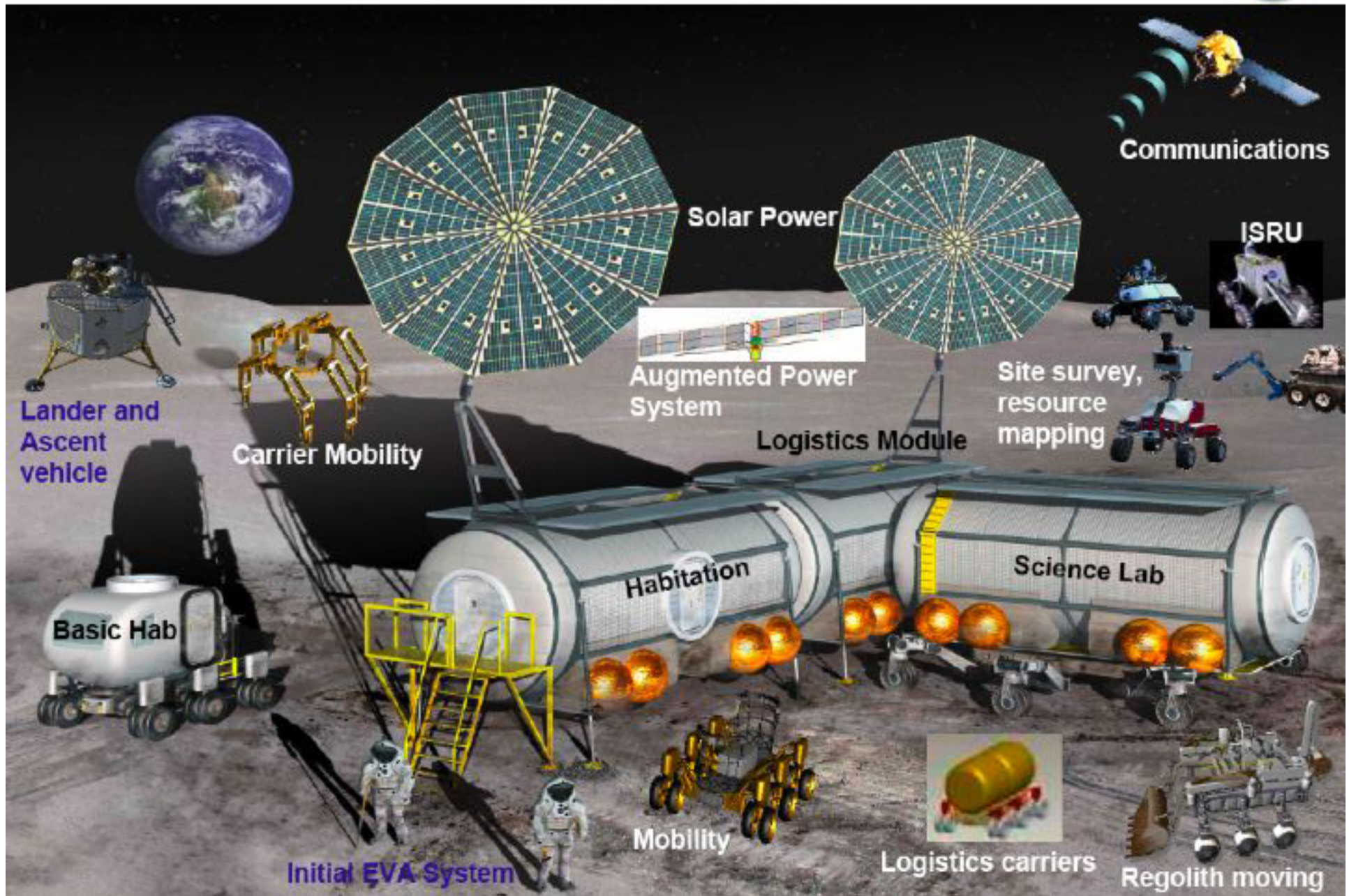


- Initiated more direct engagement of the lunar science community through the LEAG, LPI and NLSI, Sept 2008
- Began funding 6 FTE to help implement OSEWG leadership strategy, Oct 2008
- Developed SSS Team membership with involvement by 6 NASA Centers, Oct 2008
- Developed initial action plan to address science objectives, studies, etc. identified by NAC, NRC, OSEWG review of EARD and CARD, and results of June 2007 LEAG/OSEWG workshop, Oct 2008
- Briefed the NAC Science Committee/Subcommittee 3 times thus far in 2008
- Developed a publicly accessible OSEWG website – hosted by LPI, Oct 2008 Please visit - <http://www.lpi.usra.edu/osewg>



Back Up

Lunar Surface System Concepts



Lander and Ascent vehicle

Carrier Mobility

Basic Hab

Initial EVA System

Augmented Power System

Mobility

Solar Power

Logistics Module

Habitation

Logistics carriers

Site survey, resource mapping

Science Lab

Regolith moving

Communications

ISRU

OSEWG Surface Science Scenario Team



Objectives:

- Construct Campaign-level (multi-mission) Science Scenarios, Lunar Surface Science Scenarios for single missions, and Design Reference Science Investigations that highlight scientific goals and objectives for examination by the appropriate teams for planning the lunar surface missions, campaigns, and architectures
- Use analysis of selected surface scenarios to drive concepts of operations and requirements for the Constellation program and appropriate projects (e.g., Altair, EVA, and Surface Systems Projects) or in SMD Programs (e.g., LASER, LSSO, MMAMA, ASTEP) or missions (e.g., LADEE, ILN), and present requirements for incorporation into the appropriate requirements documents
- Use analysis of selected surface scenarios to drive planning for analog studies
- Engage the science and exploration communities (through LEAG, CAPTEM, and other forums) and the NAC in the discussion of surface scenarios, including responding to NAC actions with respect to surface scenarios.



Science Surface Scenario Team - Key Activities



- **Develop science scenarios for different mission types and sites**
 - ✓ “Sortie” missions with “Apollo-like” mobility at two sites (so far)
 - Longer traverse missions at multiple sites including pole
 - A multi mission scenario of polar outpost + 3 sorties
- **Develop overarching approach for metrics for evaluating likely scientific return from lunar missions and campaigns as measured against NAC lunar science objectives from Tempe Workshop, NRC SCEM Report Objectives and LEAG**
- **Translate key scenario findings into candidate science-driven requirements for consideration by OSEWG for inclusion on the CARD or EARD**



Workshop: Planning Sorties at Tsiolkovsky and Alphonsus



- Two groups of four scientists were tasked with Tsiolkovsky or Alphonsus craters and asked to design an exploration plan driven by scientific rationale. The exercise assumed a total of eight, two-man EVAs of eight hours, including the use of two unpressurized rovers
- Results reported at NLSI Lunar Science Conference in July, and final report is being written

