What Is a ‘Global Exploration Strategy’ Used For?

• A high-level compelling story of the value of lunar exploration that can be used to explain this effort to policy makers and the general public

• A blueprint that will serve as a starting point for:
  – Coordination: coordination among participants to maximize what can be accomplished
  – Collaboration: discussions between participants regarding areas of potential collaboration
  – Mission Design: detailed technical analyses that address,
    • Time Phasing of activities and identification of dependencies among them
    • Prioritization based on individual stakeholder goals
    • Operational and Architecture Impacts of implementation of the strategy
Development of Lunar Objectives
Initial Data Collection

What can be accomplished through lunar exploration?
- Scientists
- Engineers
- Educators
- Private Citizens
- Space Advocates
- Entrepreneurs
- RFI & April Workshop

Initial list of lunar objectives developed
- What would be accomplished?
- What is the value of this accomplishment?

- Similar objectives merged
- Duplicates removed

800 Initial Objectives
85 Merged objectives
Development of Lunar Objectives – Thoroughness and Completeness Check

Meetings in:
- Montreal
- Rome
- Valencia
- Houston

14 International Space Agencies identify gaps in initial data set

85 Merged objectives

188 Refined objectives

Note:
Space agencies consulted with subject matter experts to identify gaps, for example NASA queried:
- All 10 NASA centers
- NASA Advisory Council, Science Subcommittee
- Lunar Exploration Analysis Group
- Mars Exploration Planning & Analysis Group
- Lunar Commerce Roundtable
- Space Enterprise Council, US Chamber of Commerce
- Next Generation Space Explorers Conference
- Newspace 2006 Conference
- NASA Lunar Architecture Team
### Development of Lunar Objectives – Objectives linked to high level themes

#### Lunar Exploration Themes

<table>
<thead>
<tr>
<th>Exploration Preparation</th>
<th>Scientific Knowledge</th>
<th>Human Civilization</th>
<th>Global Partnerships</th>
<th>Economic Expansion</th>
<th>Public Engagement</th>
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Objectives linked to all themes that they support

188 Refined objectives

Addresses how to “implement” a theme area... for example – What work could be done on the Moon to prepared for future Missions to Mars & Beyond?
Development of Lunar Objectives – Time Phasing

Meetings in
- Rome
- Houston

International Space Agencies evaluate phasing

188 Refined objectives

Robotic Precursor

Early Human

Early Outpost

Significant Permanence

Time phase filtered objectives

Time
Lunar Exploration Objectives
Exploration Preparation

Evaluate and employ dust mitigation techniques to protect crews, materials, and instruments during extended surface stays

Demonstrate Robust EVA Capability

Monitor space weather to determine risks to explorers

Determine the internal structure and dynamics of the Moon
Lunar Exploration Objectives
Scientific Knowledge

Characterize impact cratering over the Moon's geologic history, to understand early solar system history.

Characterize the Moon's atmosphere to better understand surface boundary exospheres.

Study the lunar regolith to understand the nature and history of solar emissions, galactic cosmic rays, and the local interstellar medium.

Determine the origin and distribution of lunar volatiles to support studies of the origin, composition, and structure of the Moon and other planetary bodies.
Lunar Exploration Objectives
Human Civilization

Understand the affects of the integrated lunar environment on human performance

Develop and validate tools, technologies, and systems that excavate lunar material

Provide position, navigation, and timing capabilities to support lunar operations and evolve to support Mars operations

Characterize radiation bombardment on the lunar surface and subsurface
Lunar Exploration Objectives
Economic Expansion

- Use the private sector to deliver payloads to the Moon
- Utilize innovative commercial entertainment and media outlets to broadcast to the public high-bandwidth video, imagery, and other information
- Deploy effective in-site and remote health care systems to ensure crew health on the Moon
- Utilize the commercial sector appropriately to perform lunar resource extraction
Lunar Exploration Objectives
Global Partnership

Establish an appropriate global framework, able to encompass both commercial and governmental involvement, to coordinate the lunar activities of all interested parties.

Establish common interface designs to enable interoperability of systems developed by a global community.

Establish standards to enable interoperability of systems developed by a global community.
Lunar Exploration Objectives
Public Engagement

Provide opportunities for the public to watch surface operations via video broadcast

Allocate space on lunar missions for university-built payloads

Allocate time for crews to teach about lunar activities
2007 Exploration Strategy Plans

- Extend discussion of destination objectives to include Mars
- Complete Framework Document which defines a common vision for exploration
- Discuss Coordination Mechanism for long-term multi-lateral engagement
- Discuss International Reference Architecture as a tool for coordination