Exploration Overview
The Road to the Moon and Beyond

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Background

• For the past two years, the US Chamber of Commerce has hosted NASA Lunar Exploration Architecture workshops

• Output from these workshops has been directly incorporated into NASA’s Lunar Architecture Plan

• Council agreed to work with NASA on Lunar Standards
  – To identify where standards would be of value
  – Candidate sources of those standards
The Administrator shall establish a program to develop a sustained human presence on the Moon, including a robust precursor program to promote exploration, science, commerce and U.S. preeminence in space, and as a stepping stone to future exploration of Mars and other destinations.
Video on the Constellation elements working together for Moon mission
Constellation Architecture Elements

- Orion Crew Exploration Vehicle
- Ares V Cargo Launch Vehicle
- Ares I Crew Launch Vehicle
- Altair Lunar Lander
Architecture Driven By A Strategy
Where We Have Been and Next Steps

Global Exploration Strategy Development – Themes and Objectives

Architecture Assessment (LAT1) Dec 06 – Outpost first at one of the Poles, elements critical to US

Detailed Design Concepts (LAT2) Aug 07 – Operations concepts, technology needs, element requirements

Detailed Design Concepts (CxLunar) May 08 – Refinement of operations concepts, technology needs, element requirements

Surface system concepts but no final designs

Lunar Capabilities Concept Review June 08 – Refinement of concepts in support of the transportation system

Lunar surface concept additional analysis cycles

Lunar Transportation system SRR

Lunar surface systems SRR

Element SRRs
Architecture Desired Attributes

- Enable lunar sustained presence early
- Develop infrastructure while actively engaged in science and exploration
- Ensure architecture supports Objectives
- Support the establishment of Mars analog
- Allow the earliest partnership opportunities for commerce and International Partners
- Continuous and focused public engagement
Architecture Guidelines

• In addition to supporting the basic goals and objectives of the Vision, the Architecture must have the following:
  
  – Programmatic Flexibility – The Architecture must be able to adapt to changes in national priorities and budgets over several election cycles
  
  – Participant Flexibility – The Architecture must be able to adapt to changes in external participation (Commercial or IP) and changes to their priorities
  
  – Exploration Flexibility – The Architecture must be able to adapt to changes in exploration priorities and changes in exploration methods
A View of Shackleton

Video
Why is a Pressurized Rover Necessary?

Requires **Pressurized rover** to explore beyond **10 km** from the outpost

**Shackleton**
- 19 km diameter

**This crater is about as big as Meteor Crater in Arizona**
- 1.2 km diameter

Kaguya Satellite - Lunar South Pole Image
Key Elements of an Outpost

Lander and Ascent vehicle
Extravehicular Activities System
Power
Habitation
Mobility
Navigation and Communication
In-Situ Resource Utilization
Pressurized Rover

Video
Summary

• Looking for innovative concepts and ideas