

Lunar Exploration Roadmap

Theme 3: Sustainability

Goal A: Maximize Commercial Activity

Paul Eckert, Boeing Company – Introduction/Framework

Panel Presentations to Follow:

Robert Kelso, NASA Johnson Space Center – Opportunities/Methodology

Bruce Pittman, NASA Space Portal – ISRU Oxygen

Peggy Slye, Futron Corporation – Transportation & Comm./Nav.

Annual Meeting of the Lunar Exploration Analysis Group

Washington, DC

September 14-16, 2010

Sustainability Premises

- Lunar activity should involve sustainable Science, Exploration, Commerce and Security
- Sustainability: real or anticipated return of **value** to stakeholders, public and private
 - scientific discovery
 - technology developments with terrestrial application
 - **expected time to self-sustaining commercial activity**
 - opportunity costs of lunar exploration

Roadmap: Sustainability of Lunar Exploration

- **Goal A: Maximize Commercial Activity**
- Goal B: Enable and Support the Collaborative Expansion of Science and Exploration
- Goal C: Enhance the Security, Peace and Safety of People on Earth

Goal A: Maximize Commercial Activity

- Summary: Actions necessary to ensure that economically self-sustaining commercial endeavor is employed **except** where inherently-governmental activity is necessary.
- A Key Enabler: **Market Demand**
 - Integrating & aggregating needs in exploration, science, international, commercial
 - Encouraging efficient delivery, sustainable market size, early start
 - Defining essential requirements within “missions”
 - Limiting autonomy to maximize opportunity
 - Combining resources to obtain capability

Maximize Commercial Activity: Objectives

- Sust-A-1 (High, Early): **Policies** and implementation of comprehensive, coordinated governmental and intergovernmental action
- Sust-A-2 (High, Early): Preparation-I: comprehensive resource and market **assessment** of potential commercial lunar support services
- Sust-A-3 (High, Early): Preparation-II: small-scale **demonstrations** of potentially commercial lunar support services

Maximize Commercial Activity: Objectives

- Sust-A-4 (High, Middle): Transition-I: **pilot-plant** scale demonstrations of potentially commercial lunar support services
- Sust-A-5 (High, Late): Transition-II: **fully operational** delivery of commercial lunar support services

Sustainability of Lunar Exploration: Summary

- Sustainability requires **efficiencies** in planning and execution:
 - Stakeholder **Integration**: Science/Exploration, Government/Commercial, International, Public Engagement
- Sustainability requires adopting its principles early
 - **Removal of Barriers to Commerce**
 - Robotic Missions for Science, Resource Prospecting, and Technology Risk Reduction
 - Infrastructure development

Sustainability: Return of **Value** to Stakeholders