



3RD SPACE EXPLORATION CONFERENCE & EXHIBIT

NASA's International Engagement Strategy

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Overview



- **NASA has a significant history of international cooperation**
- **Since the announcement of the U.S. Space Exploration Policy in 2004, NASA has pursued a multi-pronged approach in communicating NASA's programs and opportunities for cooperation**
 - Met commitments to assemble the ISS
 - Sponsored workshops and conferences in the US, and have participated in conferences overseas
 - Initiated multilateral dialogue with representatives of 13 science and space agencies around the world under the banner of the Global Exploration Strategy
 - Employed specific bi-lateral strategies on a country by country basis based on a particular partner's capability and interests

Elements of NASA's International Strategy



- **Rationale**
 - Robust capabilities and redundant systems are key factors in a successful exploration program
- **Approach**
 - Provide a core capability to transport crews and cargo to/from the lunar surface
 - Welcome parallel capabilities while seeking “open architecture” contributions
 - Continue success of the Global Exploration Strategy through multilateral engagement in International Space Exploration Coordination Group (ISECG)
 - Build on long-standing bilateral relationships while seeking new relationships when opportunities and conditions permit
 - NASA will not prescribe the manner of international participation
- **Pursue Near-term Science and Precursor Robotic Mission Opportunities**
 - Demonstrate leadership early by coordinating lunar robotic science missions
 - Pursue lunar outpost risk reduction payload opportunities
 - Continue to encourage international community to share lunar data



Lunar Exploration – “Open Architecture”

US/NASA Developed Hardware - Establishing the Foundation for Lunar Exploration

- Launch Vehicle Architecture
- Lunar Lander: ascent vehicle, descent vehicle, basic habitation
- Initial EVA system for CEV and an Initial Surface Suit
- Basic Navigation and Communication

- **Systems and Capabilities Envisioned for**
- **Outpost - Building on the Foundation**
 - Long duration surface suit
 - Advanced, long-duration Habitation
 - Augmented Power Systems
 - Basic, un-pressurized rover
 - Pressurized rover
 - Logistics rover
 - Augmented, high bandwidth satellite communication/navigation
 - Logistics Resupply
 - ISRU Production

Open for
Cooperation

Time

Robotic Precursor/Risk Reduction Missions that inform both system design and outpost operations

- LRO- Remote sensing and map development
- Flight system validation (descent and landing)
- Rovers/Landers/additional orbiters for: basic environmental data; materials identification and characterization;
- ISRU characterization, demonstration

**** US/NASA Developed hardware**



Summary of Multilateral Activities

- **Following announcement of the Exploration Policy, NASA engaged in bilateral and multilateral dialogue to explain progress in implementing the Vision and to discuss potential partnerships**
- **In April 2006, NASA initiated multilateral discussions aimed at developing a globally coordinated strategy for exploration – the Global Exploration Strategy**
 - Australia, Canada, China, the European Space Agency, France, Germany, Great Britain, India, Italy, Japan, Russia, the Republic of Korea and Ukraine
- **In May 2007, 14 space agencies released “The Global Exploration Strategy – The Framework for Coordination”**
 - “Framework Document” articulates a shared vision of human and robotic exploration focused on solar system destinations where humans may someday live and work
- **International Space Exploration Coordination Group (ISECG)**
 - The Framework Document recognized the need for a voluntary, non-binding mechanism by which space agencies could share plans for space exploration and collaborate to strengthen the collective effort



Summary of Bilateral Cooperation

- **Russia (Roscosmos)**
 - ESMD-sponsored fundamental life sciences experiments on the Russian Foton-M3 mission that launched Sept. 13 with recovery Sept. 26
 - Agreements concluded to fly Russian neutron detectors on LRO (LEND) and MSL (DAN)
- **India (ISRO)**
 - NASA Moon Mineralogy Mapper and Mini-SAR instruments to fly on Chandrayaan-1
- **Japan (JAXA)**
 - NASA providing Deep Space Network support to Kaguya (SELENE) lunar mission
 - Administrator/JAXA President signed June 2007 joint statement to pursue cooperation on potential follow-on SELENE (lunar lander) and Hayabusa (asteroid rendezvous) missions
- **Korea**
 - Sleep study with KARI
 - Discussions on small sats with KAIST



Summary of Bilateral Cooperation (cont.)

- **European Space Agency (ESA)**
 - NASA and ESA initiated a four-month “comparative architecture assessment” in January; goal is to identify by May 2008 potential future collaborative scenarios utilizing respective human/robotic exploration capabilities
- **United Kingdom (BNSC)**
 - Administrator signed April 2007 joint statement with UK Department of Trade and Industry to establish joint study of potential lunar cooperation.
 - Study results released February 15
- **Germany (DLR)**
 - NASA Administrator/DLR Chairman signed a February 2007 joint statement expressing desire to discuss areas of exploration cooperation
- **Other**
 - Bilateral discussions are continuing with a number of other nations who have expressed potential interest in exploration related cooperation

Conclusions



- **NASA's efforts in building international awareness and potential for participation in human and robotic lunar exploration have been successful**
- **The Global Exploration Strategy/International Space Exploration Coordination Group process is very important to NASA**
 - Need to sustain forward momentum generated by the release of the Framework Document
- **International lunar robotic interest is strong and growing, including near-term opportunities for international cooperation**
 - International Lunar Network provides an opportunity for near term science cooperation
- **Potential key international contributions to human exploration are beginning, formulating, progressing**