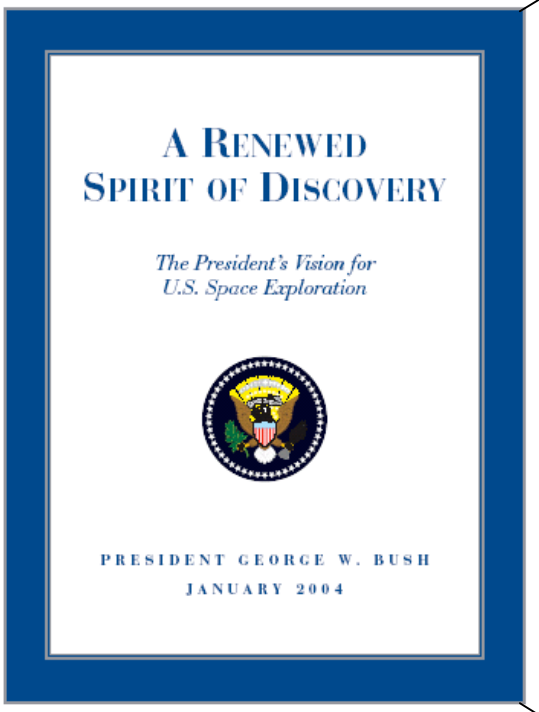

Exploration Systems Mission Directorate
NASA Space Exploration
1st Year Report
Rear Admiral Craig E. Steidle (Ret.)
Associate Administrator
January 31, 2005

The Vision for Space Exploration

THE FUNDAMENTAL GOAL OF THIS VISION IS TO ADVANCE U.S. SCIENTIFIC, SECURITY, AND ECONOMIC INTEREST THROUGH A ROBUST SPACE EXPLORATION PROGRAM



Implement a sustained and affordable human and robotic program to explore the solar system and beyond

Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations;

Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration; and

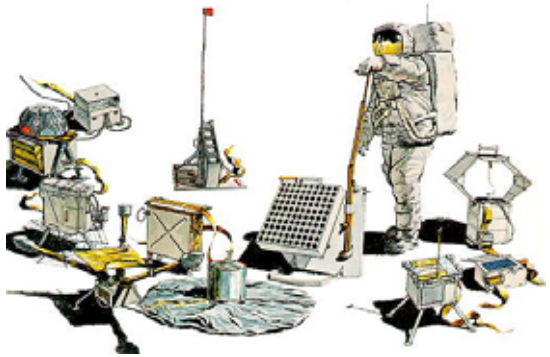
Promote international and commercial participation in exploration to further U.S. scientific, security, and economic interests.

Objectives

- Implement a sustained and affordable human and robotic program
- Extend human presence across the solar system and beyond
- Develop supporting innovative technologies, knowledge, and infrastructures
- Promote international and commercial participation in exploration

Major Milestones

- 2008: Initial flight test of CEV
- 2008: Launch first lunar robotic orbiter
- 2009-2010: Robotic mission to lunar surface
- 2011: First uncrewed CEV flight
- 2014: First crewed CEV flight
- 2015–2020: First human mission to the Moon



EXPLORATION SYSTEMS MISSION DIRECTORATE
OVERARCHING PRINCIPLES

Corporate Focus

To advance the Vision for Space Exploration in tandem with other NASA Enterprises

Focused, Prioritized Requirements

Targeted to demonstrate sustainable and affordable success in human and robotic exploration

Spiral Transformation

Develop capabilities in stages (spirals) with evolving, modular components

Maturation of technologies for inclusion in future spirals—technology will transform spirals without placing program execution at risk

Management Rigor

Focused on time-phased priorities, cost performance, and personnel development

Supported by a sound acquisition strategy that promotes innovation

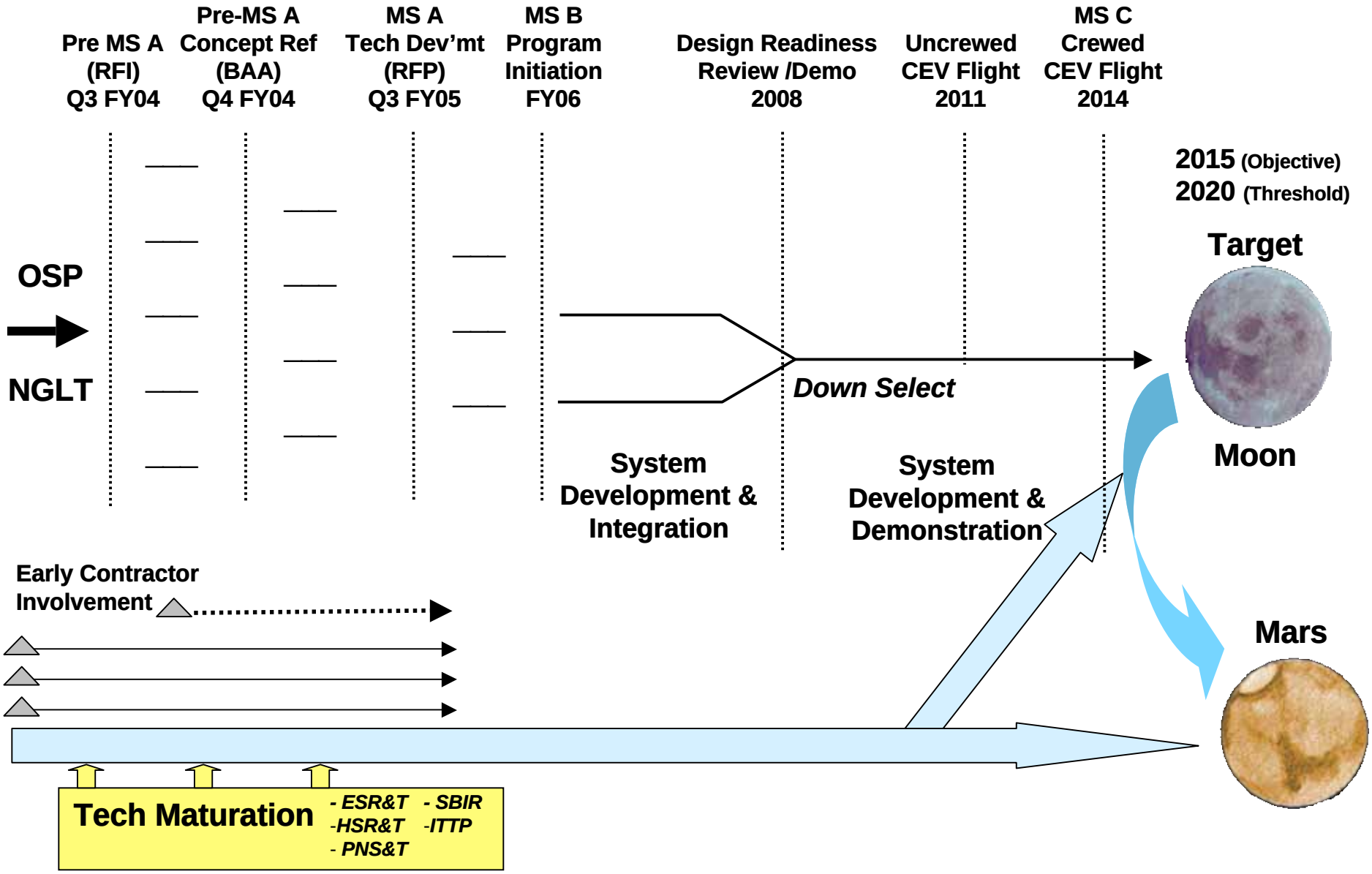
New Way of Doing Business Enables Affordability & Sustainability

- Spiral Development employs technology to enable each successive step
- Implement Strategy-to-Task-to-Technology Process
- Employ innovative acquisition strategies
- Rigorous acquisition strategy and execution

Use the Vision to Transform NASA

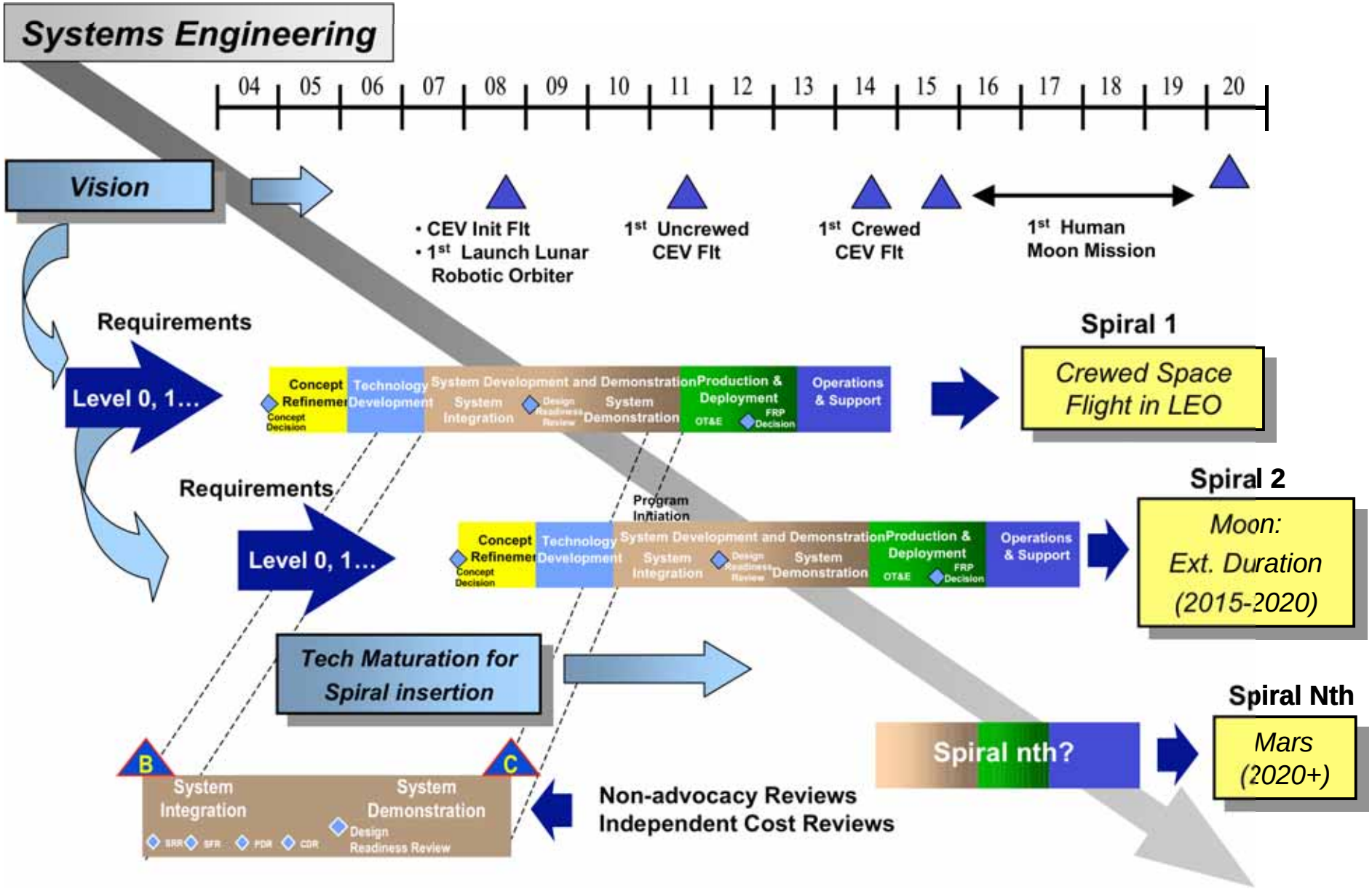
- Focus Agency on a long term space vision
- Employ an integrated agency approach
- Leverage talent, experience and leadership – recent successes and demonstrated management reforms
- Maintain passion and commitment to succeed

Constellation Program Acquisition Strategy Overview (Baseline)



Crew Exploration Vehicle (CEV)—One Example

Spiral Acquisition Process



Vision Requires System-of-Systems Integration

Cross-Agency Coordination & Integration

Transit and Launch Systems

Crew Transport

Launch

Crew Support

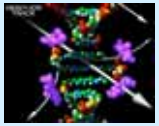
The Human: an Essential Element of the System of Systems

Surface and Orbital Systems

Landing Systems

Comm/Nav

Surface Mobility



Biomedical Countermeasures and Limits

Resource Identification and Characterization

Supporting Research

Long-Duration Habitation

Pre-Positioned Propellants

Surface Power and Resource Utilization

Technology Options

Mars Candidates

Telescope Candidates

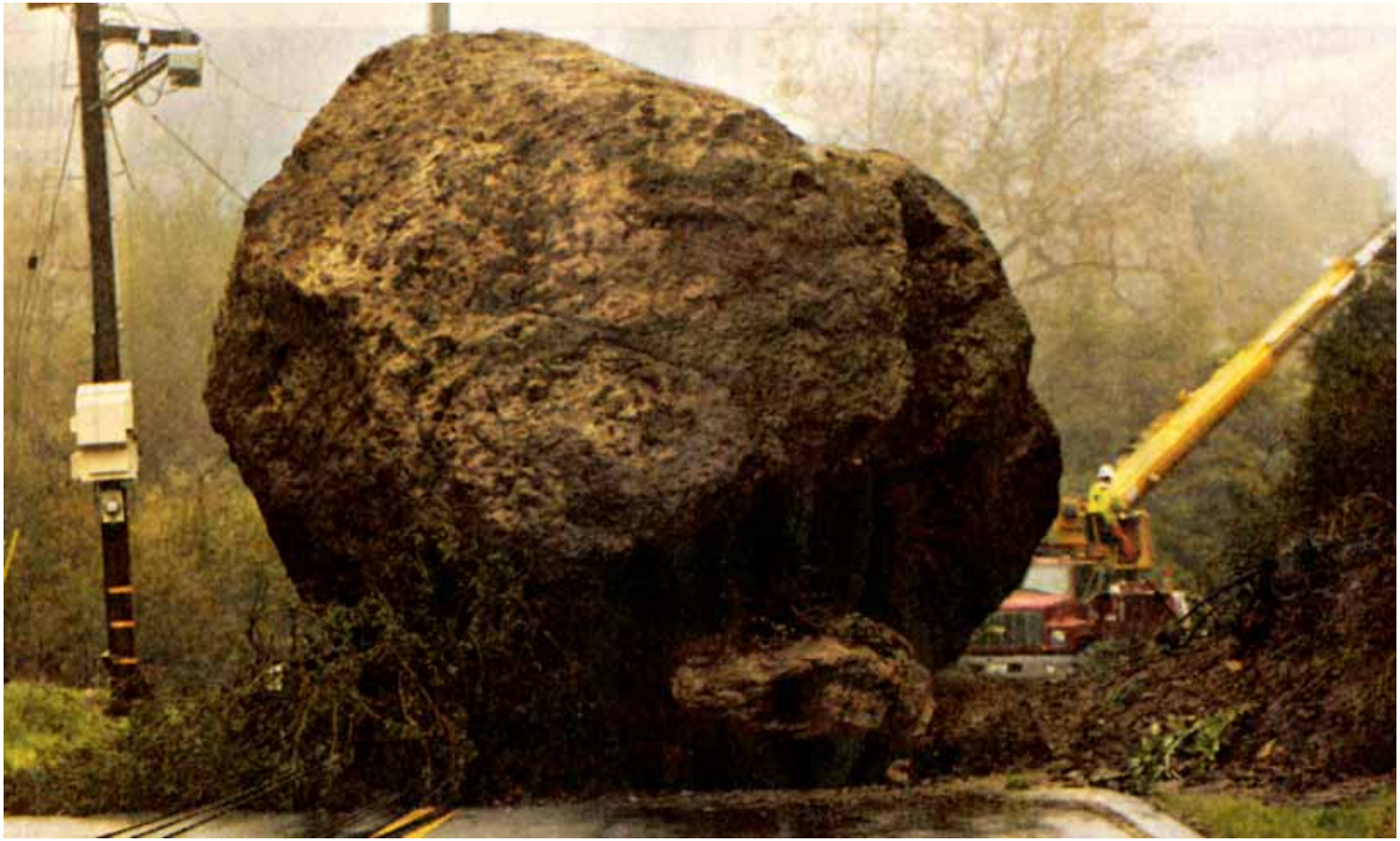
Outer Moons Candidates

Commonality/Evolvability For Future Missions

- **Lessons-learned reviewed and incorporated into management process**
- **Released Request for Information (RFI)(May 04)**
- **Released CE&R BAA (Jun 04)**
- **Released System of Systems Intramural Call for Proposals (ICP) for**

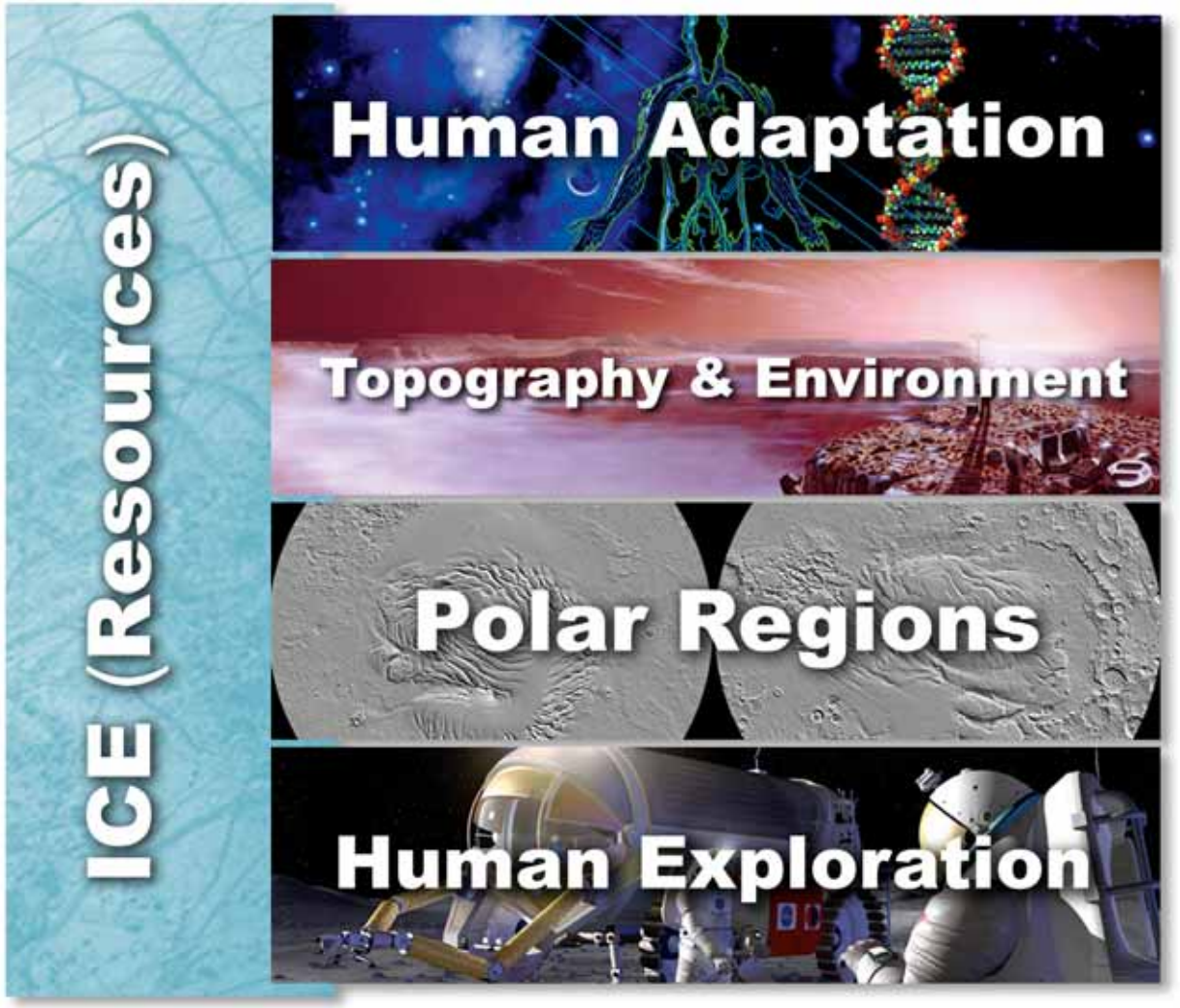
  Spiral 2 & beyond (May 04)
- **Released Extramural System of Systems BAA for Spiral 2 & beyond (Jul 04)**

ESMD's $500 Project



- **Constellation Super-System, CEV Preliminary Level 1 requirements and Concepts of Operations developed utilizing rigorous process:**
- **CEV RFP process initiated with target award date of Aug 05**
- **JIMO spacecraft contract awarded September 20**
- **Hubble Robotic Servicing Mission contract awarded October 1**
- **SBIR Phase II 125 contracts—July**
- **SBIR Phase I 290 contracts—November**

LRO Measurements Strategy: Prepare for Human Exploration



Project Objectives

- Biological adaptation to lunar environment (radiation, gravitation, dust…)
- Understand the current state and evolution of the volatiles (ice) and other resources in context
- Develop an understanding of the Moon in support of human exploration (hazards, topography, navigation, environs)

Major Elements of the Developing International Strategy

International cooperation is enhancing; we will pursue cooperation where it is best value/value-added

- **Communicate and Engage with Potential Partners**
- **Strategy, Architecture, and Roadmaps**
  - Exchange of information / Ideas
  - Seek synergy and common interests
- **Precursor Robotic Missions**
  - Coordinate with SMD
  - Seek ways to share data and minimize overlap with partner missions (to the moon in particular)
- **Research and Technology**
  - Sharing of ground based facilities
  - Coordinated flight experiment programs; particularly ISS
  - Exchange of data; scientist-to-scientist teaming
  - Best value/value-added technology strategy
- **Constellation Systems**
  - Industry-to-industry teaming for CEV (guidelines for acquisition activities complete)
  - Longer term option - Identify opportunities for major systems provision by an international partner on a government-to-government basis

Centennial Challenges

Background

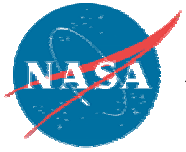
- **A program of contests in which NASA will establish cash awards to stimulate innovation and competition in technical areas of interest to Civil Space and Aeronautics.**
- **Specifically,**
  - Encourage innovation in ways that standard federal procurement cannot
  - Enrich NASA research by reaching new communities
  - Help address technology pitfalls
  - Promote returns that outweigh the investment
  - Educate, inspire and motivate the public
- **Innovation Sought:**
  - Revolutionary advances in fundamental technologies
  - Breakthrough robotic capabilities
  - Very low cost space missions
- **Announcements released for:**
  - Prize formulation workshop involving external community (15 -16 June)
  - Informational website announced and active (www.centennialchallenges.nasa.gov)

Activities

- **Finalizing/implementing initial Prize opportunities**
- **Drafting rules for individual challenges and set up review boards**

The Way Ahead

- **Exploration Conference (Jan 30–Feb 1, 05)**
- **Status of International Conference Action Items (Jan 05)**
- **Biological & Physical Research Integrated Baseline Review (Jan 05)**
- **ESMD ISS prioritization Results (8 Feb 05)**
- **Spiral 1 ESRRB (21 FEB 05)**
- **Crew Exploration Vehicle (CEV) Request for Proposal (RFP)**
  - Draft (Jan 05) / Final (Mar 05) / Award (Sep 05)
- **Spiral 1 MS A Approval Brief to Agency PMC (Jul 05)**
- **Systems Engineering & Integration RFP**
  - Draft (April 05) / Final (Jun 05) / Award (Dec 05)
- **Other Major 05 Events: “Gap Filler” BAA; Centennial Challenges**

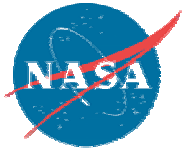


Achieving a Sustainable Vision

Budget and Program Advocacy

How do we sustain funding and support for the Vision over 30 budget cycles, 8 presidential elections, and many congresses?

- **Have a united front from Internal NASA, Industry, Academia, Researcher, Scientific and Engineering Communities**
- **Develop clear and consistent messages**
- **Engage broader communities**
- **Deliver on commitments / responsible stewards of taxpayer $$**
- **Educate, inspire, and motivate the public**



Thoughts

- **We Have a Great Team – Greater Than the Sum of Its Parts**
- **We Are Putting Together "World Class" Programs and Processes**
- **We Are Substantially Changing the Way NASA Does Business by Infusing Management Rigor, Consistency of Purpose, and Disciplined Processes**
- **Tremendous Support From Our Administrator, the White House and Support in Our Congress**
- **Great Enthusiasm From US and International Industry to Participate**
- **We Have the Privilege to Be Working on Programs of High National Importance on Behalf of All Americans**
- **We Are Inspiring Our Children - the Next Generation of Americans That Will Pick up the Baton of Exploration**
- **United Support of Vision will Ensure Sustainability**

Exploration Systems Mission Directorate

We're not where we want to be,
We're not where we're going to be,
<u>BUT</u> we're certainly not where we were yesterday.