



Exploration Systems Mission Directorate

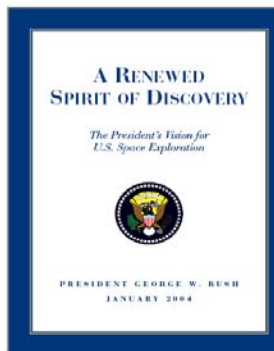
The Vision for U.S. Space Exploration

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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

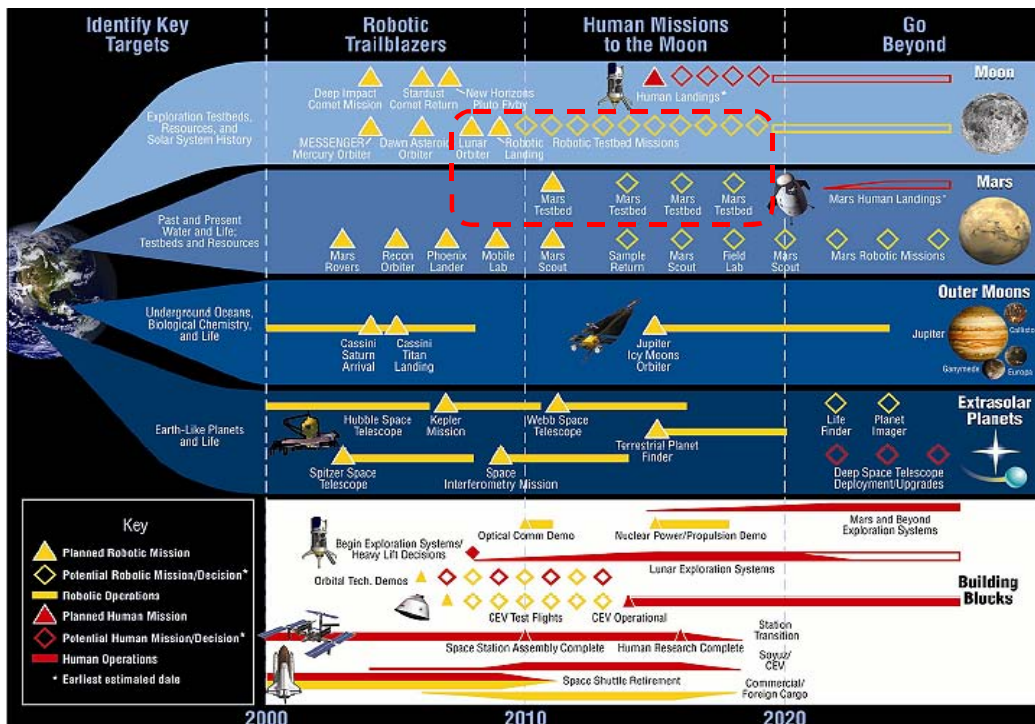


Implement a sustained and affordable human and robotic program to explore the solar system and beyond

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.



NASA Lunar Testbeds and Missions

- Continue Discovery and New Frontier programs for understanding solar system history
- Begin robotic missions to the Moon by 2008. Vision assumes:
 - 2008 Orbiter – Lunar ice/resources and other landing site characteristics
 - 2009 Lander – Platform for future demonstrations and initial demonstrations
 - Up to one lunar robotic mission per year thereafter to demonstrate new capabilities, such as robotic networks, reusable planetary landing/launch, precision landing, pre-positioned propellants, ISRU, etc.
- Begin human expeditions to the Moon in the 2015 – 2020 timeframe.
 - Moon serve as testing ground/operational environment to demonstrate sustainable exploration approaches and human exploration systems for Mars and other destinations.
 - Specific number, frequency, duration, size, and types of human lunar missions/systems determined by requirements for future human and robotic Mars exploration, research results from Mars robotic spacecraft, and available resources.
 - Pursue science of/on the Moon as secondary goal

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Mars Research, Testbeds, and Missions



- Continue Mars Exploration Program science missions planned through end of the decade (3 rovers, 1 lander, 2 orbiters). Search for water and life.
- Augment Mars Exploration Program technology for aggressive science missions next decade, such as sample return, deep drilling, etc. Accelerate search for water and life.
- Begin new series of Mars Exploration Program testbed missions to demonstrate “dual-use” technologies that can enhance robotic and enable human exploration:
 - 2011 Lander – Platform for future demonstrations and initial demonstrations
 - Missions at every Mars opportunity thereafter to demonstrate improved aerodynamic entry, deep space rendezvous and docking, precision landing, ISRU, etc. May also obtain critical data on hazards (“Safe on Mars”), resource locations, and research sites and prepare resources and sites in anticipation of human landings.
- Begin human expeditions beyond Earth Orbit:
 - First mission could be deep space telescope deployment/upgrade, near-Earth asteroid visit, Mars circumnavigation, or Mars landing.
 - May test human-scale power, propulsion and transit systems before taking on additional risk of Mars landing.
 - Timing first Mars landing depends on discoveries from robotic explorers, techniques to mitigate Mars hazards, demonstration of sustainable exploration at Moon, and available resources.

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Outer Moons Research and Missions



- **Cassini mission to Saturn this decade may identify Titan as another key target for understanding habitable environments and life.**
- **Jupiter Icy Moons Orbiter next decade to confirm/map subterranean oceans and search for evidence of life on Europa, Ganymede, and Callisto.**
- **Advanced follow-on missions (e.g., Europa submarines, Titan balloons) likely after 2020.**
- **Human research presence at some of these worlds may eventually become desirable.**

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Key Elements of the Vision

- **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
 - 2012-2015: Jupiter Icy Moon Orbiter (JIMO)/Prometheus
 - 2015-2020: First human mission to the Moon



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EXPLORATION SYSTEMS ENTERPRISE 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



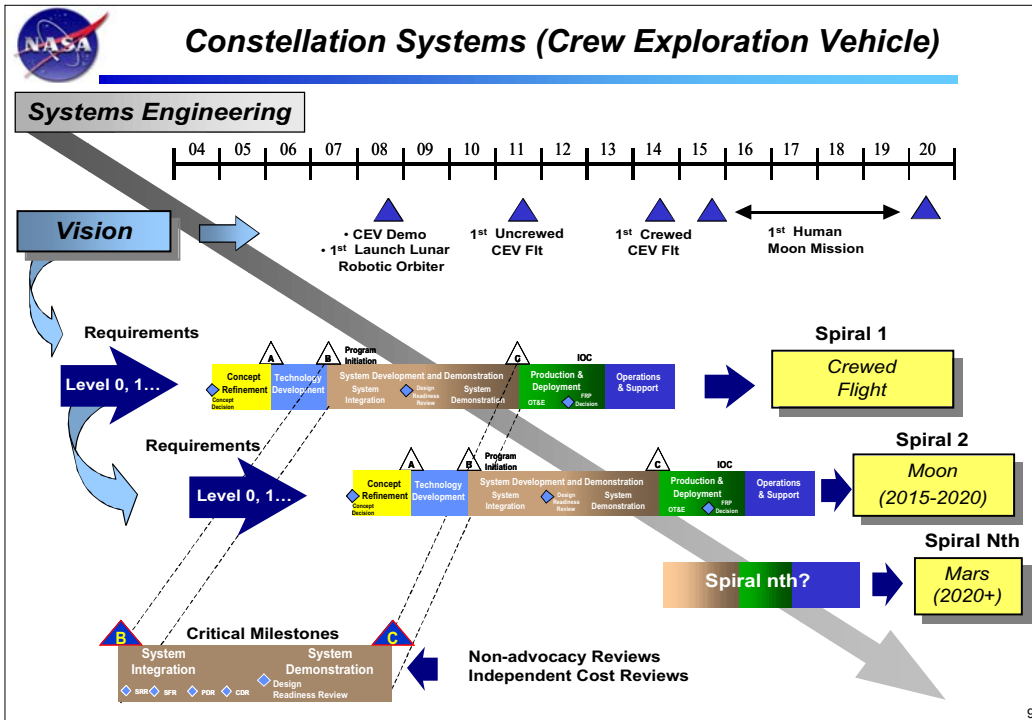
Spiral Transformation

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



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- International Cooperation - Policy Imperatives**
- President's Speech (Jan 2004)
 - "We'll invite other nations to share the challenges and opportunities of this new era of discovery. The vision I outline today is a journey, not a race, and I call on other nations to join us on this journey, in a spirit of cooperation and friendship."
 - The Vision for Space Exploration (Feb 2004)
 - "Pursue opportunities for international participation to support U.S. space exploration goals"
 - President's Commission (Jun 2004)
 - "... international talents and technologies will be of significant value in successfully implementing the space exploration vision"
 - "The Commission recommends that NASA pursue international partnerships based upon an architecture that would encourage global investment in support of the vision"
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International Cooperation - Efforts Underway

- Continue focus on bilateral discussions on cooperation with potential international partners
 - Discuss partner capabilities, specific interests, available resources
 - Review potential models for cooperation
- Solicit international views on cooperation and partnerships during major events
 - Farnborough Air Show in July, 2004
 - International Astronautical Congress in Vancouver in October, 2004
- Convene a NASA-sponsored international conference in the fall to discuss exploration goals, possible areas of coordination, cooperation, or collaboration
 - Invite international government participation
 - All potential partners present their plans and interests for exploration
 - Identify areas of mutual interest for further discussion

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Sustaining the Vision

- How do you sustain the funding and support for the Vision during 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

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Office of Exploration Systems

*We're not where we want to be,
We're not where we're going to be,
BUT we're certainly not where we
were yesterday.*

