

**21st National Space Symposium
Colorado Springs
April 7, 2005**

**Hon. Richard Russell
Associate Director
Office of Science and Technology Policy
Executive Office of the President**



***The President's Vision
For Space Exploration
- Review and Outlook***

Hon. Richard Russell
Associate Director
Office of Science and Technology Policy
Executive Office of the President



Thank you for inviting me to speak at this symposium. It has been just over one year since President Bush set forth a bold new vision for space exploration.

I would like to use this opportunity to provide a status of where we are in pursuing this vision, as well as the Administration's broader civil space policies.

National Budget Priorities

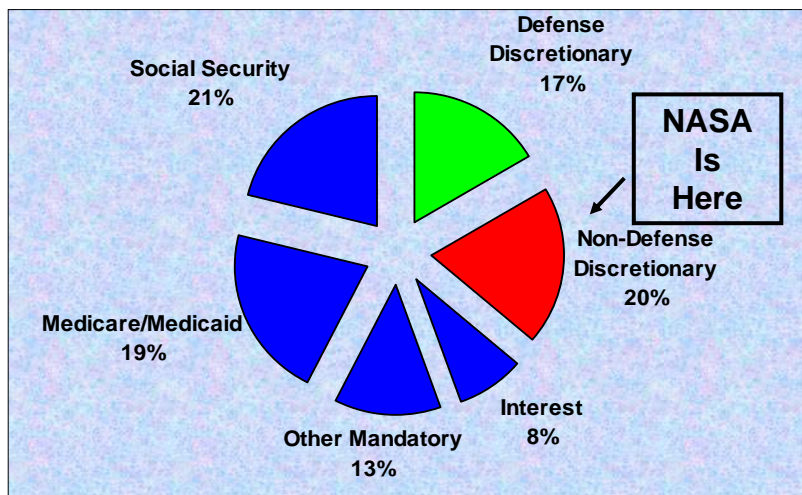


- Promoting Economic Growth
- Protecting America
- Supporting a Compassionate Society
- Making Government More Effective

- 2 -

Let me begin by putting into context where space exploration fits within the broader national agenda. The President's 2006 Budget continues the progress the Administration achieved during the first term, in: Promoting Economic Growth, Protecting America, Supporting a Compassionate Society, and Making Government More Effective.

President's 2006 Budget (\$2.6 trillion)

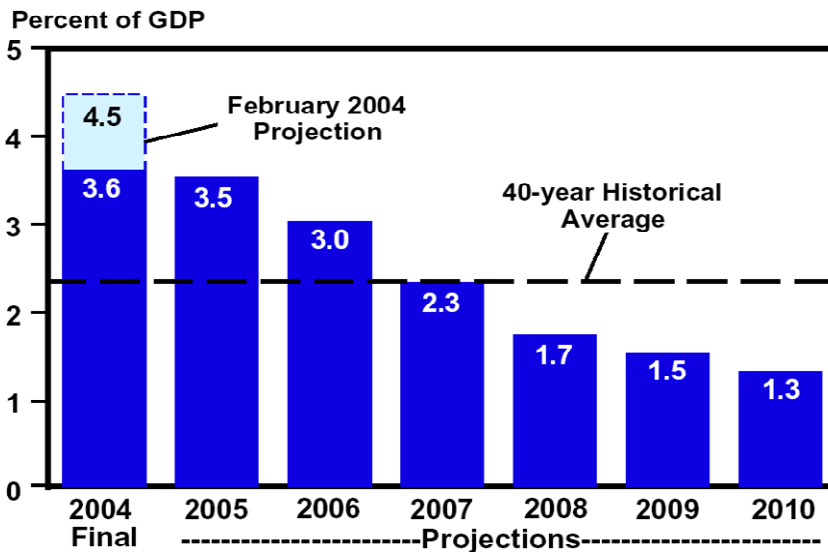


- 3 -

In addition to the non-discretionary accounts, like social security and the Medicare/Medicaid spending, the President is committed to spend what is needed to win the War on Terror and protect the homeland. To rebuild and transform our armed forces, the President raises overall defense spending by 4.8 percent in 2006, or 41 percent since 2001, the largest increase in defense spending since the Reagan Administration.

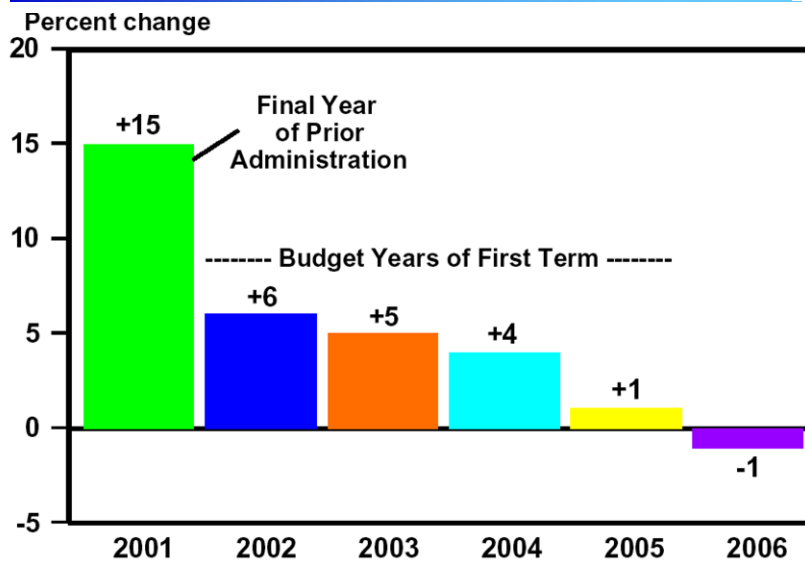
The President has also nearly tripled funding for homeland security activities in the past 4 years to make our homeland safer.

Reducing the Deficit



At the same time, the President is committed to reducing the Federal budget deficit. The FY2006 budget is consistent with the objective to cut the deficit by more than half from 2004's 3.6 percent of GDP—to just 1.5 percent of GDP by 2009. This reduction will bring the deficit down to well below the 40-year historical average of 2.3 percent of the GDP, and is lower than all but seven of the last 25 years.

Discretionary Spending Restraint

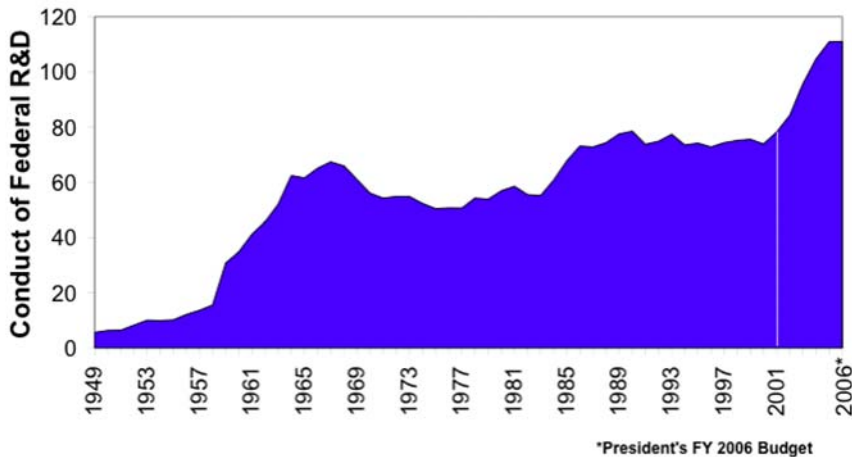


With these commitments, the President needs to enforce restraint in non-security discretionary spending. The President has worked with the Congress in successfully bringing down the rate of growth in non-security discretionary spending each year of his first term, from the fifteen percent growth in the last budget year of the previous Administration, to just one percent growth in 2005, and the President will reduce the non-security discretionary spending by nearly 1 percent in 2006—the tightest such restraint proposed since the Reagan Administration.

Federal R&D Spending Up



(Outlays in billions, constant 2000 dollars)



- 6 -

These reductions to the discretionary budget are targeted against lower priority or lower performing programs. In contrast, high priority and well-performing programs continue to be supported. The overall Federal spending in R&D, under this Administration, has gone up by more than 35% over the last four years.

This demonstrates the Administration's support for a strong national research and development base, a base that has proven beneficial to our national security, economic prosperity, and quality of life, and has contributed to the United States' ability to lead the world at the forefront of scientific discoveries and technological innovations.

A Renewed Spirit Of Discovery



White House

"Today we set a new course for America's space program. We will give NASA a new focus and vision for future exploration. We will build new ships to carry man forward into the universe, to gain a new foothold on the Moon, and to prepare for new journeys to worlds beyond our own."

***-- President George W. Bush
January 14, 2004***

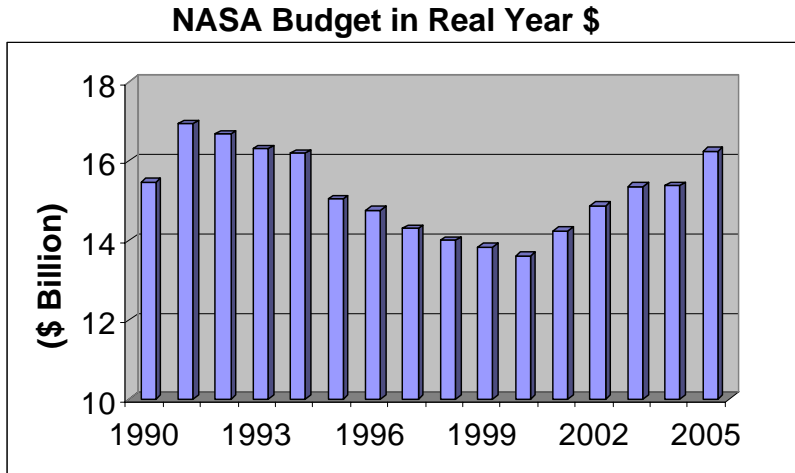
- 7 -

The President believes that space exploration, like other Federal science and technology activities, is an investment in our future. America's history is built upon the desire to explore new frontiers. Past explorations from Lewis and Clark to the Apollo Moon Landings have greatly benefited our nation. The President, therefore, has set a fresh new course with his bold but pragmatic "Vision for Space Exploration" to guide our exploration of space.

Let me emphasize that the Administration's support for the vision remains strong. When the President announced the vision on January 14, 2004, he chose NASA Headquarters as the appropriate venue. This was a symbolic choice to show his commitment and support – making President Bush the first U.S. President to ever visit NASA Headquarters.

Through his articulation of the new vision, he committed the Nation to a journey that will return us to the Moon in the next decade to enable future human explorations of Mars and beyond, and he empowered the scientists and engineers across the nation to contribute their ingenuity to this bold pursuit. As the President directed, we will deploy and leverage future space explorations in an affordable and sustainable way. Not only will human and robotic explorers be employed as partners in this endeavor, so will NASA work in close partnership with industries, academia, and other Federal agencies *"to advance U.S. scientific, security, and economic interests through a robust space exploration program"*.

The Vision Remains an Administration Priority



- 8 -

As a first step towards implementing the vision, the President proposed a 5.6% increase in NASA's budget for fiscal year 2005, which was the largest budget increase for NASA in 13 years. For the fiscal year 2006 request, although the average non-security discretionary spending is proposed to decrease by about 1% (as we saw in one of the earlier charts), the President has requested a 2.4% increase for NASA. This back-to-back increase of NASA's budget reflects a solid commitment towards the vision of space exploration and the transformation of NASA.

In addition to providing sufficient funds to implement the vision, the President has nominated the right leader for NASA -- a leader who will carry out this bold vision in a technically-sound and pragmatic way. Dr. Michael Griffin is just such a leader with not only an impressive technical expertise, but also a deep passion for space. The President has placed great confidence in Dr. Griffin and believes he is the best candidate to lead NASA at this historical juncture.

The strong support from the Administration and Congress, as well as the right leadership at NASA, has only laid the foundation for us to begin addressing the challenges on this bold journey. To guide the near-term implementation, the vision includes several substantial milestones.

Shuttle and ISS



- Return Shuttle to Flight Safely
- Complete ISS Assembly by 2010
- Focus ISS Research on Vision
- Retire Shuttle by 2010



First, we will return the Space Shuttle to flight safely. We will complete the assembly of the International Space Station by 2010, with a configuration that meets the needs of the space exploration vision and our international partners, and also uses as few Shuttle flights as possible. After the completion of Station assembly, the Shuttle will be retired by 2010 with nearly 30 years of service. Research will continue to be conducted onboard the Space Station, and will focus on supporting space exploration goals.

Robotics and Human Return to the Moon



- Robotic lunar reconnaissance mission by 2008
- CEV initial operation by 2014
- Human return to the Moon by 2020

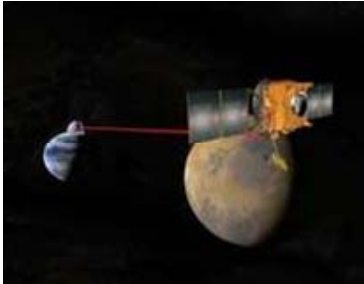
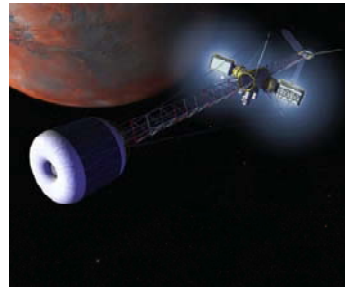


Second, starting no later than 2008, we will initiate a series of robotic spacecraft to explore the Moon to advance lunar science, provide detailed maps of the Moon's geography and natural resources, and identify the best locations for humans to visit.

Third, we will develop the Crew Exploration Vehicle with an initial operational capability to conduct human missions by no later than 2014, and to undertake extended human expeditions to the lunar surface no later than 2020 to learn how to live and work over the long periods of time that will be required for human visits to more distant locations.

These are the milestones that NASA is entrusted to achieve within the next two decades, and they will mark the essential first steps in this daring journey that the President has laid out. The successful completion of these milestones will rejuvenate the American people's excitement and confidence in human spaceflight, and will inspire them to lend their continuing support to the pursuit of space exploration.

A Journey, Not a Race



**Advanced Power and Propulsion
Space Environment Effect and
Countermeasures
Optical Communications
Space Weather Prediction
In-situ Resources Utilization**

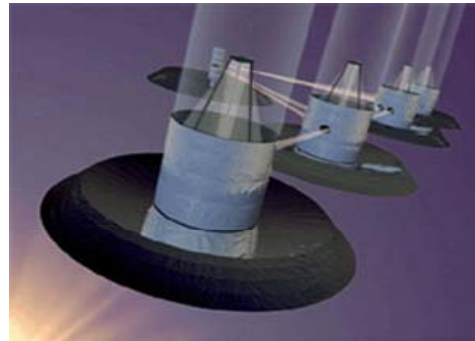
It is worth pointing out that the milestones that I just mentioned are the only milestones in this space exploration vision that come with a timetable. The spirit of this vision is to explore our universe in a sustainable, affordable, and flexible manner. As we continue our journey, many enabling science and technologies need to be understood and developed. As examples, we will need advanced in-space propulsion systems for more efficient interplanetary flight; we will need advanced power systems; we need to understand the effect of long-term space travel on humans, including heavy ion radiation and microgravity effects, and to develop effective protection systems and medical countermeasures; we need to be able to communicate reliably with significantly higher bandwidth; we need to have the capability to forecast and communicate warnings of upcoming space storms so our valuable space assets and travelers away from Earth will be protected; and we need to be able to make use of *in-situ* extraterrestrial resources to minimize the materials and equipments we have to carry out of the Earth's deep gravitational well.

These technologies and their scientific underpinnings need resources and time to develop and mature, and therefore, this vision for space exploration is a journey, and not a race against competitors or time. Each human step beyond the Moon will be determined on the basis of available resources, accumulated experience, and technological readiness. It will be in an economically prudent way that we will safely spiral the human sphere of influence outwards and through space.

Science will Continue to Advance



Artist's concept of first direct detection of the atmosphere of a planet outside our solar system



An artist's concept of Terrestrial Planet Finder

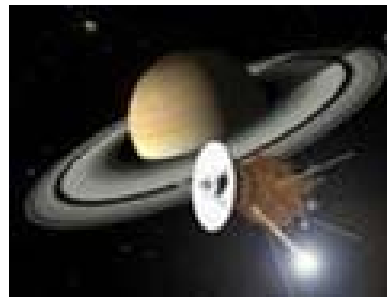


Universe is expanding faster possibly due to the existence of dark energy

Thanks to the advances in space science and technologies, our knowledge of how the cosmos was born and how it evolved has grown exponentially in just one human lifetime. The space programs have contributed to several major advances in astronomy, including the observations of an atmosphere of a planet outside our solar system, the completion of the first detailed full-sky map of the oldest light in the universe, and the discovery that dark energy is accelerating the expansion of the universe.

In the next couple of decades, NASA will build bigger and more powerful space telescopes to continue our search for planets that might have, or even still harbor life, and to observe the first stars and galaxies in the universe formed following the Big Bang to better understand the origin and the structure of our universe. The human and robotic in-space capabilities advanced by this space exploration vision will offer new opportunities to assemble and service complex platforms in space that will facilitate these observations and enhance our knowledge.

Breaking Science Ground with Robotics



Artist's drawing of Huygens landing on Titan

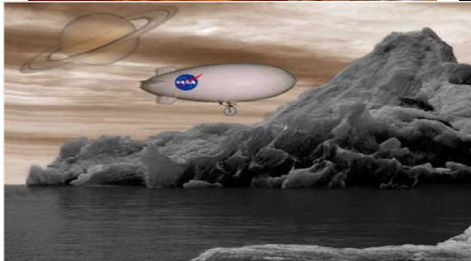
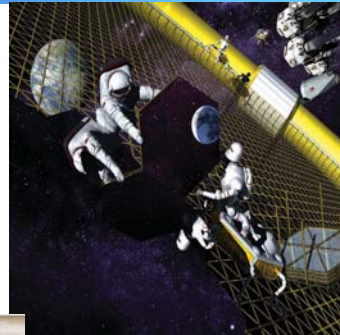


Cassini approaching Saturn

Solar system science has continuously made excellent progress. It has been fifteen months since the first of the twin Mars rovers landed on the red planet, and they are still working, greatly surpassing their nominal mission life designed for just three months on Mars. These two diligent robot geologists have not only gathered nearly irrefutable evidence that Mars once had saltwater seas on its surface, they have also observed the atmospheric phenomena on Mars and helped characterize its climate.

The Cassini mission has also made great findings exploring Saturn's system of rings and moons from its orbit. It has taken pictures of unknown moons and surprising textures hidden in Saturn's rings. Its Huygens probe, developed by our international partner-the European Space Agency, has for the first time landed on Titan and made invaluable measurements and observations about its clouds and its mysterious, planet-like atmosphere.

Science an Integral Part of Exploration



An artist's concept of a future air vehicle exploring the atmosphere of Titan

Concept of human and robots building a space telescope

Following these recent successful robotic investigations of Mars and Saturn, we will continue sending advanced robotic missions to the planets, asteroids, and other destinations in our solar system to study their geological and biological past and present, to map the physical and chemical environment, and to understand how the Solar System formed and evolved and the possible implications to the terrestrial environment.

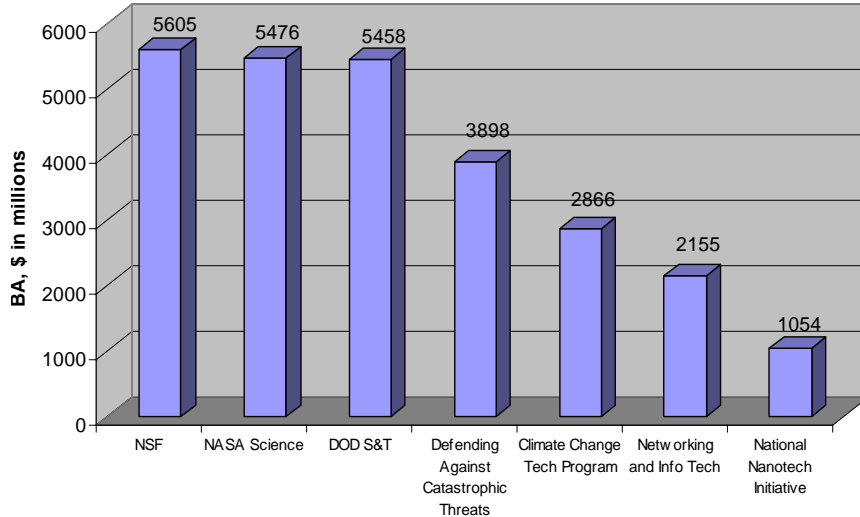
Closer to home, NASA will continue to be a major contributor to the Administration's Climate Change Science Research Program. NASA's operating Earth observing missions will continue providing a host of on-going data sources to improve our understanding of the intricate and dynamic linkage among Earth's climate and its ocean, land, atmosphere, and biosphere. NASA will also develop new space probes to study the Sun's influence on the Earth and space environment, which may one day, set the foundation for a space weather sentinel system.

The importance of science to space exploration is evident, and the benefit is mutual and synergistic. On this journey of exploration, science will inform us where to go, what to expect, and how to manage. In return, exploration will provide us nearly limitless opportunities to unlock new knowledge.

Healthy Science Budget at NASA



Federal S&T Programs



Science is critical to the vision and to NASA. It has the support of the Administration, and the U.S. will continue to lead the world in unraveling the mysteries of the cosmos. The 2006 NASA science funding level remains strong in absolute terms, and is comparable to the total science budget at the National Science Foundation and the basic science programs within the Department of Defense. In addition, NASA’s out-year budget projections reflect a sustained commitment to Earth and space science programs, anticipating a 24-percent increase in funding from 2006 to 2010.

It should be noted that although NASA science programs constitute an important part of the Federal S&T portfolio, there is a broader science and technology effort across the Federal Agencies that NASA can and should leverage. Advanced science, technology and manufacturing concepts are being seeded in areas like high end computing, intelligent systems, and nanotechnology that the space exploration vision should help harness and harvest as we prepare for our next steps in exploration.

Engaging and Enabling Industry



"The role of government is not to create wealth; the role of our government is to create an environment in which the entrepreneur can flourish, in which minds can expand, in which technologies can reach new frontiers."

– President George W. Bush



Lockheed Martin Corp.



Scaled Composites, LLC.



Boeing Co.

- 16 -

Pursuant to the President's direction, and upon the "Aldridge Commission's" recommendations, NASA has been refocusing its organization, realigning its programs, personnel, and facilities, and experimenting with new ways of doing business. This transformation of NASA will continue and is vital to ensuring the successful implementation of the vision.

One of the objectives of the vision is to promote commercial participation in exploration. As President Bush has stated, *"The role of government is not to create wealth; the role of our government is to create an environment in which the entrepreneur can flourish, in which minds can expand, in which technologies can reach new frontiers."* Nowhere does this seem to ring more true than in the space industries.

The private sector possesses the creativity and the capacity to innovate, and is the lynchpin in achieving a long-term sustainable vision. A great recent example of continued American innovation is Burt Rutan and Scaled Composites' SpaceShipOne, which became the first private manned spacecraft to exceed an altitude of 100 km twice within the span of a 14-day period, a feat that won them the X-Prize.

U.S. Space Policies



- **Recently updated/issued U.S. Space Policies:**
 - U.S. Commercial Remote Sensing Policy, signed April, 2003
 - U.S. Space Exploration Policy, signed January, 2004
 - U.S. Space-Based Positioning, Navigation, and Timing Policy, signed December, 2004
 - U.S. Space Transportation Policy”, signed December, 2004

- **Space Transportation Policy on Exploration Vision**
 - Emphasize the potential for using derivatives of the EELV for future heavy-lift capabilities
 - Evaluate the comparative costs/benefits of
 - a new dedicated heavy-lift launch vehicle or
 - options based on the use of Shuttle-derived systems.
 - Include impact assessment on national security, civil, and commercial launch activities and the space transportation industrial base.

- 17 -

The space exploration vision is one component of a broader government policy that ensures a robust commercial space sector is sustained in support of our national and homeland security, civil, scientific, and economic interests. Over the past few years, the Administration, in addition to developing the space exploration vision, has also worked to make permanent the Federal R&D tax credit; fostered licensing of commercial space launches through the FAA; established new policies for:

- 1) Remote Sensing;
- 2) Position, Navigation, and Timing;
- 3) Space Transportation; and
- 4) Is currently developing updates to the National Space Policy.

In general, the policies establish a framework whereby the Federal Government looks first towards the private sector to fulfill its mission needs. Only after exhausting those opportunities should the Federal Government establish capabilities to meet its unique requirements. This philosophy is obviously moderated by the existence of market inefficiencies, such as the global overcapacity of launch vehicles due to national security concerns and a general downturn in the forecasted commercial demand.

Whenever possible, the Government will operate under the presumption of private sector supply. For example, the “U.S. Commercial Remote Sensing Policy” signed on April 25, 2003, stresses private sector supply of remote sensing imagery. The capability to launch crew and cargo safely into the low Earth orbit is critical to the implementation of the space exploration vision, and the commercial sector is equipped with some of the needed capabilities.

The recently updated “U.S. Space Transportation Policy”, signed on December 21, 2004, has prescribed, specifically relating to the vision for Space Exploration, that NASA’s options to meet potential exploration-unique requirements for heavy-lift beyond the capabilities of the existing EELVs will emphasize the potential of using derivatives of the EELVs, and that the Administrator of NASA and the Secretary of Defense shall jointly submit to the President a recommendation regarding the preferred option to meet future heavy lift requirements. The recommendation will include an assessment of the impact on national security, civil and commercial launch activities and the space transportation industrial base.

The commercial sector must be encouraged to support future space exploration activities. In this regard, NASA will seek to use existing or new commercial launch vehicles to support the transport of crew and cargo to the Space Station, and potentially to the Moon and other exploration destinations of the future.

Compete to Best Meet the Requirements



- **Centennial Challenges Program will establish cash purses to**
 - Stimulate innovation
 - Enrich NASA research by reaching new communities.
 - Achieve returns that outweigh program investment.
 - Educate, inspire and motivate the public.

- **Industry, academia, and NASA Centers will have opportunities to compete for over \$10 billion in new opportunities over the next five years. Examples:**
 - *Exploration Systems -- Crew Exploration Vehicle, Crew Launch Vehicle, Project Prometheus, and exploration research and technology*
 - *Science -- Discovery, Explorer, New Frontiers, Mars Scouts, Lunar Robotic, Earth Science Pathfinders, New Millennium, Living with a Star*
 - *Space Operations -- Launch services to Station and other users*
 - *Aeronautics -- New breakthrough flight demonstration projects*

- 18 -

Likewise, NASA is opening up competition to leverage the capabilities of the private sector, to seek ideas and innovations that best meet its priorities and requirements. It is encouraging innovations through programs like the Centennial Challenges Program, which is designed to stimulate innovation and competition in ways that standard federal procurements cannot, and to reach communities beyond the traditional aerospace ones.

NASA is also exploring innovative commercial approaches to accomplishing the near-term milestones in the vision. All told, NASA plans to award over \$10 billion dollars over the next five years to industry, academia, and NASA Centers to meet the vision’s requirements.

Continuing the Journey



NASA / JPL

"We do not know where this journey will end, yet we know this: human beings are headed into the cosmos."

-- President George W. Bush
January 14, 2004

- 19 -

The Administration is transforming the nation's space enterprise to make it stronger, more competitive, and to encourage the innovation that has made us the leading space-faring nation. An important component of this transformation is the bold new path outlined for the civil space community in the space exploration vision. The torch is being passed from the space pioneers, who first took humans to the moon and robotics to the edge of our solar system -- to the new generation of explorers who will take discovery to the next level, bringing us closer to answering the mysteries of the cosmos.

The vision will continue mankind's journey of exploration.

Thank you.