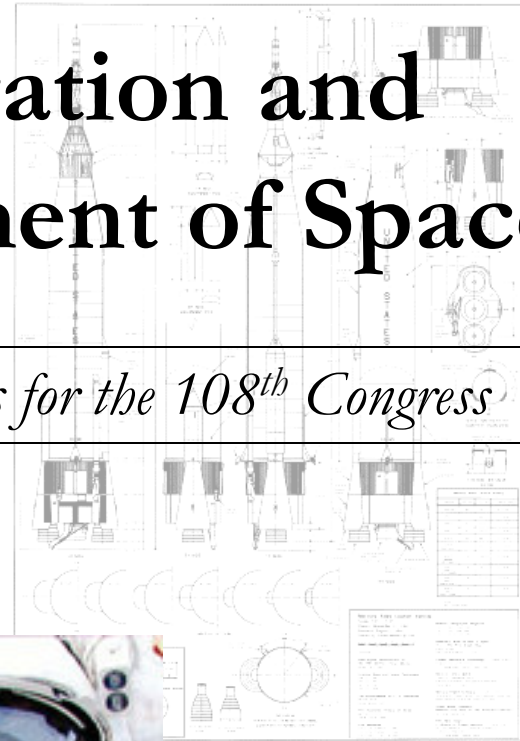




# A Blueprint for the Exploration and Development of Space

*Recommendations for the 108<sup>th</sup> Congress*



**National Space Society**

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(202) 543-1900 • (202) 546-4189 (fax) • [www.nss.org](http://www.nss.org)

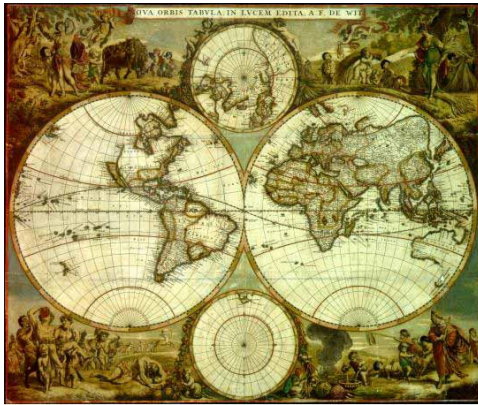


# The National Space Society

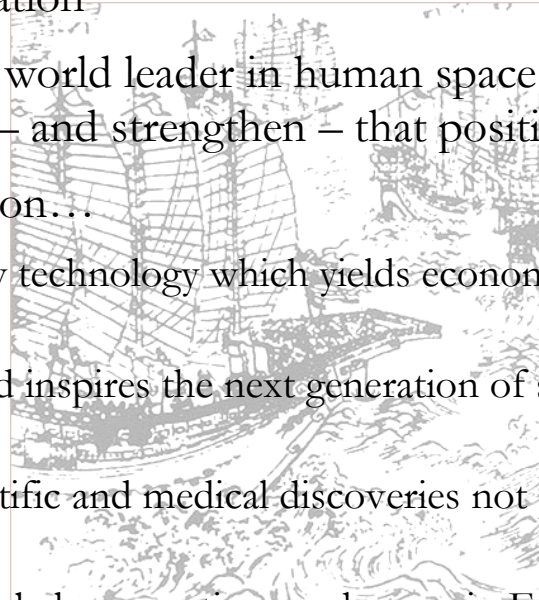
- Independent, nonprofit 501(c)(3) organization dedicated to the permanent settlement of space
  - **OUR VISION: People living and working in thriving communities beyond the Earth**
  - **OUR MISSION: To promote social, economic, technological, and political change, to advance the day when humans will live and work in space**
- More than 20,000 members and 50 chapters throughout the world, including the U.S., Canada, Mexico, Australia, Germany, the United Kingdom, Ireland, Brazil, France, Spain, Turkey, Japan, and Israel
- Preceded by the National Space Institute (NSI), which was established by Wernher von Braun, and the L5 Society, both of which were formed in 1974; NSI and L5 merged in 1987 to form the National Space Society



# Why Explore Space?



- Historically, societies that have pushed their frontiers outward have prospered
- Exploration inspires society and helps establish long-term goals for our nation
- The U.S. is the world leader in human space exploration and must maintain – and strengthen – that position
- Space exploration...
  - ...develops new technology which yields economic and scientific benefits
  - ...motivates and inspires the next generation of scientists and engineers
  - ...enables scientific and medical discoveries not possible in Earth's gravity
  - ...provides a global perspective on changes in Earth's environment and resources
  - ...is a small investment in our future — less than 7/10th of 1% of the federal budget is allocated for NASA's efforts





# Humans & Robots

- Any balanced space exploration and development effort uses both
  - Robots can explore destinations which are too remote or hostile for humans and obtain the scientific information necessary for human missions—however, humans will far surpass the capabilities of robots for the foreseeable future
  - For example, despite advances in robotic technology, we still send researchers today to Antarctica, the depths of the ocean, and other hostile environments here on Earth
- The mobility, dexterity, intellect, reaction time, situational awareness, and observations of human explorers will always surpass the capabilities of robotic or automated probes, even those remotely operated by humans – if robots could replace humans, scientific laboratories on Earth would not be staffed by people
- Human exploration is critical to lay the groundwork for a permanent presence in space





# Commitment to Exploration



- Each and every time we have lost brave space explorers, the colleagues and families of those who were lost are the first to proclaim the importance of continuing our quest to open the frontiers of space
- True exploration and expansion of frontiers have always included risk and loss of life — and it always will...
- ...but the individuals who risk their lives today remain committed to exploring

*“Although we grieve deeply, as do the families of Apollo 1 and Challenger before us, the bold exploration of space must go on. Once the root cause of this tragedy is found and corrected, the legacy of Columbia must carry on—for the benefit of our children and yours.”*

— The families of the Space Shuttle Columbia crew





# Guiding Principles

- The U.S. should strengthen its leadership in human space exploration by building on the principles in the 1988 National Space Policy and direct federal departments and agencies to permanently open the space frontier to enable the U.S. and humanity to receive the enormous benefits from the exploration, development, and settlement of space
- Low cost, robust, and reliable access to space is the single largest barrier to further advancement in space exploration and development
- A significant federal role will continue be critical in the exploration and development of space – but the federal government, especially NASA, needs to be a reliable customer for the private sector and should solicit, encourage and foster free market solutions and entrepreneurs where feasible





# Policy Priorities

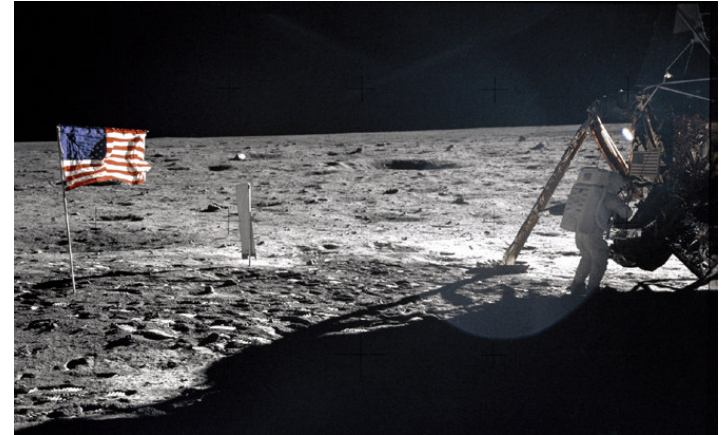


- ✓ **Increase overall NASA funding** to meet existing and new priorities
- ✓ **Return the Space Shuttle to Flight** to complete the International Space Station (ISS) and service the Hubble Space Telescope
- ✓ **Fully fund and complete the International Space Station** through “International Partner Complete” and maximize the ISS crew complement to realize its full scientific research capacity
- ✓ Build the **Orbital Space Plane** on an accelerated schedule using available technology – the right design can be used not only to complement the Space Shuttle in supporting ISS but also for future exploration missions beyond LEO
- ✓ Create guidelines to foster and appropriately regulate the emerging **suborbital launch industry** and provide statutory direction to the FAA on an overall regulatory framework
- ✓ Continue funding for the **Alternate Access to Station** program



# Policy Priorities (continued)

- ✓ Develop a **long-term space exploration architecture** to provide a clear direction for the future, including a **return to the Moon (this time to stay) and beyond**
- ✓ Support **Project Prometheus** to fund the development of advanced propulsion and power systems
- ✓ Fund a **next generation technology launch system** – using a partnership of NASA, DoD, and the private sector – to continue the research and technology developments required to replace the Space Shuttle and current ELVs
- ✓ The **Department of Defense** should be assigned the task of developing protections for American space assets and the nation from terrestrial and extra-terrestrial threats, including orbital debris and Earth-crossing asteroids and comets.







# Need More Information?

## **BRIAN CHASE**

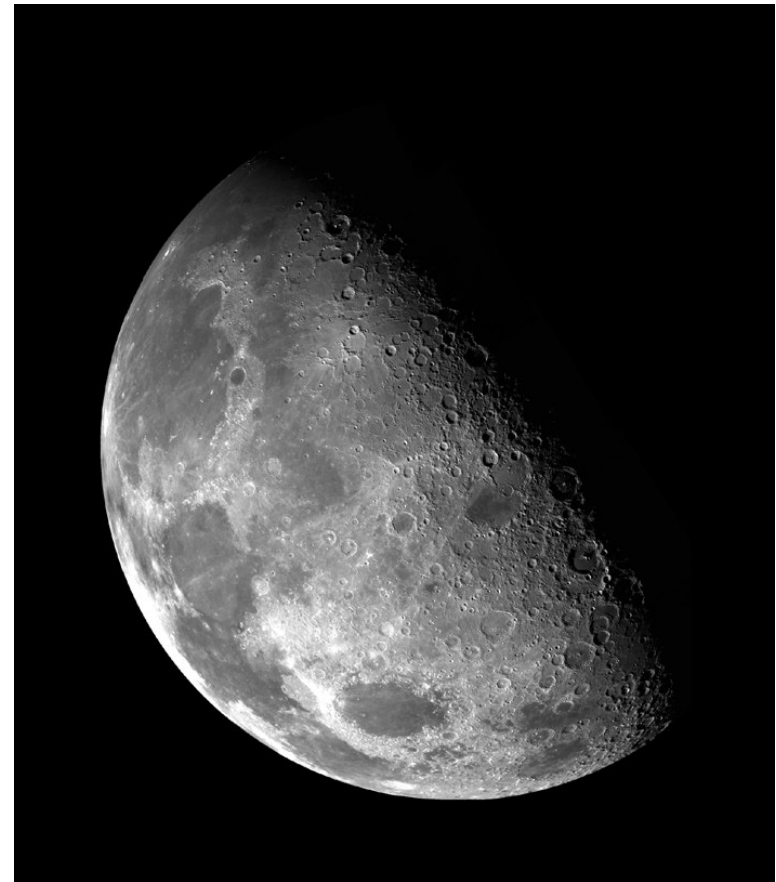
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# BACKGROUND INFORMATION

*Orbital Space Plane: How We Got Here*

*From SLI to OSP*

*Why Orbital Space Plane?*

*A New Market: Suborbital*

*Suborbital Recommendations*

*The Moon*



# OSP: How We Got Here

- Multiple efforts have been undertaken in the last 20 years to partially or fully replace the Space Shuttle, but all have ended in failure or funding was curtailed
  - National AeroSpace Plane (NASP)
  - Advanced Launch System (ALS)
  - National Launch System (ALS)
  - X-33/VentureStar
  - Space Launch Initiative (SLI)
- What went wrong?
  - Each program relied heavily on the development of advanced technology in multiple systems
  - NASA and/or the DoD had unrealistic funding estimates
  - Most of the programs relied on emerging or speculative commercial markets
  - Most of the programs were designed from the outset as wholesale replacements for the Space Shuttle, rather than building vehicles with incremental improvements
- As a result of these programs, Space Shuttle funding was repeatedly compromised and there was a lack of long-term planning for its future



# From SLI to OSP

- In 2002, as the SLI program was undergoing a major assessment, NASA recognized the need for an incremental approach to developing new launch systems and restructured SLI, with Orbital Space Plane (OSP) as the centerpiece
  - 2<sup>nd</sup> Generation RLV Program cancelled
  - Focus is on an ISS crew transport vehicle (Orbital Space Plane)
  - Existing EELV (Delta IV and Atlas V) used as the booster for OSP
  - Shuttle will continue to fly in parallel with OSP for some period of time
  - Continued funding for breakthrough technology via the Next Generation Launch Technology (NGLT) program
- Multiple OSP designs are being considered, including derivatives of the tried and proven Apollo capsules



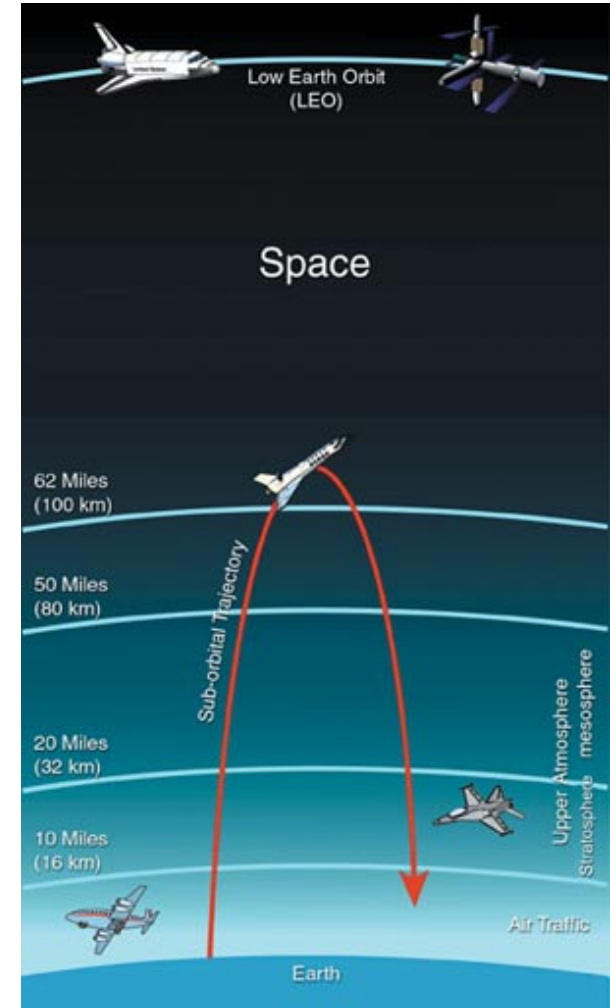
# Why Orbital Space Plane?

- Relies on available – not cutting edge – technology which lowers the risk, is more affordable, and enables a vehicle to be fielded sooner
- Work will continue on advanced technologies which promise lower costs and increased reliability in the longer term
- Leverages the EELV boosters already paid for by DoD and industry, which increases the demand for EELVs
- OSP is tightly coupled to Shuttle and ISS
- OSP flight rate and, hence, costs are not based upon future commercial demand
- OSP will serve as the ISS “lifeboat” thus reducing reliance on the Russian Soyuz vehicle
- Depending on the final design, OSP can be used as the building block for future launch systems, as well as future exploration missions beyond LEO



# A New Market: Suborbital

- Potential suborbital markets include space tourism, commercial imaging, film & television, microgravity and atmospheric research, and national security
- Unmanned suborbital launches occur today, but manned suborbital launches using reusable launch vehicles (such as the X-Prize competition) offer an entirely new potential for dramatic growth
- Given the large number of domestic companies pursuing suborbital launches, and the strong growth potential for this emerging market, it is in the best interest of the United States to encourage and foster this industry.





# Suborbital Recommendations



- Without clear regulatory direction, private investment in (and therefore rapid progress by) this nascent industry will be impeded, and ultimately suborbital launch industries will likely emerge abroad and leave the U.S. with little or no presence in this potential high-growth market
- The suborbital launch industry needs structured, pro-growth federal regulations to ensure stability
  - Provide a statutory definition for “suborbital rocket” and “suborbital trajectory” to clarify that FAA AST has sole regulatory authority over this industry
  - Develop an innovative, flexible regulatory regime that reflects the unique characteristics and performance of suborbital vehicles while also recognizing the tremendous economic and national security potential for the market
  - Provide assistance to companies in meeting FAA mandated liability insurance requirements



# The Moon...



- ...possesses a unique environment for cutting edge physics, biological research, and astronomical observation.
- ...contains a wide range of raw materials (such as Helium 3, silicon, aluminum, and titanium) that could demonstrate the use of lunar resources to lower the cost of deep space exploration.
- ...has regolith from which oxygen can be extracted (a technique proven with Apollo lunar samples), and sources of hydrogen that, together, can be used as an early source of air, water, and fuel.
- ...and its resources could be used for power generation for either terrestrial or lunar use.

