

Special Topic: Space

The Promise and Potential of Space

Over the past 60 years, the United States has emerged as the global leader in space exploration and, in doing so, has developed technologies with resounding global benefits. From the now-ubiquitous Global Positioning System (GPS), to advanced communications satellites that help bridge the digital divide, to accurate weather forecasting and warning, to technology and health innovations resulting from decades of human spaceflight and microgravity research, space technology has transformed the way billions of people live and work.

The United States' current leadership position across the national security, civil and commercial space arenas was not a given. It was earned through significant and sustained financial and political investments by the U.S. government and industry since the earliest days of the space age. Those investments paid off, not only in a string of unprecedented achievements that helped cement America's role as a global leader in innovation but also in smart, visionary policy decisions that laid the foundation for a thriving and entrepreneurial U.S. space industry.

Today, the roughly \$350 billion that makes up the global space economy is driven by opportunities in both the government and commercial arenas.¹ Government investments have served as a major catalyst, and significant continued growth is expected from the next generation of space-based services, including advanced satellite broadband technologies and services and the complex positioning and timing networks essential to the banking, transportation, energy exploration and delivery sectors. Commercial services are playing a growing role in the global space economy, and additional opportunities for commercial endeavors may include crew and cargo transport, space platforms, and usage of space resources.

The State of the Space Innovation Landscape

Even as global competition ramps up, the United States remains in a strategically advantageous position for innovation in space through strong federal investments from the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the Office of Space Commerce and the

Department of Defense. Stability in purpose and investment in these efforts enables the United States to lead the human exploration of deep space with the development of the Space Launch System and the Orion spacecraft—which will return astronauts to the moon and carry them farther into deep space than ever before—even as international competitors set their sights on similar capabilities. The country's steadfast commitment to investing in space technology supports the continued operation of the International Space Station through at least 2030, as well as innovations that span commercial and government missions, including the growing U.S. launch industrial base and constellations of cutting-edge satellite systems that support the warfighter, keep Americans safe and contribute to the commercial 5G ecosystem.

The global space economy is also poised to see sustained growth over the coming decades, propelled by both commercial and government engagement. Forecasts estimate that by the 2040s, the size of the space economy could more than triple, growing to the \$1 trillion to \$2 trillion range.^{2,3} Against this backdrop of growing investment and advances in space technology, many nations are actively pursuing competing systems, platforms and calculated strategies to challenge U.S. leadership in space. They are rapidly establishing or growing their national space agencies and taking steps to foster domestic space industrial base capabilities. This situation presents the United States with the opportunities that accompany a growing and competitive global market, as well as new strategic challenges.

Looking to the Future of Space

Policies that were developed in an era with a small commercial space sector and only a few international competitors need to be revisited, particularly in light of the advent of next-generation communications and on-orbit technologies, as well as other nations' strategies to weaponize and challenge U.S. leadership. U.S. policy and investments in this new era of space technology

should protect public safety, ensure safe and sustainable operations in the increasingly congested space domain, protect U.S. national security and global leadership, and encourage continued innovation and investment. Other nations have recognized the advantages the United States derives from space and are actively seeking the ability to deny those advantages. Space has become a domain that must be protected.

To meet these objectives and preserve U.S. leadership across the national security, civil and commercial space sectors, policymakers must take steps to:

- 1. Protect space capabilities.** The greatest threat to the U.S. ability to leverage space capabilities comes from those that actively seek the ability to deny the United States the use of space. U.S. policies must recognize the need to develop capabilities that keep pace and stay ahead of potential threats to the viability of U.S. space assets.
- 2. Ensure constancy of purpose and funding.** The single greatest self-imposed threat to continued U.S. leadership in space is uncertainty in funding and direction for civil and defense space programs. Agencies and businesses rely heavily on predictable funding to maintain productivity and stability throughout long-term space program life cycles. Congress and the Administration should continue to support stable funding and a policy environment that maintains a clear, long-term strategic vision while encouraging sustained investments in space technology.
- 3. Build a world-class science, technology, engineering and math (STEM) workforce.** The backbone of the U.S. space industry is the country's human capital. The United States should invest in education and workforce training programs in STEM fields, including for skilled workers and programs that support continuous learning. These programs are critically important to success and growth in high-tech industries, including the space industry.
- 4. Update and streamline the space regulatory regime.** As the space sector grows and evolves, the United States should continue to regularly streamline and update policies and regulations to remain competitive while ensuring public safety, transparency and accountability among actors in the space sector. The regulatory landscape must be predictable and reliable to avoid stranding and discouraging investments in new technologies and capabilities.

5. Lead international norms and standards for space.

Continued leadership depends on the United States both taking the lead on multinational efforts and engaging with global regulatory authorities to ensure standardized "rules of the road." These standards should drive alignment between heritage and emerging space system providers and establish best practices across the full range of space-related activities (e.g., minimizing orbital debris and ensuring the peaceful use and development of space).

6. Ensure meaningful access to the radiofrequency spectrum.

The federal government should ensure access to the radiofrequency spectrum that is key to the ability to explore and operate in space while ensuring that other priority users can continue to meet current and future needs. Given the international coverage of space systems, harmonized spectrum is critical to satellite systems' economies of scale and interoperability. Competitive space operations, particularly commercial satellite communications systems, require reliable, flexible and predictable spectrum access.

ENDNOTES

- 1 Satellite Industry Association. *2018 state of the satellite industry*. [Link]
- 2 Foust, J. (2018, July 5). A trillion-dollar space industry will require new markets. Space News. [Link]
- 3 Reports cited include forecasts from Goldman Sachs, Morgan Stanley and Bank of America Merrill Lynch. The estimates range from \$1 trillion to \$2.7 trillion in the 2040s.