



Public-Private Partnerships: Considerations for the New Space Age

Karen L. Jones, Aerospace Corporation, Center for Space Policy & Strategy

Summary

The New Space Age has arrived and with it many new opportunities will emerge to form public private partnerships (P3s), allowing commercial space companies to introduce innovation, accelerate space capabilities to market, and apply focused expertise. Likewise, the government has a central role to play, as it plans missions, implements policies, and provides regulatory oversight. Government program offices can lay the groundwork for future success by leveraging a current understanding of the evolving commercial space landscape, balancing risk and optimizing the return for the taxpayer and capturing lessons learned from past P3s.

Background

Most Americans with an awareness of public private partnerships, or “P3s”, probably think of them in terms of toll roads and other components of traditional public infrastructure. However, innovative partnerships, drawing upon the strengths of both government and commercial companies, can address a broad range of sectors, including space. This variety helps explain why P3s have no single, widely accepted recipe for success. In considering their applicability to space development, planners should be mindful of the mixed record of P3s. It is wise to first ask whether a P3 is even appropriate. Ultimately a P3 arrangement is between a public sector partner and a private sector company to deliver a collective good. It could be a product, capability, or service. Both public and private parties must have “skin in the game” and share in the risk.

Both sides must contribute to a “win/win”. Government seeks a public good at reasonable cost, schedule, and/or better quality than if they were to do it themselves. And industry seeks profits.

Bridging the Translational Research Gap

The pharmaceutical industry is a fitting role model for nontraditional P3s focused on innovation rather than infrastructure development. Drug makers are often challenged with bridging the gap between basic research and a formal drug development process. The commercial pharmaceutical industry can partner with government and use P3s to reduce “the journey from discovery to development” and to bridge the “translational research gap.”¹ Ironically, the 1960s television series Star Trek popularized the term “warp speed”, so it seems only fitting that Operation Warp Speed might one day provide inspiration for a future space P3 that will need to harness market velocity fueled by the commercial sector and financial commitment from government.

Operation Warp Speed (OWS) is an example of how a P3 can be used by government to quickly respond. OWS facilitated the development of two effective vaccines from U.S.-based pharmaceutical companies, which were subsequently mass-produced and distributed by December 2020. The arrangement allows for private companies to lead the science and manufacturing while obligating the U.S. government to purchase vaccine doses.

“One of the most ingenious functions of

OWS was the implementation of a funding mechanism which allowed for government intervention and adherence to FDA guidelines without threatening the autonomy and ingenuity of the pharmaceutical companies.” —Julie A. Bargo, “Operation Warp Speed: A Template for Successful Public/Private,” PA Times, March 15, 2021.

The Space Act

The National Aeronautics and Space Act, referred to as “the Space Act” was signed into law by President Eisenhower in 1958. The Space Act authorizes NASA to “... enter into and perform ... other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate...” to accomplish its mission.² This “other transaction authority” (OTA) provides NASA with the ability to enter into public private partnerships through legally binding agreements for the purpose of carrying out research projects that meet the stipulations set forth in two sections of the law.³ Research partnerships between commercial space and government is flourishing across a range of government organizations, a few examples:

- NASA’s small business innovation research (SBIR) funding
- NASA’s Space Technology Mission Directorate “Tipping Point” solicitations seek to reduce development cost of space technologies and accelerate the infusion of emerging commercial capabilities, with commercial companies providing expertise, facilities, hardware and software at no cost.
- Defense Innovation Unit “Outpost” – leveraging commercial unmanned

orbital outpost prototype designs.

Providing Space Infrastructure for Broader Commercialization. A workshop during 2019 sponsored by the Defense Innovation Unit (DIU) and Air Force Research Laboratory (AFRL) addressed challenges and threats to the U.S. space industrial base and U.S. dominance of space suggesting that the National Space Council institute an interagency and commercial working group to:

“explore public-private partnerships to invest in space infrastructure that would ensure U.S. leadership in the growth of future space-enabled economic engines such as smart cities, connected logistics, precision agriculture, autonomous vehicles, and others.”⁴

The “economic engine” rationale is not new. P3s were applied during the late 19th century to build railway infrastructure which revolutionized the U.S. economy and provided a transformative shift in terms of GDP growth and possibly an even more important psychological catalyst to move west to build and invest in the U.S. economy.⁵

P3 - Key Elements and Goals

“P3s have several common elements, including leveraging the strengths of the public and private sectors, appropriate risk transfer, transparent and flexible contracts and alignment of policy goals.”

—Findings and Recommendations of the Special Panel on Public-Private Partnerships, Committee on Transportation & Infrastructure, U.S. House of Representatives, January 2014

P3s are often used interchangeably with traditional private sector procurement

contracts, causing many in both the public and private sector to confuse the issues. The key elements of a P3 model are different from a traditional project delivery model in the following ways:

- **Funding:** Public funds are not dispersed at outset. Instead, a P3 entity receives periodic payments based upon reaching specific milestones or a contractual formula.
- **Duration:** P3s often extend beyond construction or deployment and often include operations and maintenance.
- **Output vs. Input:** P3s are based upon output or performance. By contrast, a traditional procurement describes the exact “inputs” (a product or service) that will be purchased.
- **Risk Allocation:** Traditional procurement risk is borne by the public sector. P3s, on the other hand, offer a way for more risk to be allocated to the private sector.

When a public sector entity considers whether to pursue a P3 arrangement, they should first explore their strategy and goals. Typically, P3s are pursued for the following reasons:

- **Efficiency Gains.** Improve operations management and leverage the profit driven efficiencies that the private sector offers in terms of schedule, costs and experience. Government agencies often seek out private sector efficiencies to support space-based navigation, imaging, communications and weather services.
- **Reduce Life Cycle Costs.** Seek the lowest cost alternatives over the lifecycle of an asset. Attain Value for

Money (VfM)

- **Transfer Risks.** Operational and project execution risks are transferred from the government to the private sector which is often better able to contain costs and manage key milestones on schedule.
- **Create Additional Revenue Streams.** The private sector has the ability to create additional revenue streams from unique government assets such as space-based infrastructure, services, or data. For instance a private sector company, such as Accuweather, repackages large amounts of National Weather Service (NWS) weather data and adds value-added services and analytics for a fee to the private sector. Another example is the potential for launch providers to use their same launch vehicles that might serve NASA missions to carry tourists to space. A productive co-existence is possible between private sector profit interests and public sector mission needs.

In addition to the above four benefits which are applicable to almost any industrial sector, the space sector recognizes the importance of P3s to meet certain strategic space imperatives:

- **Innovation and Technology “Spin-Ins”** – Government recognizes that there is value in P3 structures for encouraging innovation and “spinning in” new technology. NASA partnered with eight U.S. companies to advance small spacecraft and launch vehicle technologies that are on “the verge of maturation”. The result were fixed-priced contracts requiring a minimum 25 percent industry contribution and

milestone payments tied to technical progress.⁶

- Alignment with Space Policy Goals – The National Space Policy of 2010⁷ encourages the use of P3s to promote a “robust commercial space industry.” NASA is now encouraging entrepreneurship, catalyzing commercial space development, strengthening the U.S. space industrial base through public private partnerships.

range of risk and participation between the public and private sector. Various types of cooperative grants, Space Act Agreements, and long-term development agreements have the potential to “spin-off” additional revenue streams for the commercial sector. This may also include sharing or assigning intellectual property or data rights to the private sector for further capitalization.

Conclusion

The space economy, once the sole domain of wealthy countries, has rapidly transitioned to a complex ecosystem of public and private entities. Along the way, government and commercial sectors have learned by doing, recognizing and incorporating key successes and lessons learned from other industries and past partnerships. Stakeholders must sort

P3 Project Delivery Models

Figure 1 illustrates a notional range of project delivery models from private sector design to full privatization. The y-axis represents the level of private sector risk and equity that a commercial P3 partner might assume. The x-axis

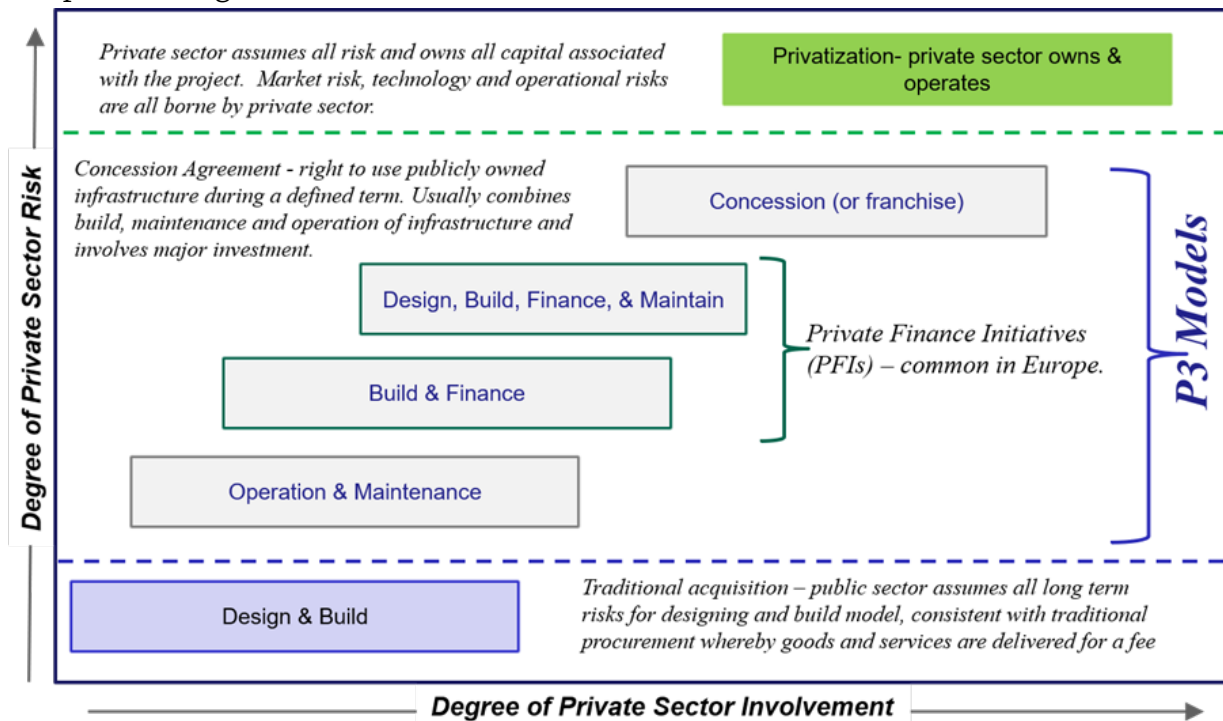


Figure 1: Traditional Public Infrastructure Sector (Source: K.L. Jones with adaptation from Canadian Council for Public Private Partnerships)

represents the level of government involvement. Figure 2 illustrates the fluid

through a myriad of complexities, conflicts, and contingencies to shape an acceptable

agreement. Most stakeholders recognize that this process is more art than science. Yet there is potential to achieve greater efficiency without sacrificing transparency and accountability by utilizing a decision framework supported by a broad understanding of past experiences in multiple sectors.

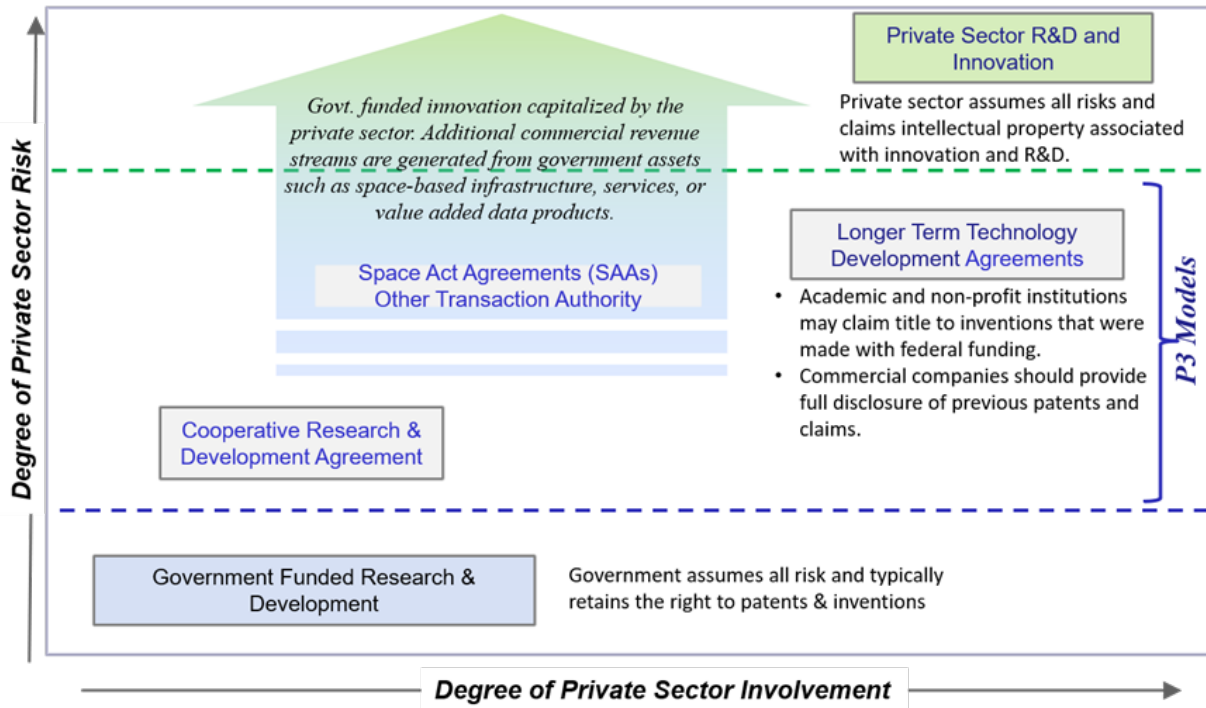


Figure 2: Space Sector P3 Delivery Models

This article was drafted for a workshop at Perry World House, the University of Pennsylvania’s global affairs hub. The workshop was made possible in part by the generous support of Carnegie Corporation of New York. The statements made and views expressed are solely the responsibility of the author.

Endnotes

- 1 Simon L. Croft, “Public-private partnership: From there to here,” June 2005. https://dndi.org/wp-content/uploads/2005/10/croft_sl_trstmh260.pdf.
- 2 51 U.S. Code § 20113. Powers of the Administration in performance of functions; <https://www.law.cornell.edu/uscode/text/51/20113>.
- 3 Other Transaction Agreement 101, Advanced Technology International
- 4 Dr. Thomas Cooley, Colonel Eric Felt, Colonel Steven J Butow, “State of the Space Industrial Base: Threats, Challenges and Actions,” May 30, 2019.
- 5 Richard Hornbeck, V. Duane Rath, Martin Totenberg, Becker Friedman Institute, University of Chicago, Working Paper No. 2019-146, “Railroads, Reallocation, and the Rise of American Manufacturing,” 2019.
- 6 NASA; Source Selection Statement, Appendix H: Human Landing System, Option A Next Space Technologies for Exploration Partnerships-2 (NextSTEP-2) NNH19ZCQ001K_APPENDIX-H-HLS, April 16, 2021, <https://www.nasa.gov/press-release/nasa-establishes-new-public-private-partnerships-to-advance-us-commercial-space>.
- 7 Barack Obama, “National Space Policy of the United States of America,” June 28, 2010.