ARC ARISE FEASIBILITY STUDY

KEYSTONE SPACE COLLABORATIVE

Prepared for the Appalachian Regional Commission

MAY 2024

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EXECUTIVE SUMMARY

The Keystone Space Collaborative was founded in 2021 by a group of space industry leaders in the Tri-State region of Ohio, Pennsylvania, and West Virginia to capitalize on the area's space industry capabilities and foster economic growth. Recognizing the potential beyond traditional U.S. city or state space hubs, Keystone Space aims to position the Tri-State as a leader in the global space market. Through its Four Pillars - Industry, Workforce Development, Research and Development, and Advocacy - Keystone Space focuses on attracting businesses, developing talent, fostering research partnerships, and promoting the region's space industry strengths. Led by a diverse leadership team, including a Program Director and a Board of Directors with expertise spanning various industries, Keystone Space has achieved significant milestones, including hosting successful Annual Conferences, facilitating industry roundtables, and launching initiatives like the Keystone Space Innovation Challenge and the Keystone Space and Defense Innovation District. Supported by grants and regional partners, Keystone Space is well-positioned to pursue an ARC ARISE implementation grant, aiming to further catalyze economic growth in the Tri-State's space industry.

Building on the success of its "Ready to Launch" campaign, Keystone Space engaged stakeholders across the region to align priorities and define an approach to an ARC ARISE implementation award, emphasizing economic development in Appalachian communities and regional collaboration. Through initiatives like "Liftoff Appalachia," Keystone Space aims to elevate the Tri-State region as a leader in the $1 trillion global commercial space industry by fostering regional collaboration and economic growth in Appalachian communities, and laying the foundation for a comprehensive regional strategy aligned with national priorities. Specifically, Keystone space will achieve this by leveraging regional strengths, developing workforce capabilities, fostering innovation, convening strategic partners, launching thematic consortia, and delivering programs to support the space ecosystem across the Appalachian counties in the Tri-State.

The Feasibility Study presents a strategic roadmap for Keystone Space to lead the region towards becoming a hub for commercial space innovation and economic growth. Aligned with the conclusions of the Feasibility Study, Keystone Space is prepared to implement an organizational and programmatic strategy focused on unlocking the economic potential of the Appalachian counties within the Tri-State. Securing an ARC ARISE grant would be instrumental in ensuring the operational sustainability of Keystone Space, enabling the development of a comprehensive regional space economic strategy, and facilitating programming aimed at nurturing and attracting space talent and opportunities to the region. Ultimately, this initiative aims to foster greater cohesion, engagement, and support within the Appalachian and Tri-State space ecosystem, paving the way for enduring economic prosperity and societal impact.

SECTION ZERO
INTRODUCTION

0.1 Background and Origins

In 2020, a group of space professionals from Pittsburgh convened to highlight notable space industry work occurring in Pittsburgh and the surrounding area, and to consider Pittsburgh's place within the projected $1 trillion global space market. The result of that meeting, which included an early volunteer-led assessment of the space ecosystem in the Pittsburgh area, led to the formal establishment of the Keystone Space Collaborative in 2021.

The early research showed that Allegheny, Butler, and Beaver Counties boasted over 100 companies participating in the global space economy as primes or subcontractors to NASA or DOD-funded space-relevant projects. The original hypothesis of the Keystone Space Collaborative was that not only Pittsburgh but also the surrounding region (initially including Ohio, Pennsylvania, and West Virginia) shared certain competitive attributes. These included a shared history of university-driven space-relevant R&D, manufacturing, materials innovation, and technology development; several key "nodes" of strategic economic development. This in addition to the fact that it was home to a diverse ecosystem of space researchers, commercial space companies, and space-adjacent suppliers. What was missing was a commercial space industry-focused regional voice – a voice that could identify, coalesce, and grow the burgeoning space industry across the Tri-State, and communicate and amplify the work both within and outside the region, with the goal of driving strategic support, funding, and additional commercial opportunities. The Keystone Space Collaborative was formed to address this gap and to serve as the regional voice of the commercial space industry across the Tri-State.

0.2 Goals of the Feasibility Study

The goal of this Feasibility Study is to describe the work of the Keystone Space Collaborative to-date, to test its regional hypothesis, and to explore the economic development opportunities that the Keystone Space Collaborative has already initiated, and those it can contribute to the Tri-State broadly (and to the Appalachian Region within the Tri-State specifically).

This Feasibility Study describes the Keystone Space Collaborative as an organization, including its team as well as its mission and vision, and its region focused programs and work product. This includes its well-attended Annual Conference, its Regional Ecosystem Map and Industry reports, and its regional programming and events, all designed to drive economic growth by focusing on 4 core Pillars – Industry growth, Research and Development activity, Workforce Development activation, and Advocacy support across the Tri-State. These assets serve as a foundation for understanding how the Appalachian counties within the Tri-State participate within the space ecosystem as a whole, and where opportunities might exist for further growth across the 4 Pillars.

Finally, the Feasibility Study is intended to serve as an action plan for the future. The Feasibility Study evaluates the strength, weaknesses, opportunities, and threats of the Tri-State region through the lens of the global space economy, with the goal of identifying an action plan that can generate measurable economic impact for its Tri-State communities within the Appalachian region while elevating the Tri-State as a recognized space region and positioning the Tri-State for a competitive future (particularly when evaluated against other space regions across the United States).

The Feasibility Study will form the critical basis upon which the Keystone Space Collaborative will develop its programming and application for the ARC ARISE opportunity to unleash the space economy potential of the Tri-State region to serve the Appalachian communities within it.

SECTION ONE

ORGANIZATIONAL HISTORY AND ACCOMPLISHMENTS

1.1 Formation

The Keystone Space Collaborative was founded in 2021 by a multidisciplinary group of space industry leaders in the Ohio, Pennsylvania, and West Virginia (Tri-State) region to address a previously unmet need – to harness the historical and existing space industry capabilities of the Tri-State. The aim is to acknowledge and amplify the region's identity as a new space region with capabilities critical to supporting national and global space objectives. Simultaneously, the initiative seeks to develop and grow an innovative and sustainable regional space industry ecosystem, thereby spurring economic growth and job creation in the region.

Nationally recognized geographic centers of space industry activity within the United States have become specialized, focusing on the execution of particular aspects of a given mission (e.g., Florida as a launch site, Texas as a center for human spaceflight expertise, and Colorado for satellite development). Consequently, the economic benefits accompanying a thriving space industry and attendant federal investments are limited to discrete geographic areas. While this may serve the discrete geographic area (typically, a state or city), local specialization becomes entrenched in a self-perpetuating cycle based on the incentives of institutional knowledge and economic efficiency from existing infrastructure, thereby foreclosing opportunities to draw on strengths and capabilities from neighboring communities and regions. The United States, with its history of space-faring leadership and execution, and with its wealth of innovative potential, must leverage a larger technical infrastructure and talent base for achieving its overarching civil, commercial, and national security-related space ambitions. Failure to think outside of currently recognized space geographies (i.e., FL, TX, AL, CO, CA) results in missed opportunities, which could have untold economic and scientific costs for future national economic advancement.

These are the cycles and gaps recognized by Keystone Space's leadership, which established Keystone Space as a unique space industry collaborative with a mission to support and serve the growing space industry in the Tri-State and to attract and expand the next generation of space industry businesses and talent. Keystone Space's founders identified a substantial, if uncoordinated and decentralized, hub of space industry innovation in the region which could assist the United States in leveraging innovative and perhaps heretofore underrecognized capabilities outside of the traditional centers of space industry. Symbiotically, the Tri-State would be able to realize the resultant economic benefits in its development into a nationally and globally recognized space industry participant. As a 501(c)3 nonprofit organization, Keystone Space is leading a cohesive Tri-State approach to addressing American space challenges by positioning the Tri-State as a global leader in space excellence with respect to engineering, research and development, workforce, and educational opportunities. The end-goal for Keystone Space is to be a self-propelling, space-centric economic enabler for the Tri-State region around strategic areas of strength that define the Tri-State region to date.

1.2 Mission Statement

The Keystone Space Collaborative is a nonprofit organization with a mission to support and serve the Tri-State region's (Ohio, Pennsylvania, West Virginia) growing space industry, and to attract and expand the next generation of space industry businesses and talent in the region.

With its distinctive characteristics, the Tri-State region is well positioned to emerge as a national leader in the burgeoning in-space commercial marketplace. Central to this potential are several key areas of focus, including the advancement of commercial space technology, pioneering endeavors in in-space manufacturing and technology demonstrations, groundbreaking research in material science within microgravity environments, the facilitation of scientific experiments uniquely reliant on or enhanced by microgravity conditions, and the exploration of life science and bioscience innovations within the realm of space.

1.3 Four Core Pillars

To better articulate its mission and outline critical areas of focus in its strategic planning, Keystone Space adopted a set of core operating principles in furtherance of its goal of developing a sustainable Tri-State approach to commercial, space-related economic growth. These core operating principles are the Four Pillars of Keystone Space: Industry, Workforce Development, Research and Development, and Advocacy and guide the organization's performance of its mission:

- **Industry**
  Create, amplify, grow, and attract space-related business and funding opportunities within the region and to the region.
- **Workforce Development**
  Develop and keep high-level talent within the region by building awareness about and facilitating access to space-related employment opportunities and supporting overall space-related job growth in the region.
- **Research and Development**
  Build strategic partnerships between industry, government, and secondary education institutions to bolster space-relevant research and development in the region.
- **Advocacy**
  Position the Tri State as a nationally and internationally recognized space region by identifying and promoting space-related regional activities and strengths to internal and external stakeholders and developing a regional strategy for advancing the space industry.

1.4 Leadership Team

The leadership team of Keystone Space has been instrumental in architecting and steering its development as an innovative leader in the region's space economy. Leadership of Keystone Space is the responsibility of a full-time Program Director who oversees day-to-day operations and strategic growth initiatives, and a Board of Directors, comprised of a volunteer working group of the founding members of the organization and space industry leaders.

The Keystone Space Leadership team brings together a group of accomplished professionals with diverse expertise. Zoë Karabinus, Program Director, specializes in strategic planning and program management, boasting a portfolio spanning both aerospace and aviation industries. Justine Kasznica, Board Chair and Founder, serves as a technology and corporate attorney at Babst Calland, where she leads the Emerging Technologies group and provides legal and regulatory support to clients in a wide variety of technology sectors, including autonomous mobility and commercial space sectors. Bryan Muzyka, Board Vice Chair, who serves as a sales and marketing leader at Advanced Cooling Technologies, Inc., and leads business development teams across diverse industries including space and energy. Bernie McShea, Board Treasurer and Founder, leads the McShea Group LLC, consults on space industry and regional economic development matters, leveraging a career with Space Florida prior to his relocation back to the Tri State region. Jeremiah Leiter, Board Secretary, CEO of Acoustic Research Systems, Inc., specializes in providing acoustic environment testing solutions for aerospace applications, emphasizing steady, sustainable growth and customer-centric ventures. Dr. Jonathan Volk, Founder, Business Development Director for ZIN Technologies, brings over a decade of experience in the commercial space industry, in particular focusing on LEO economic development. Dr. John M. Horack, Neil Armstrong Chair in Aerospace Policy at The Ohio State University, is a globally-recognized leader in space-based research and policy, with significant academic, space industry and NASA experience. Michael Johanson, Senior Vice President at ZIN Technologies, brings 30 years of experience in engineering, operations, and strategic planning.

The combined expertise of the leadership team across various industries both reflects the wide variety of stakeholders in the regional space economy and provides a deep well of diverse experiences and viewpoints to serve as strategic and supervisory guidance in the performance of Keystone Space's mission.

1.5 Achievements to Date

In the three years since its formation, with a determined team of one full-time employee and seven working board members, Keystone Space has expeditiously launched and successfully piloted a number of initiatives.

The 2022 and 2023 Keystone Space Annual Conferences gathered hundreds of regional and national commercial space industry stakeholders to celebrate and amplify the Tri-State region's impact, collaborate on national challenges, and envision how the Tri-State can contribute to solving these challenges. The conferences provided a venue for industry, academic, and government speakers and attendees to collaborate on ways to build on the region's strengths and create opportunities for the Tri-State to emerge as a leader in the global space ecosystem. The strong and increasing turnout and the caliber of speakers and attendees alike, including local and national leaders and industry and institutional leaders, speak to the continued need for a central forum to connect regional space industry stakeholders that Keystone Space addresses as a leader and collaborator.

Keystone Space regularly hosts virtual industry roundtables where regional space stakeholders convene to discuss macro-level space economic and policy trends, fostering regional ties and incubating ideas. These roundtables strengthen relationships forged at the organization's annual conferences and facilitate mutually beneficial engagements across the Tri-State, positioning Keystone Space as a trusted facilitator and host.

The Keystone Space Innovation Challenge, a collaborative initiative between Keystone Space, Innovation Works, and supported by Pennsylvania's Ben Franklin Technology Development Authority (BFTDA), aims to propel regional entrepreneurs into the forefront of the global space economy. This challenge serves as a platform to educate and train aspiring entrepreneurs, offering them opportunities to tap into the burgeoning space industry. With a focus on providing crucial support, funding, and fostering innovation in space-related ventures, the challenge also emphasizes collaboration with industry partners to catalyze growth and development in the Tri-State region's space sector.

Keystone Space leads the creation of the Keystone Space and Defense Innovation District in Pittsburgh's North Side. It aims to foster a cluster of space and defense innovation industries, catalyzing regional economic development by linking educational, entertainment, and retail assets with surrounding communities. As part of this, Keystone Space partners with the U.S. Air Force to establish the Keystone Space Innovation Center and AFWERX/SpaceWERX Pittsburgh Innovation Hub. These, along with anchor founding member Astrobotic Technology, will form the core of the district, connecting various elements of the regional space ecosystem – innovation, academia, economic development, workforce development, and community – in Southwest Pennsylvania. Initial progress from this initiative has included securing the extension of the KIZ tax incentive program to Pittsburgh North Side. Additionally, commissioning the architectural firm Populous, in collaboration with partners such as the Carnegie Science Center, Buhl Foundation, City of Pittsburgh's Urban Redevelopment Authority, Office of the Allegheny County Executive, Astrobotic Technology, Manchester Citizens Corp, and others, to conduct a concept study. The study focuses on rejoining the Manchester and Chateau neighborhoods, separated by the development of Route 65.

Keystone Space's success is largely attributable to the strong support from regional partners and funders, including the Richard King Mellon Foundation, Hillman Family Foundation, and the Pennsylvania Department of Community and Economic Development (DCED). These entities have consistently backed Keystone Space, supporting the afore-mentioned initiatives, as well as workforce development programming, space industry development and partnerships, and the promotion of space entrepreneurship. Additionally, they sustain Keystone Space by providing financial support for its leadership team, administrative team, marketing and communications team, and digital assets.

The impact of these initiatives is recognized across the Tri-State and beyond, confirming the founder's hypothesis – that the Tri-State boasts a vibrant and diverse growing space ecosystem rooted in its history as a center for manufacturing, advanced technology, innovation, and resilience. This ecosystem is ripe for rapid acceleration with dedicated, regionally focused advocacy and support; this constitutes the raison d'être of the Keystone Space Collaborative. Its activities and programs showcase the Tri-State space ecosystem's ability to stimulate high-tech, space-related regional economic growth while materially contributing to American space leadership.

1.6 ARC Planning Grant: "Ready to Launch"

In 2022, one year after its formation, Keystone Space was awarded a $400,000 planning grant entitled "Ready to Launch" from the Appalachian Regional Commission (ARC). The two-year grant has supported the afore-mentioned Keystone Space initiatives and programs to grow the space economy and space-related workforce in the Appalachian counties of Ohio, Pennsylvania, and West Virginia. This Feasibility Study has positioned Keystone Space to apply for an ARC ARISE implementation grant, which is a core focus area of the organization in 2024 and will break open many of the opportunities and goals laid out in this Study.

The achievements of Keystone Space, coupled with the efforts of this Feasibility Study, have positioned the organization to apply for an ARC Appalachian Regional Initiative for Stronger Economies (ARISE) implementation grant. If awarded, this opportunity will enable Keystone Space to capitalize on many of the opportunities outlined in this Feasibility Study, fostering large-scale regional economic transformation through collaborative multi-state projects across Appalachia.

SECTION TWO
APPALACHIA'S SPACE POTENTIAL

2.1 History of Tri-State Space Economy

We have historically thought of space as a place to discover, explore, and test the bounds of human capability. This perspective is reflected in missions to the Moon, Mars, and deep space that have captured imaginations since the start of the Space Age. Now, in this 'New Space Age,' space is increasingly viewed as a place to visit and, perhaps one day, to live. This shift is evidenced by the recent interest in and rise of space tourism and habitation endeavors, expanding the need for research and innovation in a wide variety of fields. The space economy is also transitioning from what was once primarily a government endeavor to a rapidly growing commercial sector. Projections indicate the potential for it to become a $1 trillion global market between 2030 and 2040 (Morgan Stanley/Bank of America/Keystone Space/BryceTech).

The history of the Tri-State's presence in the space economy spans decades (Figure 1). The Tri-State has inherent, legacy capabilities that can be harnessed for new space missions, particularly within the growing commercial sector. In parallel, emerging capabilities in Appalachian communities can be engaged, energized, and utilized to play a crucial role in the new regional and global space economy. As such, with support from relevant policymakers, the region is poised to rapidly emerge as a leader in the space industry by drawing on its legacy capabilities to develop and maintain a sustainable regional space industry ecosystem.

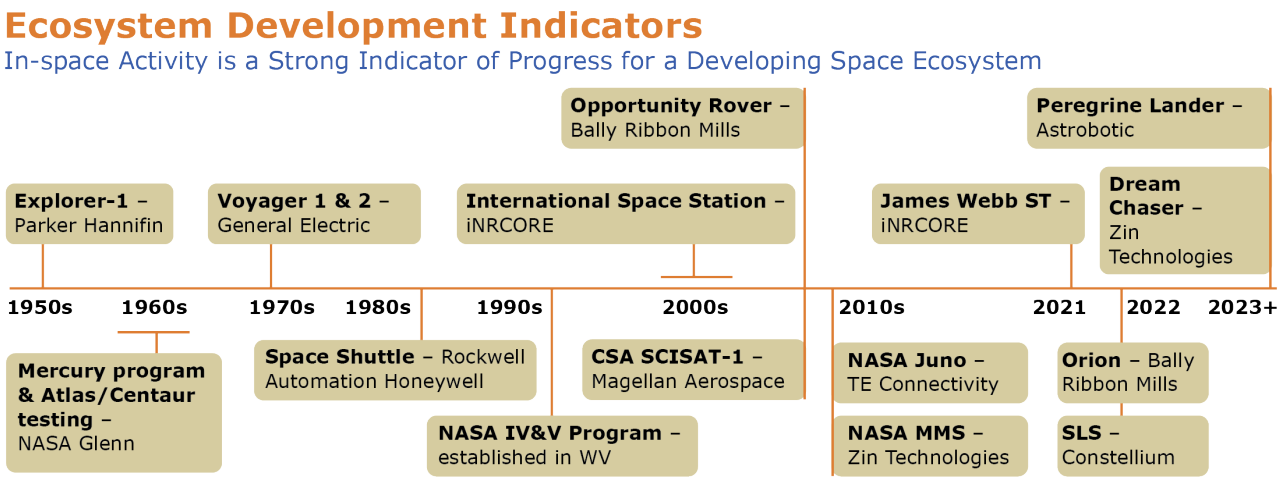

Figure 1. *History of Space Economy in the Tri-State Region (Keystone Space/ BryceTech, 2023)*

The Tri-State region shares a number of common challenges regarding aging infrastructure, drug and mental health issues, discordant educational trends, decreasing populations, and the loss of talent. Keystone Space has supported the Tri-State in its space economy goals by deploying its expertise and taking a leadership role in facilitating a more coherent, collaborative, and productive regional space ecosystem, allowing Tri-State policymakers to address other challenges facing the region.

The Tri-State continues its legacy of valuable contributions to American space efforts. As depicted in Figure 2, the Tri-State has a diverse, dynamic, and growing configuration of space ecosystem participants, with 700+ contributors across the region encompassing industry, academia, investors, and government, including military and civil participants.

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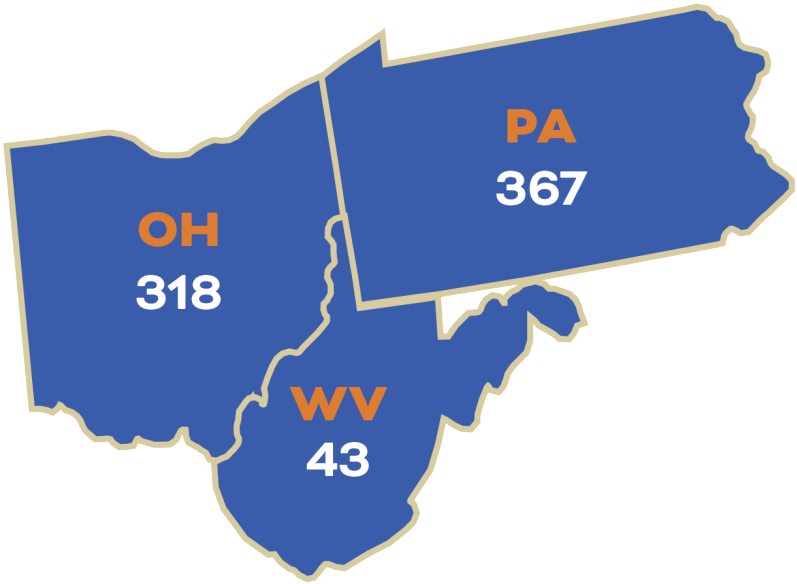


***Figure 2**. Tri-State Space Ecosystem Participants by State (Keystone Space/BryceTech, 2023)*

The Tri-State region is home to numerous innovative organizations with a focus on space, including top-ranked research universities, a significant Department of Defense presence, NASA centers, federal labs, Fortune 500 companies, and startups. Keystone Space has learned that despite the abundance of regional space organizations, ecosystem participants believe that space innovation operates in silos. There is a wealth of information and activity, yet a lack of coordination. For example, researchers in West Virginia may not be aware of the activities of the aerospace startup community in Philadelphia, PA, or an innovative component maker in the suburbs of Columbus, OH. What the Tri-State lacks is a central organization to help drive it forward and enhance the economic development of the region. As illustrated in Figure 3, if the Tri-State combined its resources, it would be comparable to all other major space economy states, excluding Virginia and California.

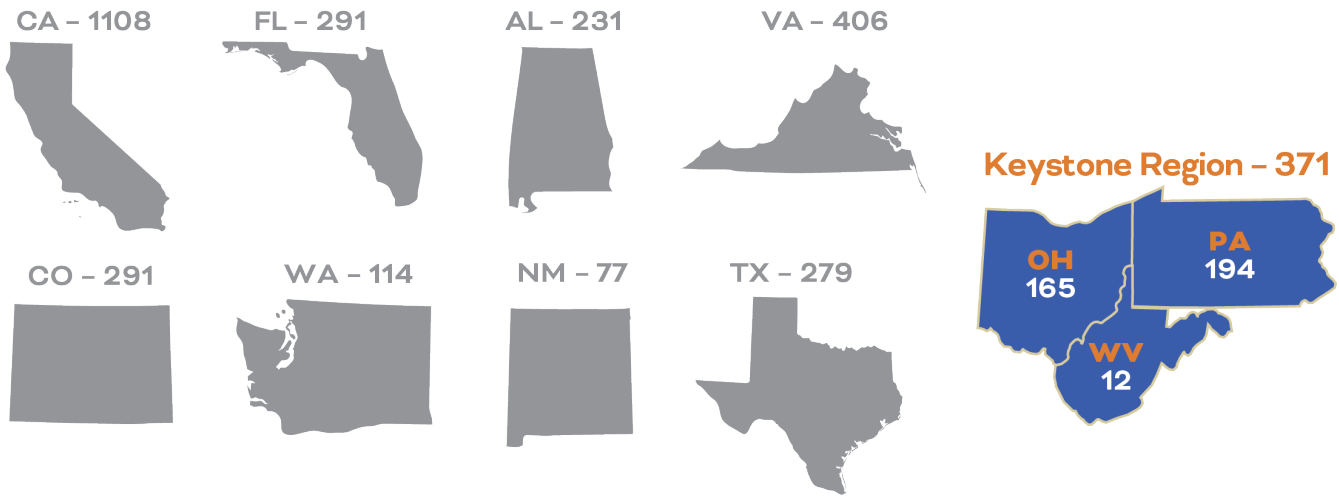


Figure 3. *State-specific Space Ecosystem Participants Compared to Combined Keystone Space States (Keystone Space/BryceTech, 2021)*

2.2 State-Supported Priorities

To better understand the region as a whole and the states' challenges and opportunities in facilitating greater regional connection, it is important to understand the needs and priorities of each of the three states.

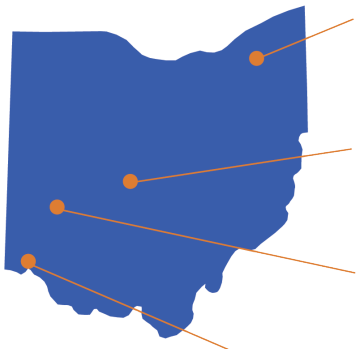
2.2.1 Ohio

Ohio is dedicated to supporting the following priorities:

- Economic Development: The state prioritizes initiatives aimed at fostering economic growth and prosperity.
- Entrepreneurship: Ohio encourages and supports entrepreneurial endeavors to drive innovation and job creation.
- STEM Workforce Strengthening: Ohio is committed to bolstering its workforce through targeted efforts in Science, Technology, Engineering, and Mathematics (STEM) education and training.

There are 32 Appalachian counties in Ohio, including: Adams, Ashtabula, Athens, Belmont, Brown, Carroll, Clermont, Columbiana, Coshocton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Mahoning, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Scioto, Trumbull, Tuscarawas, Vinton, and Washington.

Figure 4 illustrates the traditional clusters of the space economy in Ohio.



Cleveland
- Focus areas: Additive manufacturing, smart devices/systems, energy storage
- Strong aerospace cluster and groups focused on advanced materials

Columbus
- Diverse and non-traditional aerospace industry
- Strong higher education and startup presence

Dayton
- Focus areas: Aerospace R&D, IT, Health Care, Advanced Materials & Manufacturing
- Sustainable focus on water and solar

Cincinnati
- Sectors: Energy/chemicals, automotive/aerospace, logistics/distribution, food manufacturing
- Large Fortune 500 HQ and higher education presence with opportunity for aerospace curriculum

Figure 4. *Ohio Space Industry Map (Keystone Space/Space Commerce Matters 2022)*

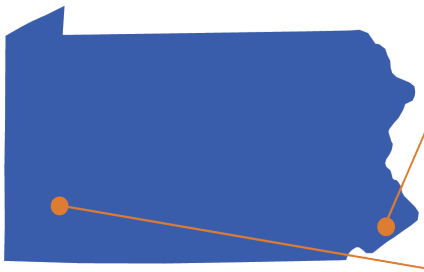
2.2.2 Pennsylvania

Pennsylvania showcases a strong commitment to several key priorities:

- Fostering Emerging Technology: Pennsylvania is dedicated to supporting the advancement of emerging technologies.
- Accelerating Tech Development: The state actively promotes the rapid development of technology through effective commercialization strategies.
- Collaboration with Higher Education: Pennsylvania engages closely with institutions of higher learning to drive innovation and talent development.

There are 52 Appalachian counties in Pennsylvania, including: Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Butler, Cambria, Cameron, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Crawford, Elk, Erie, Fayette, Forest, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lawrence, Luzerne, Lycoming, McKean, Mercer, Mifflin, Monroe, Montour, Northumberland, Perry, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Venango, Warren, Washington, Wayne, Westmoreland, and Wyoming.

The Pittsburgh and Philadelphia metropolitan areas stand out as the primary anchors driving Pennsylvania's space economy, as depicted in Figure 5. Northeastern Pennsylvania is an additional notable anchor in Pennsylvania, boasting a robust aerospace supply chain and a supportive network of partners (spearheaded by NEPA Alliance), renowned educational institutions, and a newly formed Angle Fund, positioning the region well for economic growth. Leveraging existing resources like the Department of Defense supply chain and local technical employers, Northeast Pennsylvania holds potential as a strong space industry supply activator. The active support from Northeast Pennsylvania district congressional representatives, particularly from the Chair of the Commerce-Justice-Science Subcommittee, also underscores a concerted effort to advance space initiatives in the region.



Philadelphia

- Broad industry focus including: higher education, manufacturing, oil refining, finance (VC hub) and biotechnology
- Large Fortune 500 HQ, higher education and startup accelerator presence
- Large aerospace companies located here with smaller companies manufacturing components

Pittsburgh

- Focus areas: manufacturing, technology, healthcare, robotics, AI and software
- High academic R&D spending (over 2x the national average)
- Large higher education and startup presence
- Strong supply chain industry association, philanthropic foundation, and research presence

Figure 5. *Pennsylvania Space Industry Map (Keystone Space/Space Commerce Matters, 2022)*

2.2.3 West Virginia

West Virginia is committed to supporting the following priorities:

- Economic Diversification: The state aims to diversify its economy to reduce dependence on traditional industries.
- Small Business Encouragement: West Virginia fosters an environment that supports the growth and success of small businesses.
- Workforce Development and Training: The state invests in programs and initiatives to enhance workforce skills and capabilities.
- Community Development: West Virginia focuses on building strong and resilient communities through targeted development efforts.
- Opportunities for Young People: The state seeks to provide opportunities and resources for the youth to thrive and succeed.

West Virginia, entirely encompassed within the Appalachian region, comprises 55 counties, namely: Barbour, Berkeley, Boone, Braxton, Brooke, Cabell, Calhoun, Clay, Doddridge, Fayette, Gilmer, Grant, Greenbrier, Hampshire, Hancock, Hardy, Harrison, Jackson, Jefferson, Kanawha, Lewis, Lincoln, Logan, Marion, Marshall, Mason, McDowell, Mercer, Mineral, Mingo, Monongalia, Monroe, Morgan, Nicholas, Ohio, Pendleton, Pleasants, Pocahontas, Preston, Putnam, Raleigh, Randolph, Ritchie, Roane, Summers, Taylor, Tucker, Tyler, Upshur, Wayne, Webster, Wetzel, Wirt, Wood, and Wyoming.

West Virginia is characterized as a single cluster with a rural economy and a legacy industrial focus. However, it presents abundant opportunities for reskilling towards a new space economy, as depicted in Figure 6.

Industrial base

- Strong fossil fuel energy, fine chemicals, oil and gas manufacturing and carbon fiber (reinforced plastics), Earth observation and remote sensing industries
- Philanthropic foundation and supply side thought leadership base
- Emerging areas of focus: cybersecurity and life sciences

Economic and Industry Development

- Strong activity of the tri-state with collaboration between government and private sector

Figure 6. *West Virginia Space Industry Map (Source: Keystone Space/Space Commerce Matters 2022)*

2.2.4 Tri-State Region

In the Tri-State region, Appalachian communities prioritize initiatives focusing on:

- Entrepreneurial and Business Development: ARC invests in strategies to foster the growth and success of businesses and entrepreneurs in the region.
- Education Improvement: Efforts are directed towards enhancing educational opportunities and outcomes for residents of the Tri-State area.
- Capacity Building and Skills Development: ARC facilitates the development of skills and capacities among current and future leaders and organizations, enabling them to innovate, collaborate, and drive economic development forward.

It's evident that the priorities of the Appalachian communities across the Tri-State closely align with the objectives of Keystone Space, particularly the Four Pillars of Industry, Workforce Development, Research and Development, and Advocacy outlined in Section One. Keystone Space is uniquely positioned to identify, document, and leverage space assets within the Tri-State area, maximizing their potential to fuel future space-related achievements. This endeavor will yield substantial ripple effects that resonate with the overarching priorities previously delineated for each state and the broader Tri-State region.

2.3 Tri-State Space Ecosystem Reporting

In its comprehensive approach to grasp the full spectrum of space assets and capabilities in the Tri-State area, Keystone Space conducted evaluations of each state within the region. This initiative aimed to attract and retain commercial space business in both the short and long term, while strategically mapping out the region's strengths and weaknesses. Such assessments were performed individually on each state before conducting a broader regional evaluation and analysis to provide a holistic overview. The data collected informed Keystone Space's strategic planning and has been shared with regional stakeholders as well as national space leaders and decision-makers, providing valuable information and analysis to both industry and government.

Keystone Space collaborated with space analytical consulting firm BryceTech to assess the regional space ecosystem in the Tri-State. The full report is provided in Appendix A. Key findings include:

- The Tri-State region is generating substantial economic activity
- $1.8B in space-relevant federal funding has been awarded to the Tri-State region ecosystem participants from November 2021 to April 2023.
- Science and engineering (S&E) degree conferral has generally increased in the region since 2021 but remains below the national average.
- The number of space-relevant startups has increased.
- There are 80 academic participants in the space ecosystem, with 44 of those institutions receiving NASA grants and subgrants.
- Tri-State academic institutions supported 27 experiments on the International Space Station.

The Tri-State region boasts a plethora of internationally recognized facilities helping to foster space-related innovation. A visual representative of these facilities and institutions across the Tri-State is detailed in Figure 7. Additionally, Keystone Space hosts a virtual Tri-State Ecosystem Map which is publicly accessible on Keystone Space's website (https://keystonespace.org/ecosystem/).

The Ecosystem Map plays a vital and integral role in Keystone Space's effort to empower decision-makers. It facilitates informed strategic choices by leveraging the strengths and capabilities of the diverse regional space entities shown in Figure 7, while also highlighting emerging opportunities within Appalachian communities. These opportunities support the transfer of talent and expertise to these entities Additionally, the map provides stakeholders with convenient access to available Tri-State resources.

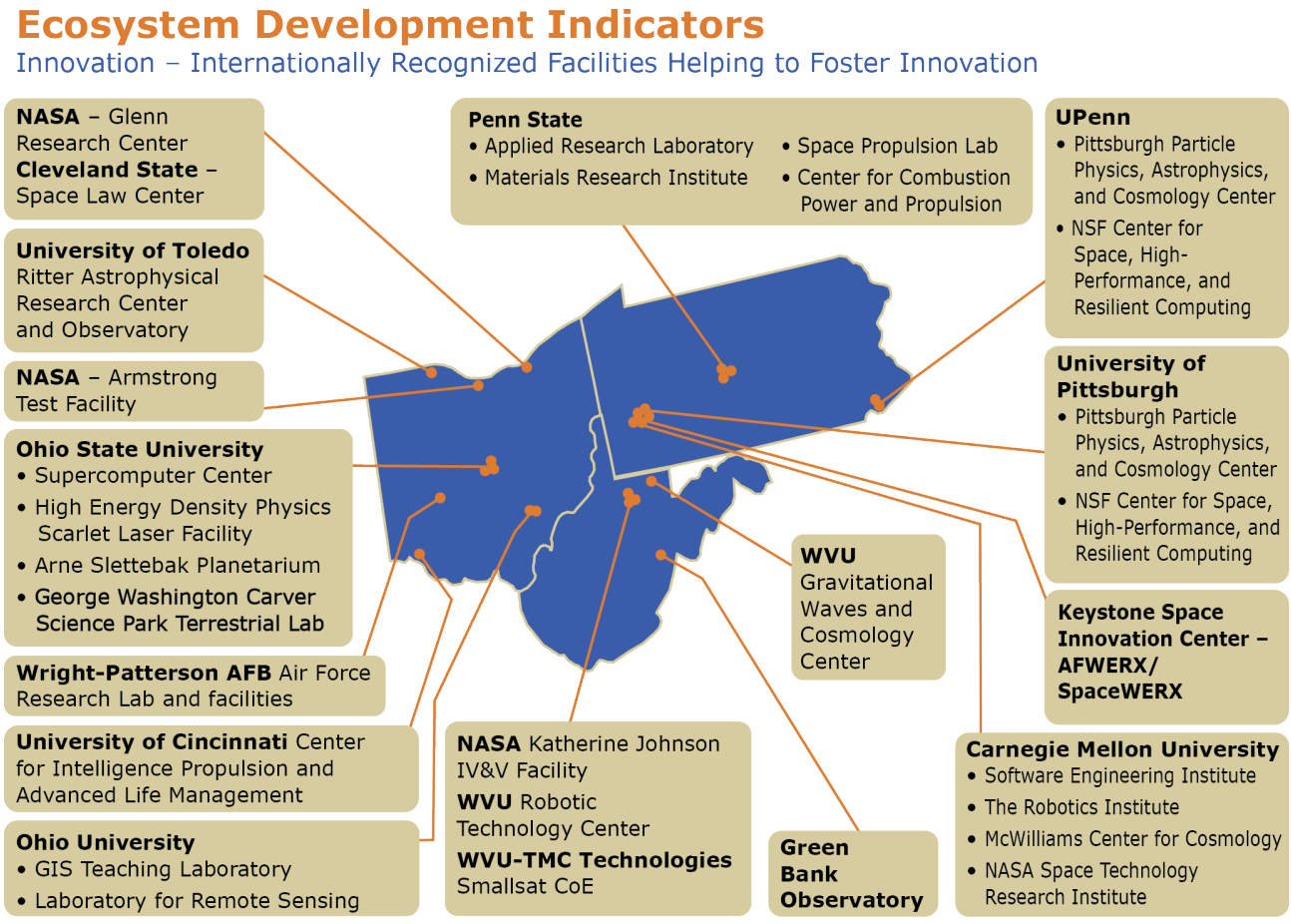


Figure 7. *Ecosystem Development Tri-State Entities Mapped (Source: Keystone Space/BryceTech, 2023)*

In addition to analyzing and mapping the Tri-State's space ecosystem, Keystone Space has conducted further analysis on the region for a more in depth understanding of its challenges and capabilities. This includes the most recent assessment of the Tri-State's Strengths, Weaknesses, Opportunities, and Threats as represented in Figure 8.

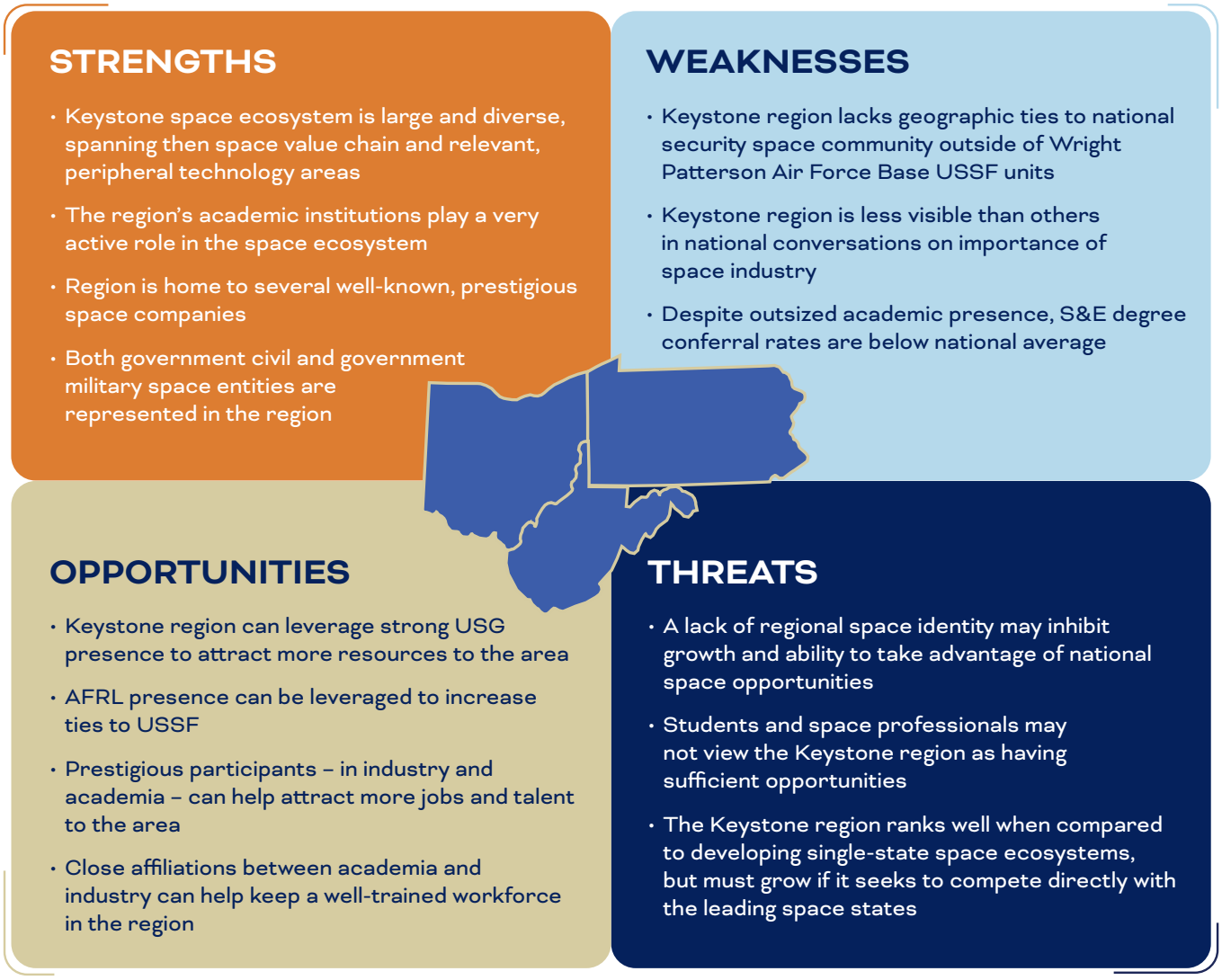


Figure 8. *Assessing Strengths, Weaknesses, Opportunities, and Potential Threats of the Tri-State Region in 2023*

Space holds the potential to become the new arena for economic growth in the region. However, this growth will not materialize unless a strategic plan, supported by regional stakeholders, is implemented. This plan must capitalize on the region's strengths and opportunities while addressing its weaknesses and threats.

2.4 Keystone Space's History with ARC

As discussed in Section One, in 2022, Keystone Space received a $400,000 ARC planning grant entitled "Ready to Launch." The purpose of the grant was to inaugurate and grow Keystone Space's operations. This included sustaining a full-time Program Director, commencing administrative and initial external relations functions, and conducting Keystone Space's annual conferences. "Ready to Launch" played a pivotal role in preparing Keystone Space to assume the role of the Tri-State strategic lead for highlighting existing space activities and cultivating new commercial space stakeholders. By positioning itself as a central hub for space-related initiatives in the region, Keystone Space aimed to catalyze economic growth, workforce development, and job creation across the 139 Appalachian counties comprising the Tri-State region. The period of performance spanning from 2022 to 2024 provided Keystone Space with a critical window to build upon existing relationships with business and government decision-makers while simultaneously embarking upon new relationships with potential future stakeholders.

Looking ahead, Keystone Space is leveraging its momentum to pursue additional funding through an upcoming ARC-ARISE implementation grant titled "Liftoff Appalachia: Appalachia's Onramp to Space," continuing its mission of space innovation and collaboration in the Tri-State region.

SECTION THREE
METHODOLOGY

3.1 Unlocking Potential through Keystone Space's "Liftoff Appalachia Initiative"

The global commercial space industry is estimated to reach $1 Trillion dollars by 2030 and Keystone Space's "Liftoff Appalachia" initiative is focused on elevating the Tri State as a key driver of this industry, while securing long term resilient and sustainable economic benefit for the Appalachian communities within the Tri State. The history of U.S. commercial space exploration has demonstrated that regional collaboration plays a pivotal role in driving progress and innovation. Since its inception, Keystone Space has been a beacon of such collaboration, fostering positive momentum and gaining recognition as the preeminent regional organization for commercial space in the Tri-State region. Building upon this success, Keystone Space is now poised for the next phase of action with its "Liftoff Appalachia: Appalachia's Onramp to Space" initiative.

The genesis of Keystone Space's success can be traced back to its inaugural "Ready to Launch" campaign, which laid the foundation for progress within the Tri-State region. Through strategic outreach and engagement efforts, notably the successful execution of its annual conference (which convenes over 300 space ecosystem participants to the Tri State annually), the updates to and expansion of its regional Tri State Industry Report and Ecosystem Map, and collaborative Working Group discussions in each of the three states comprising the Tri-State region, Keystone Space positioned itself as the go-to organization for regional commercial space endeavors, garnering trust and credibility among stakeholders at both state and national levels.

With the groundwork laid by the "Ready to Launch" campaign, the "Liftoff Appalachia" initiative marks Keystone Space's progression towards securing an ARC ARISE implementation grant and deepening collaboration with Tri-State Appalachian stakeholders. This implementation phase underscores a significant commitment to further collaboration with stakeholders and solidifying Keystone Space's role in driving regional economic growth through space-related projects, with a focus on activating Appalachian communities within Ohio, Pennsylvania, and West Virginia.

3.2 Stakeholder Engagement: Embracing Regional Collaboration

In late 2023, Keystone Space initiated a comprehensive stakeholder priority assessment, involving stakeholders from across the Tri-State region. This process aimed to evaluate the priorities of space and space-adjacent industries in the Tri-State, aligning them with Keystone Space's mission and ARC's ARISE initiative. Through meticulous review and engagement efforts, Keystone Space sought to identify opportunities with the highest potential for collaborative implementation.

The stakeholders engaged in this process represented a wide spectrum of leaders from the space sector, along with related fields in government, academia, industry, and economic development spanning the Tri-State region. The list of these invited stakeholders in provided in Appendix B. Efforts were made to prioritize diversity in perspectives and priorities among stakeholders, with special attention given to proactive inclusivity by ensuring representation from Appalachian communities. Throughout ongoing discussions, ARC representatives remained actively engaged, providing valuable recommendations to identify additional relevant participants and thought leaders. This inclusive approach aimed to capture a comprehensive range of viewpoints, ensuring that the initiatives undertaken by Keystone Space were aligned with the diverse needs and aspirations of all constituents across the region, with additional priority on those based in Appalachia.

The process unfolded through a series of briefings facilitated by Keystone Space, aiming to achieve three main objectives: firstly, to provide context of Keystone Space's mission and background; secondly, to establish a deep understanding of the Tri-State's space ecosystem – especially for those focused solely within a single state or community; and thirdly, to highlight the untapped economic benefits of space, unlocking Appalachia's potential. These sessions also offered an overview of the Tri-State region's rich space history and assets, alongside a call for collaborative participation in Keystone Space-led ARC ARISE initiative.

Prior to these briefings, Keystone Space meticulously reviewed each of the three states' four-year plans and annual strategy statements to identify alignment between the states, Keystone Space's mission, and the priorities of ARC's ARISE initiative.

The process began with Keystone Space briefing each state's ARC Program Managers to gather feedback on the proposed approach to planning for an ARC ARISE. Subsequently, a highly engaged space stakeholder from each state was selected – with considerations from Keystone Space and ARC – to act as a third-party supporter of Keystone Space's outreach and stakeholder engagement efforts. Their role was to encourage entities unfamiliar with or who hadn't worked with Keystone Space previously to attend the initial stakeholder briefings. These individuals also assisted Keystone Space in defining the appropriate list of relevant stakeholders from each state.

Once the groundwork was laid, Keystone Space convened with stakeholders from each of the three states to accomplish the aforementioned objectives. This broader stakeholder meeting was followed up by several more intimate meetings and correspondences between Keystone Space and each of the state's stakeholders. As momentum continued to build, additional personnel and organizations not initially engaged were brought in for briefings as well.

Central to Keystone Space's approach was a focus on economic development, particularly within Appalachian communities. Recognizing the economic potential of space and space-related initiatives, stakeholders expressed enthusiasm and support for Keystone Space's endeavors. Emphasizing the organization's Four Pillars – Industry, Workforce Development, Research & Development, and Advocacy – Keystone Space prioritized initiatives aimed at invigorating the region's workforce and sustainably bolstering the supply chain.

Although initial resistance to regional collaboration existed among some state-based stakeholders, ongoing dialogue underscored the benefits of a unified approach. Stakeholders increasingly recognized the value of regional collaboration in enhancing the region's competitiveness nationally, reinforcing Keystone Space's commitment to fostering collaboration across state borders.

3.3 Paving the Way for Regional Prosperity

The "Liftoff Appalachia" initiative by Keystone Space signifies a crucial step towards unlocking the economic potential of the Appalachian Tri-State region through space-related projects. By engaging relevant stakeholders, aligning priorities with the needs of Appalachia, and embracing regional collaboration, Keystone Space is well-positioned to lead transformative initiatives that propel the region's space industry forward while fostering economic prosperity for all involved. As Keystone Space charts its course forward, its dedication to diverse collaboration and innovation sets the stage for a future where the Tri-State region emerges as a hub for commercial space exploration and economic growth.

SECTION FOUR
FINDINGS

4.1 A Comprehensive Regional Strategy Meets National Aims

Keystone Space was established to address the need for a regional voice on behalf of the commercial space industry in Ohio, Pennsylvania, and West Virginia. The progression of Keystone Space from a conceptualization to receiving ARC support under "Ready to Launch" activities was pivotal in comprehending both the strengths and deficiencies of the Tri-State region. This understanding is essential for fostering a cohesive space industry ecosystem and facilitating economic growth in the Appalachian counties comprising a significant portion of the Tri-State.

Virtually all of the space stakeholders engaged by Keystone Space, as part of "Ready to Launch" and in preparations for the "Main Engine State", acknowledged that the Tri-State region possesses tremendous potential to emerge as a dominant national leader in advancing the commercial space industry. However, they also observed that this potential remains largely untapped due to the absence of a comprehensive regional strategy for the space industry. The prevailing perception, and the reality, is that other parts of the country, benefiting from concentrated space-centric political support and public advocacy, are ahead as recognized space states/regions and are leading in the national "pace race."

These stakeholders further recognized that as individual states, it would be challenging for the Tri-State region to compete against the established national space players. However, they believe that with dedicated support, the formulation of a regional strategy, and a unified voice, the Tri-State region could compete with and emerge as a leading driver of the space economy. Keystone Space believes that activating the Appalachian counties within the Tri-State by connecting them to the existing leading space hubs within the region (such as NASA centers, DOD innovation and R&D hubs, universities pursuing space R&D, and other space industry-focused companies and entities) is a critical first step to achieving this goal.

"Ready to Launch" has laid the foundation for the beginnings of a comprehensive regional strategy and stakeholders are already witnessing results. Keystone Space, in its brief existence thus far, has begun addressing the need for a coherent space narrative connecting the Tri-State region. This effort positions the Tri-State as a competitive location for commercial space endeavors, on par with other states and even other spacefaring nations. Keystone Space's "Ready to Launch" initiative has helped identify and convene a regional space ecosystem of participants willing to collaborate across state borders, laying the foundation for developing the beginnings of a comprehensive regional strategy to activate the space economy across Ohio, Pennsylvania, and West Virginia.

"Liftoff Appalachia" will further strengthen and build upon these foundations. With continued support, Keystone Space is poised to demonstrate increasingly impactful and tangible mission successes across the Tri-State, marking a crucial next step in bolstering Keystone Space's leadership and influence in shaping a coherent regional space strategy. Through the development of a coherent regional strategy aimed at generating economic growth in Appalachian communities within the Tri-State, the region will be well-equipped to harness regional resources in its pursuit of competing against the established national space players.

4.2 "Liftoff Appalachia" Alignment with ARC & National Priorities

Keystone Space possesses a distinctive ability to instill stakeholders across the Tri-State with a regional collaboration mindset, leading to an outlook of success in commercial space efforts. Ohio, Pennsylvania, and West Virginia stand poised to become a prominent symbol of commercial space achievements on a national scale. This mindset reflects and is in furtherance of many of the stated goals of ARC.

In the recent FY 2023 ARC Performance and Accountability Report, Aerospace is explicitly cited as a priority area for diversification across the region. Additionally, convening public forums to provide solutions and the need for coordinating functions for Appalachian Communities are highlighted as prime considerations for ARC's work. Finally, upskilling the region's workforce, adapting to new technologies, and the desire to continue attracting high-tech jobs are declared aims. Keystone Space's "Liftoff Appalachia" aligns with all of these goals and offers tangible and measurable proposals to achieve them. Furthermore, Strategic Investment Goal #2: "Building Appalachia's Workforce Ecosystem," lays out objectives that Keystone Space's "Liftoff Appalachia" directly addresses in its proposals focusing on regional workforce development.

Given Keystone Space's alignment with the space industry, it is crucial to synchronize this alignment with national policy prerogatives. Since the subject matter discussed in this Feasibility Report pertains to space, national space policy prerogatives cannot be disregarded. Importantly, many of the priorities articulated by national space leaders are consistent with those of both ARC and Keystone Space. For instance, the United States Space Priorities Framework outlines national priorities such as:

- Fostering a policy and regulatory environment that enables a competitive and burgeoning U.S. commercial space sector
- Protecting space-related critical infrastructure and strengthening the security of the U.S. space industrial base
- Investing in the next generation and preparing the nation's STEM workforce to fuel the economy of the future

Keystone Space's efforts clearly embody all of ARC's objectives outlined above. Its priorities, as articulated in its Four Pillars, are closely aligned with ARC's success milestones. Moreover, the crucial need for coordination among local, state, and

federal decision makers, along with advocacy for commercial space in the region, represents a mission-critical function that no other entity is presently undertaking. The innovative approach and work of Keystone Space not only align with ARC's strategic goals but also support American civil, commercial, and national security space aspirations. Keystone Space's alignment with ARC's objectives, along with its innovative approach and strategic alignment with national priorities, underscores the significance of its role in advancing regional and national space initiatives.

4.3. Tri-State Stakeholder Activation

To achieve the regional and national objectives pursued by the United States, ARC, and Keystone Space, stakeholder support and engagement across the region are imperative. Keystone Space has encountered a lack of routine communications among regional space stakeholders, as well as the absence of an overarching regional space strategy. Facilitating such communication and strategy is a key part of Keystone Space's raison d'etre, and it has taken steps to rectify the situation and fill the void. Admittedly, a full redress will take time to enable stakeholders to shed themselves of parochialism and realize they have partners in success across Ohio, Pennsylvania, and West Virginia. It will become self-evident to current and future stakeholders in the region that they can only compete against the rest of the nation in terms of contributing to the global space economy if they leverage the effective power (political, educational, technological, etc.) of three states instead of one. "Ready to Launch" has begun to turn the tide in a more favorable direction, as have the preliminary "Liftoff Appalachia" strategic stakeholder engagements.

Within distressed Appalachian communities, Keystone Space can and will motivate talented individuals, regardless of age or experience, to engage in the burgeoning field of commercial space activities. As Appalachian communities begin to flourish and benefit from this activation, the ripple effect will spread to other areas, whether they are space-related, space-adjacent, or unrelated to space. This will inevitably lead to cross-pollination with other mission areas of ARC.

Over time, Keystone Space will grow in its mission to act as a facilitator, connecting the valuable space resources and partners across the Tri-State region to support national space efforts. With its unique position, Keystone Space can offer valuable insights, leveraging its ability to monitor national policy trends to engage and unite Tri-State space stakeholders. Keystone Space will guide Tri-State government, academic, and industry leaders, enabling the region to offer compelling contributions at both national and international levels.

To be successful, the Tri-State commercial space strategic decision-making process must align closely with national space objectives. Keystone Space has been diligently focusing on areas of emerging national space interests where the Tri-State region can provide sustainable assistance with long-term impacts. These include, but are not limited to:

- Stimulating and growing STEM/workforce development
- Strengthening the supply chain
- Developing in-space power generation and communication services

- Advancing technology, manufacturing, and material sciences research and commercialization
- Conducting biomedical research related to long-duration deep human spaceflight efforts
- Testing, demonstrating, and developing logistics and infrastructure for suborbital to Low Earth Orbit (LEO) to Cislunar missions

National leaders are keenly focused on the imperative for serious harmonization and interoperability across various space policy fronts. Currently, the United States lacks a comprehensive master plan, handicapping both the nation and the region's ability to make informed investments. This gap is likely to worsen as more international signatories join NASA's Artemis Accords and allies become increasingly engaged in national security space initiatives. Keystone Space has already made strides in improving interoperability by convening the 2023 Fall Lunar Surface Innovation Consortium event in Allegheny County, PA, within the Appalachian region.

As Keystone Space expands its operations, whether through high-profile events with national leaders or day-to-day work benefiting Tri-State space stakeholders, all parties will feel empowered to seek assistance from Keystone Space at any time. Keystone Space will be seen as a routine, reliable, and often mission-critical asset for their goals. With its national and international expertise, Keystone Space can inform and invigorate the plans and actions of Tri-State stakeholders. The alternative would be to continue with an unsustainable and unproductive scatter-shot approach. This would, at best, waste well-intentioned but misdirected energy, and at worst, lead to a codified strategy for failure.

4.4 Keystone Space's Regional Space Leadership Strategies

The detailed overview of Keystone Space's activities and impact provided in Section One demonstrates that Keystone Space is rising to the occasion, providing regional leadership aimed at attracting, retaining, and fostering commercial space economic growth. Drawing from its work to date and continued discussions with national and regional stakeholders, Keystone Space is confident that the "Liftoff Appalachia" initiative will unleash the economic development potential offered by the global space industry to the Tri-State program. This initiative is well poised to address the following critical needs:

- Keystone Space must leverage its current successes to ensure long-term operational sustainability. This entails establishing a robust, disciplined, and multifaceted operational team to represent, convene, and accelerate the growth of the space industry ecosystem across the Tri-State region.
- Keystone Space must convene strategic partners, including federal civil and defense space entities, along with critical regional stakeholders. By leveraging regional strengths and opportunities, and aligning priorities, these stakeholders are well-suited to develop a consensus-based regional strategy for advancing the commercial space industry throughout the Tri-State.

- With its current strategic position, Keystone Space is well-suited to launch one or more thematic consortia. These consortia would allow the Tri-State to develop its regional space economy around existing strengths, such as space power, communications, infrastructure, as well as activities in low Earth orbit (LEO) and lunar economic development.
- Keystone Space must uphold its commitment to delivering and supporting regional programs that further solidify the Tri-State space ecosystem and enhance the economies of Appalachian communities. This commitment encompasses hosting its annual conference and implementing ambitious cross-state programming in collaboration with key regional partners.
- Keystone Space must further establish strategic pathways for Appalachian communities to connect with the regional space and space-adjacent resources and leaders. This necessitates securing resources and support to identify strategic partners for piloting space industry-relevant workforce development and supply chain activation programs across the Tri-State. These efforts should prioritize achieving sustainable, long-lasting impacts for Appalachian communities within the region and establishing programmatic models that can serve as case studies for the broader Appalachian region.

Since its formation in 2021, Keystone Space has consistently exceeded expectations for its size and resources. However, for Keystone Space to contribute significantly to making the Tri-State a robust driver of the expected $1 trillion global space economy, it requires support to expand its reach across the region. Success begets success, and Keystone Space aims to build upon its "Ready to Launch" initiative and leverage "Liftoff Appalachia" to further its mission. This entails fostering regional cohesion, advancing STEM and workforce opportunities, supporting research and development, and advocating a compelling message for the region at both national and international levels.

CONCLUSION

The future of the Tri-State, including its Appalachian counties, as a pivotal driver of the global space economy, holds immense promise. Shaped by a history and culture marked by innovation, resilience, tenacity, and an unwavering pursuit of national parity, the region and its people embody a collective spirit of determination. Its technological and manufacturing advancements resonate with its roots as the heart of US industrialization, thriving notably during the Apollo Era and now poised for resurgence in this new industrial age of reshored American manufacturing and technological innovation.

Through the Keystone Space Collaborative, the Tri-State emerges as a burgeoning space frontier, primed to lead the charge in industrializing the expanding global space market. Recognizing the significant Appalachian presence within the region, Keystone Space envisions the commercial space sector as a catalyst for economic growth, particularly within the Appalachian counties.

The findings of the Feasibility Study affirm the Tri-State's readiness to assume a prominent role in the global space economy, supported by the diverse coalition of stakeholders coalesced by Keystone Space. With the promise of proper backing and initial funding, Keystone Space is confident in its ability to harness the region's burgeoning space industry to create sustainable economic opportunities, particularly benefiting individuals residing in the Appalachian counties of Ohio, Pennsylvania, and West Virginia.

Aligned with the outcomes of the Feasibility Study, Keystone Space is prepared to execute an organizational and programmatic strategy focused on activating the economic potential of the Appalachian counties within the Tri-State. Securing an ARC ARISE grant would ensure the operational sustainability of Keystone Space, facilitate the development of a comprehensive regional space economic strategy, and enable programming aimed at nurturing and attracting space talent and opportunity to the region. Ultimately, this initiative seeks to foster greater cohesion, engagement, and support within the Appalachian and Tri-State space ecosystem, paving the way for enduring economic prosperity and societal impact.

APPENDIX A

2023 KEYSTONE SPACE ECOSYSTEM REPORT

Click here to review the report.

APPENDIX B

LIST OF STRATEGIC STAKEHOLDERS BY STATE

OHIO

Aerozone Alliance
Air Force Research Laboratory (AFRL)
America Makes
Buckeye Hills Foundation
COSI
Dayton Development Coalition (DDC)
Denison University
Eastgate Regional Council of Governments
Governor's Office of Appalachia
Intel Corporation
John Glenn Astronomy Park
JobsOhio
NASA Glenn Research Center
NASA Headquarters
Office of Ohio Governor Mike DeWine
Office of Ohio Representative Marcy Kaptur
Office of Ohio Senator JD Vance
Office of Ohio Senator Sherrod Brown
Ohio Aerospace Initiative (OAI)
Ohio Chamber of Commerce
Ohio Department of Development
Ohio Federal Research Network
Ohio House of Representatives Ohio Aerospace and Aviation Technology Committee
Ohio Mid-Eastern Governments Association
Ohio Space Grant Consortium
Ohio State University (OSU)
Ohio University
Ohio Valley Regional Development Council
Ohio5
OhioSE (Ohio Southeast Economic Development)
Parallax Advanced Research
Team NEO
ZIN Technologies, Inc. (Voyager Space)

PENNSYLVANIA

AFWERX / SpaceWERX Pittsburgh
Allegheny Conference on Community Development

Altoona-Blair Development Corp.
Ansys
Astrobotic Technology, Inc.
Carnegie Mellon University
Carnegie Science Center
Catalyst Connection
Delaware Valley Industrial Resource Center
Hillman Family Foundation
Innovation Works
Johnstown Area Regional Industries
Manufacturer's Association
McGowan Institute
Moonshot Museum
Northeastern Pennsylvania Alliance (NEPA)
Northeastern Pennsylvania Industrial Resource Center (NEPIRC)
Northwestern Pennsylvania Commission
Office of Pennsylvania Governor Josh Shapiro
Office of Pennsylvania Representative Chrissy Houlahan
Office of Pennsylvania Representative Chris DeLuzio
Office of Pennsylvania Representative Guy Reschenthaler
Office of Pennsylvania Representative Matthew Cartwright
Office of Pennsylvania Representative Mike Kelly
Office of Pennsylvania Senator Bob Casey
Office of Pennsylvania Senator John Fetterman
Office of Pennsylvania Representative Summer Lee
Pennsylvania Department of Community and Economic Development (DCED)
Pennsylvania Manufacturing Extension Partnership
Pennsylvania Space Grant Consortium
Pennsylvania State University, The
Pennsylvania Technical Assistance Program (PennTAP)
Pittsburgh Technology Council
Production Systems Automation
Richard King Mellon Foundation
Smart Munitions Expert Solutions, Inc.
Southwest Pennsylvania Commission
tecBRIDGE
Team PA Foundation
The Pennsylvania State University
The Wharton School at the University of Pennsylvania
University of Pittsburgh
Westinghouse

WEST VIRGINIA

Acoustic Research Systems
Argo Navis
Constellium
Katherine Johnson IV&V Test Facility
Office of West Virginia Governor Jim Justice
Office of West Virginia Representative Carol Miller
Office of West Virginia Senator Joe Manchin
Office of West Virginia Senator Shelley Moore Capito
TMC Technologies
Touchstone Research Laboratory
Vertx Partners
West Virginia Department of Economic Development
West Virginia House of Delegates
West Virginia University