RECOMMENDATIONS
ANNUAL REPORT ON PENNSYLVANIA’S INNOVATION ECONOMY
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Recommendations

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Introduction

The following document captures particular opportunities to develop Pennsylvania’s innovation economy, which are informed by literature reviews, conversations with experts, and the writers’ experiences living and studying in the state. These recommendations are not meant to be interpreted as “must dos,” but rather as “ideas worth exploring.” It should be noted that some of these ideas may already be under development or implemented in one or more of the state’s PREP regions.

Top Recommendations

Through conversations with stakeholders and government experts, these recommendations emerged as likely to have an outsized return on investment. Decision makers should place particular emphasis on them when planning next steps.

1. Establish an Innovation Advisory Working Group within the BFTDA
   - This group would provide the government with real-time feedback on the state of the innovation economy, with implications for policymaking. It could also advise the drafting of future versions of the annual innovation report, providing important context beyond the data points.
   - The BFTDA has served an advisory role to the government in the past and this initiative would reinvigorate this historically significant partnership.
   - The working group could include representation from across geographies, sectors, and industries, including:
     - Non-Governmental:
       - Incubators and accelerators
       - Investors
       - University offices of tech transfer
       - College and university career advisory offices
       - Chambers of commerce and/or business groups including those serving BIPOC owners
       - CEOs across industries and from young and old companies
       - Workforce training programs
     - Governmental (non-DCED suggestions):
       - Departments of Transportation, Education, Labor & Industry

2. Design a strategy for distributing American Rescue Plan relief funds
   - In light of the Plan’s huge depth and breadth, consider identifying a few key policy priority areas on which to make tangible progress, then identify the specific funds to apply for and the organizations to receive the funds.¹
   - Cities and counties should establish central hubs to manage stimulus funds. These hubs should utilize working groups made up of diverse stakeholders and end-users of the funds.²
   - The hubs should be co-staffed by local BIPOC-affiliated business organizations (e.g., chambers of commerce) that connect businesses to federal funding opportunities.³
3. **Expand the DCED Engage! program for targeted business attraction and retention**
   - Consider widening the DCED Engage! program to include business attraction. Identify a short list of companies that would be expected to have a presence in Pennsylvania based on specific assets and create a concentrated engagement strategy for them. If this initiative fails it would at least reveal clear weaknesses if companies aligned with PA’s assets do not want to set up shop here.
   - Identify key CEOs who live in the Commonwealth and bring them in on the mission of keeping PA competitive, help them identify the talent they need to grow their workforce in-state. Ultimately make sure they have what they need to stay here.
   - Set up seminars where foreign born CEOs share their experiences with American-born CEOs, especially as it relates to hiring and supporting immigrant workers.

4. **Collaborate with colleges and universities to recruit students to emerging industries in the state**
   - *This recommendation is aligned with DCED’s forthcoming Target Industries Cluster dashboard.*
   - Create a webpage associated with the dashboard targeted to students interested in secure and lucrative careers. Share the dashboard and webpage with college deans and career advisory offices so they can inform students about growing industries in need of workers. They should inform students about both science- and non-science-based careers in these industries.
   - Launch an annual competition for college students aligned with one of the emerging industries or technologies as determined by data.iv
     - Consider requiring teams to be interdisciplinary across science and business fields, and to work with a business mentor who can expose students to “real-world” issues and opportunities.
     - Example competitions exist in other cities and states for high-tech industries like blockchain (South Carolina, City of Los Angeles)v,vi

5. **Consider a talent attraction scheme that targets the millions of new remote workers**
   - Incentives should be designed to amplify the employment and quality of life opportunities in the state so they attract more than just those participating in the incentive.
   - Consider partnering with existing social and professional organizations to help new workers forge lasting connections that will anchor them to the community.
   - Market any incentives by making use of proprietary data to target workers of large companies that have announced long-term remote work plans and alumni of local universities.
   - Focus marketing on nearby metro areas as new research shows the vast majority of those who moved during the pandemic did so within the same metro area.vii
   - Use clear, trackable goals to help measure return on investment.
   - Design programs with built-in flexibility so they can be iterated on without the need to request new fund allocation.
Policy & Budget Recommendations

The following recommendations are policies and programs that stood out from our research and key expert interviews. A question we received from both thought-leaders and stakeholders was “Are there any initiatives, in Pennsylvania or in other states, that stand out?” This list represents those initiatives.

Entrepreneurship and High-Growth Firms

1. **Fund a program to help startups secure their first customers**
   - Fund a First Customer Program to help research-based startups with sales and marketing efforts to secure their first customer, a task that is often outside scientist-founders’ core skill set.\textsuperscript{viii}
   - Such a program might engage large, established PA-based companies to diversify their procurement/supplier programs with an eye towards young companies. A signed pledge among multiple PA companies may increase the likelihood that goals are met.

2. **Create a program or supplement an existing program to identify and fund women- and minority-owned startups that are poised for high-growth.**
   - Research out of MIT and Harvard shows that just 5% of startups are predicted to grow at their onset based on specific business characteristics, yet these startups make up 75% of IPOs or high-value acquisitions. (Characteristics include whether the industry is traded and high-tech, whether the founder is a repeat entrepreneur, whether the firm holds a patent or trademark, and whether the firm gets media coverage.)\textsuperscript{ix}
   - Women- and minority-founded startups that have high potential at their onset should be given strong supports so they can achieve their potential.
     1. The program could live under the Pennsylvania Minority Business Development Authority or Ben Franklin Technology Development Authority. The program might also involve helping these businesses apply for Federal SBIC funds.
     2. Identify federal funding programs that could fund such a program.

Research & Development

1. **Strengthen industry R&D in the state. Ideas to consider include:**
   - Enhance university-business R&D partnerships, similar to the Maryland Industrial Partnerships program.\textsuperscript{x}
   - Establish an R&D Center Grant, reimbursing businesses for a portion of the cost of establishing a new R&D center, similar to the JobsOhio grant program.\textsuperscript{xi}
   - Establish an innovation voucher program, similar to Rhode Island’s.\textsuperscript{xii}

2. **Restart the Keystone Innovation Starter Kit (KISK) program**
   - This program provided funds to Pennsylvania academic medical centers, research institutions and institutions of higher education to recruit world-class faculty researchers and provide them with fully-equipped labs.\textsuperscript{xiii} The program was a companion to the Keystone Innovation Program.
   - Texas and Georgia run ongoing versions of this program which might offer inspiration for specific program aspects.\textsuperscript{xiv,xv}
**Venture Capital**

1. **Help direct Small Business Investment Company (SBIC) funds to capital-intensive companies in advanced industries, such as advanced manufacturing.**
   - Venture capitalists sometimes choose not to fund capital-intensive companies like manufacturers because they can take longer than service-based companies to make a profit for investors. However, these companies are key contributors to productivity and employment.
   - SBIC funds are unique in that they are federal funds distributed to companies via venture capital and private equity firms. This government involvement means there may be room to help direct funds to these companies that research shows have a positive long-term impact on the economy.\textsuperscript{xvi}

2. **Expand the PA Advancing and Next Generation Industry Partnership grants**
   - The goals of Next Gen IP grants are to 1) improve cross-sector partnerships (industry, education, workforce), 2) address workforce needs, and 3) increase partnerships in key industries.
   - Consider opportunities to bolster this initiative by directing funding to proven models and encouraging future partnerships by making models and resources accessible to stakeholders across the state. Specific steps could be:
     - Create a standard for the evaluation of the impact of Next Generation Industry Partnership grant awardee programs to support the expansion of successful models and direct future funding to evidence-based models.
     - Create a centralized resource bank/website where school districts or industry partners that want to build education/workforce partnerships can learn from proven models.
     - Identify K-12/Local education agencies that have successful industry partners and incentivize them to support the development of new partnerships in different districts.

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**Education**

**KEY RECOMMENDATION**

1. **Collaborate with colleges and universities to recruit students to emerging industries in the state**
   - This recommendation is aligned with DCED’s forthcoming Target Industries Cluster dashboard.
   - Create a webpage associated with the dashboard targeted to students interested in secure and lucrative careers. Share the dashboard and webpage with college deans and career advisory offices so they can inform students about growing industries in need of workers. They should inform students about both science- and non-science-based careers in these industries.
   - Launch an annual competition for college students aligned with one of the emerging industries as determined by data.\textsuperscript{xvii}
     - Consider requiring teams to be interdisciplinary across science and business fields, and to work with a business mentor who can expose students to “real-world” issues and opportunities.
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\textsuperscript{xix} More information and examples of successful partnerships in the education sector can be found in these guidelines and resources.
3. **Increase the number of FAFSA applications submitted by graduating high school seniors**
   - Consider how to support programs, particularly in Title 1 schools, that give families help navigating and completing FAFSA applications.
   - Define target populations and set metric-based goals to measure program effectiveness.
   - Consider requiring financial aid completion for high school seniors in order to graduate. Louisiana implemented this policy in 2018, and both Texas and Illinois began in the ’20-’21 school year. \(^{xx}\)
   - Pell Grants are well targeted to the students who need support the most, however, these students are often the least likely to apply, resulting in “money on the table.” \(^{xxi}\) A 2014 research paper analyzing national data about college students who did not complete the FAFSA found that they were missing out on $24 billion annually in Pell Grants, subsidized student loans, work-study, and state aid programs.\(^{xxii}\)
   - The completion of a Free Application for Federal Student Aid is strongly correlated with college matriculation and research has found that every additional $1,000 in grant aid per student increases postsecondary persistence rates by four percentage points.\(^{xxiii}\)

4. **Replicate the CUNY Accelerated Study in Associate Programs (ASAP) in PA community colleges**
   - The City University of New York’s ASAP program began in fall 2015 with the goal of graduating at least 50% of associate degree-seeking students within three years. The program provides wrap-around services designed to help students overcome the systemic barriers and manage the personal responsibilities that often preclude community college students from timely degree completion. These services include a dedicated advisor for each student, reserved seats in courses, and classes scheduled back-to-back to foster a sense of mutual support among students.\(^{xxiv}\)
   - The program was incredibly successful. A randomized control trial found the program doubled the three-year graduation rate of participants, from 22% to 40%. Three Ohio community colleges have since adopted versions of the program--Cuyahoga Community College, Lorain County Community College, and Cincinnati State Technical and Community College. New York City provided direct funding for ASAP at CUNY, whereas the Ohio institutions each funded their own program. ASAP continued to show success in Ohio despite differences across different locations, institutional contexts and student populations.\(^{xxv}\)
   - The state of Pennsylvania should invest in programs like ASAP that focus on completion as opposed to mere enrollment, especially as students who complete an associate degree earn $5,000-$7,000 more per year than observationally similar students who enter a two-year college but do not graduate.\(^{xxvi}\) \(^{xxvii}\)
Workforce

**KEY RECOMMENDATION**

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2. **Consider a talent attraction scheme that targets the millions of new remote workers**
   - Incentives should be designed to amplify the employment and quality of life opportunities in the state so they attract more than just those participating in the incentive.
   - Consider partnering with existing social and professional organizations to help new workers forge lasting connections that will anchor them to the community.
   - Market any incentives by making use of proprietary data to target workers of large companies that have announced long-term remote work plans and alumni of local universities.
   - Focus marketing on nearby metro areas as new research shows the vast majority of those who moved during the pandemic did so within the same metro area. xlviii
   - Use clear, trackable goals to help measure return on investment.
   - Design programs with built-in flexibility so they can be iterated on without the need to request new fund allocation.

3. **Make Pennsylvania a first option for out-of-state businesses looking to expand.**
   - Consider revamping the “Why PA?” landing page so that the state’s most important assets are highlighted to the user upon arrival at the page. xxix
     - Reconsider the value of pitching comparatively low cost-of-living, rents, and salaries to businesses as these could be seen as indicators of low economic activity and second-rate talent. Lead with our assets that rival global hubs.
     - Update the “Pennsylvania Industries” subsection to include advanced industries listed on the forthcoming Target Industries Cluster Dashboard.
   - Survey successful business owners for their insights on why PA works for them and incorporate that into branding for the state.

4. **Strategize ways to retain university graduates in their local towns.**
   - Leverage private funds to create post-graduate fellowships that keep graduates in place.
   - Create a low-(administrative-)cost mentorship program pairing students with local alumni or families.
5. **Democratize knowledge of non-profit funding opportunities and know-how for institutions that improve community quality of life.**
   - Recognizing that grant applications are more successful based on knowledge, networks, and experience, identify specific organizations in the state that have historically been successful in securing grants from private foundations and federal programs.
   - Connect these high performers with new organizations or those in counties in need of arts and community services organizations. Connecting organizations in different parts of the state can reduce potential competition.

6. **Make Pennsylvania more welcoming to its many college students who do not own cars**
   - Pilot a high-quality bus service between small cities with high student populations and large metros, namely Philadelphia, New York, and DC. This can help make up for Amtrak’s limited timetables and the decline in regional air service. If young people feel they live in a highly connected locale, they will be more likely to stay.
   - Encourage municipalities to seek input from local university students in community planning meetings. Students may have different needs than other residents who attend these meetings. They often rely on public transit and rental housing and may not have knowledge of local services or amenities. Disregarding students as transient residents will reinforce their likelihood of leaving, when young people are needed to sustain local economies. Planning departments can work with university offices of student life to publicize opportunities for input.

**Transportation & Broadband**

1. **In planning funds for broadband network extension, build off of the map of rural broadband infrastructure created by Penn State University in partnership with the Pennsylvania Utility Commission.**
   - The map was created in 2020 to help internet service providers take advantage of FCC Rural Digital Opportunity Fund monies. It shows where telecommunications structures and lines lie, the “best service available” according to the FCC, and legislator information, down to the census block group level.

2. **Work with majority-BIPOC neighborhoods around the state to prepare for the expected passage of the American Jobs Plan:**
   - Identify communities that were cut off from city centers by federally-funded highways in the 20th century, and work with community leaders to draft plans for the proposed $20 billion in the bill dedicated to reconnecting these communities. Use the funds to leverage existing state programs and staff that can help.

3. **Use anticipated federal infrastructure dollars (and public/private partnerships) to invest in transit-oriented development projects.**
   - An unspecified amount of money in the American Jobs Plan will be devoted to eliminating state and local exclusionary zoning laws, which has implications for denser development.
   - If done without community involvement and protections, this is likely to cause displacement.
- New housing developments should include 30% affordable housing units, as recommended by SSTI.
- Transit oriented development can unify previously segregated neighborhoods, and should be approached with community stakeholders’ involvement from the beginning of the process.
Data Recommendations

During the research process, the writers identified data that would be useful in measuring the innovation economy and specific programs’ effectiveness, but was not collected or otherwise unavailable. The following recommendations provide opportunities to improve data collection to enhance future decision making for the innovation economy.

1. Employment in Advanced Industries
   - Collect data on the number of jobs in either the industries in the forthcoming Target Industries Cluster Dashboard or on advanced industries in general, which Brookings defines as “the set of industries employing specialized labor who draw on scientific and technical knowledge, on the one hand, and deploy that knowledge to research and develop new products and processes, on the other.”
   - Also consider updating the “New and Young High-Tech Firms” metric in the report according to either of these sets of industries, as it would provide a more holistic look at firms impacting the innovation economy beyond high tech.

2. Tech Transfer & Commercialization
   - Collect basic, uniform metrics on entrepreneurship, tech transfer, and commercialization from all research universities in the state. This could encompass spinoffs, license agreements, patents, and/or research funding. Choose only a few metrics to collect to reduce administrative burden.

3. Grassroots Broadband Access
   - Investigate broadband usage data collected by Microsoft over a recent 18-month period and made publicly available. The dataset is described in an article by The Verge and available on Github.
   - Collect broadband access data from users instead of just from providers. A possible way to do this is through a household-level survey. These data would reveal: 1) whether provider-reported regional access rate accurately reflects whether the internet is accessible and/or affordable to every household in a region. And 2) whether the reported internet speed is the actual speed instead of the advertised highest speed.

4. Minority- and Women-owned Businesses
   - Use business and tax data to get a more granular picture of minority- and women-owned businesses, drawing on the methodology used by researchers at Drexel University for the Small Business Toolkit Map.

5. Spatial Mismatch between Workers and Jobs
   - Replicate the 2012 study undertaken by Brookings to update our understanding of this mismatch in the past decade. The study looks at the share of the population that can access the typical job by transit in 90 minutes and the share of jobs that are located in census tracts served by transit. An updated study might focus only on those jobs that cannot be done remotely, information on which is provided by the Bureau of Labor Statistics.
6. **Initial Public Offerings (IPOs)**
   - Recording IPOs is a way to measure the strength of the entrepreneurial ecosystem, by noting how many businesses have been strong enough to make the transition to public-funding. While data on IPOs are publicly available, current sources that compile IPOs are lacking in usability and the potential for analysis.xxxix

7. **Impact of Venture Capital**
   - Track companies that benefit from state-funded investments, namely the Venture Investment Program, once they exit the fund’s portfolio. This can improve understanding of the program’s impact helping high-growth firms get started.

8. **Startups that leave Pennsylvania**
   - Investigate whether tax data can be used to observe how many companies in advanced industries once paid taxes in Pennsylvania but now pay taxes elsewhere (notably in tech hubs like the San Francisco Bay Area).

9. **Geographically Divisible R&D/Patent/VC Data**
   - Data from numerous federal government agencies was critical in completion of this report including the National Science Foundation, the U.S. Patent and Trademark Office, among others. Unfortunately, many data sources collected at the federal level are not divisible by county or PREP region.
   - It is significantly harder for PA state agencies and legislators to make informed policy decisions based on this report if they only have state-wide data.
   - Three areas in particular worth exploring with more granularity are sources/destinations of industry/government R&D dollars, patents, and VC dollars. Gathering this data at the county level will help the government make better targeted funding and aid decisions.

10. **Child Care Provider Turnover**
    - Track childcare provider turnover at state-funded child care centers to understand the connections, if any, between turnover rate and long waitlists. Research implies that low wages with respect to the demands of this job lead to high turnover, but better data is needed to determine this.xl
Governance Recommendations

Collecting data and metrics on the state’s innovation economy is just the first step in supporting its growth. Good governance is needed to convert this information into policy that changes lives. The following recommendations suggest new systems for decision making in this arena.

**KEY RECOMMENDATION**

1. **Establish an Innovation Advisory Working Group within the BFTDA**
   - This group would provide the government with real-time feedback on the state of the innovation economy, with implications for policymaking. It could also advise the drafting of future versions of the annual innovation report, providing important context beyond the data points.
   - The BFTDA has served an advisory role to the government in the past and this initiative would reinvigorate this historically significant partnership.
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2. **Design a Strategy for Distributing American Rescue Plan Relief Funds**
   - In light of the Plan’s huge depth and breadth, consider identifying a few key policy priority areas on which to make tangible progress, then identify the specific funds to apply for and the organizations to receive the funds.xli
   - Cities and counties should establish central hubs to manage stimulus funds. These hubs should utilize working groups made up of diverse stakeholders and end-users of the funds.xlii
   - The hubs should be co-staffed by local BIPOC-affiliated business organizations (e.g., chambers of commerce) that connect businesses to federal funding opportunities.xliii

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1 Note: These funds will be distributed to cities in a modified version of Community Block Development Grants in two phases: the first 60 days after the bill’s passage and the second a year later. They must be used by December 31, 2024. The funds must be used for only the following:
   - Responding to the negative impacts of the COVID pandemic, including assistance to households, small businesses, and nonprofits as well as aid to affected industries such as tourism, travel, and hospitality;
   - Providing government services previously cut due to pandemic-related revenue shortfalls, and;
   - Making needed investments in water, sewer, or broadband infrastructure.
3. Solicit innovation-specific questions to add to the DCED Internal Business Survey
   ○ A key component to building a better innovation economy is understanding the current environment. As seen in section 2 of this document, accessing good data on many important innovation-related metrics is a challenge. DCED currently collects information from PA businesses on an annual basis and by adding innovation questions to that survey, the department would have a much better picture of the innovation economy.
   ○ To ensure the right questions are asked, DCED should begin to compile questions by consulting experts from different facets of the innovation economy: the tech industry, university experts, authorities at non-profits (such as the BFTDA), etc.

4. Identify follow-on work that builds on DCED’s forthcoming Target Industry Cluster Analysis to better inform the Department on how they can foster these industries in the state.
   ○ After the conclusion of the cluster analysis, DCED is preparing to create a dashboard showcasing that top performing clusters across the state. In-addition to those currently high-performance clusters, this dashboard will identify up and coming areas of opportunity for the state to support.

5. Consider compiling and cataloging PA’s specific innovation economy assets
   ○ By mapping specific assets related to the innovation economy--investors, incubators and accelerators, academic resources, economic development organizations—the government would help communities understand what resources are available to them and what connections might be made.
   ○ A model of this type of catalog is the Wisconsin Innovation Index, which describes itself as the guide to the state’s entrepreneurial assets. ([link](#))

6. Employ the PA government agency data stewards to improve transparency on what entities are receiving state subsidies.
   ○ Notably across the Keystone Opportunity Zone, Keystone Innovation Zone, Film Production Tax Credit, Tax Credit for New Jobs, and the Pennsylvania First Grant programs. [xiv]

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[ii] Ibid.

[iii] Ibid.


Ibid.

Ibid.